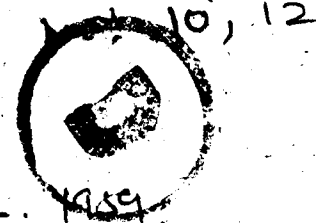


4203

Rail coach

val: III



July 1959 Sept. 1959

JL
DB15m211 P, NST RC.
NS9.3.10
129171

898

RAILCOACH

JL
7511
129171.
204.45 VRC.
1203

VOL. III, No. 10

1203



JULY 1959



The B Shop Team and the Mechanical Department team, winners and runners-up in the Inter-shop Football Tournament.

RAILCOACH

Published by the Integral Coach Factory
ISSUED ON THE 15th OF EVERY MONTH

Devoted to all Railway problems, Technical Matters
and other problems of General Interest

Rates for Advertising

Per insertion

ORDINARY—

Full page	... Rs. 100
Half page	... „ 55
Quarter page	... „ 30

COVER —

Front	(Not available)
Back	... Rs. 250
Inside Front	... „ 200
Inside Back	... „ 200

SPECIAL POSITIONS—

Facing	
(i) Front inner cover	... Rs. 150
(ii) Back inner cover	... „ 125
Facing Editorial—	
(i) Full page	... Rs. 125
(ii) Half page	... „ 70

By the side of Contents —

Half page	... Rs. 70
Facing contents —	
(i) Full page	... Rs. 125
(ii) Half page	... „ 70

Mechanical Data

Blocks	... Screen 100
Full page	... 8" x 5½"
Half page	... 4" x 5½"
Quarter page	... 4" x 2½"
Cover page	... Art paper one colour
Inside page	... Imitation art paper

CIRCULATION

The "Railcoach" circulates among Officers and staff of the Integral Coach Factory, General Managers and other important Officers of all Railways in the country, the Union Minister for Railways and Transport, the Union Deputy Minister for Railways and Transport, the Chairman and Members of the Railway Board etc.

TERMS

1. Blocks or lay-outs are to be supplied by the Advertiser or will be charged for extra.
2. Advertisement materials to reach the Editor before the 1st of every month for the month's issue.
3. Cheques should be drawn in favour of the Editor, "Railcoach", Integral Coach Factory, Perambur, Madras 23.
4. Texts of advertisements are subject to approval by the management.
5. A 5% rebate is allowed for 12 consecutive insertions.

Further particulars from

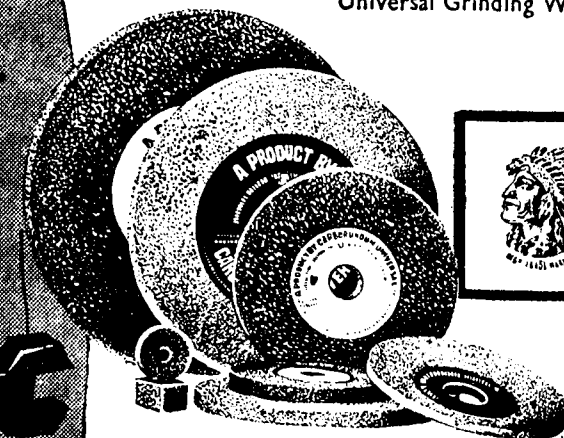
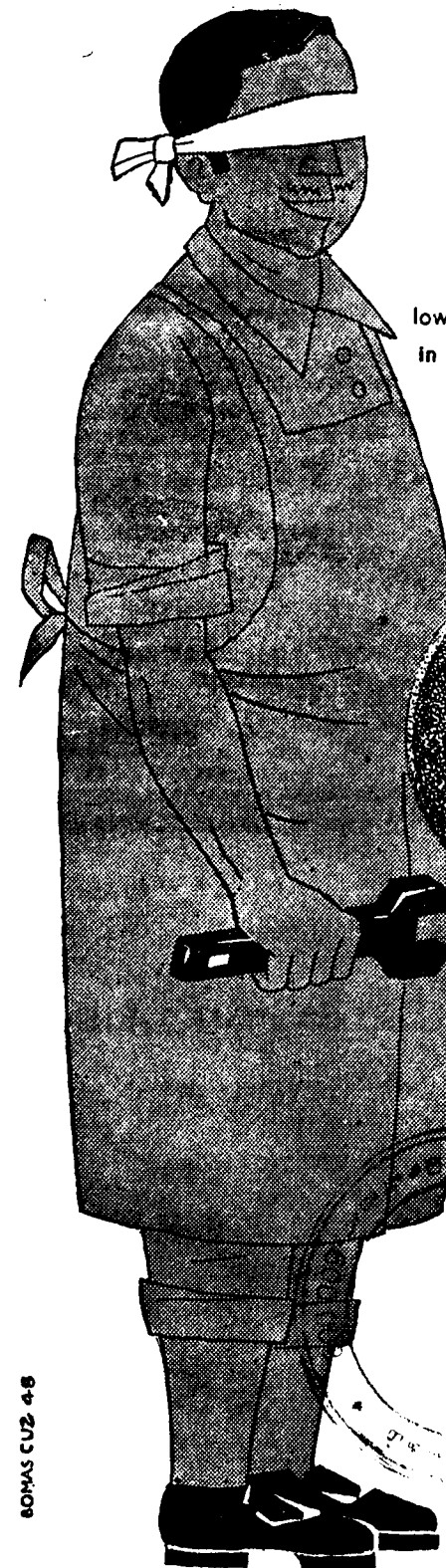
The Editor

RAILCOACH

Integral Coach Factory, Perambur, Madras 23

I NEVER SELECT GRINDING WHEELS BLINDFOLDED

To select Grinding Wheels blindfolded or for their low price is most unwise and uneconomical. Consistency in quality and economical operation are two outstanding features that you should look for when selecting bonded abrasive products, no matter what kind of grinding operation is called for. These and other outstanding features are found in Carborundum Universal Grinding Wheels.



Carborundum Universal Ltd are on Rate Contract with the Government of India for the supply of their Grinding Wheels and Segments.

CARBORUNDUM UNIVERSAL LTD.,

52/53, Jehangir Street, Madras-1.

Telephone: 2941 (4 lines)

Works: Tiruvottiyur

Distributors:

M/S WILLIAM JACKS & CO., LTD.,

Calcutta-1, Bombay-1, Madras-1, New Delhi, Bangalore-1, Kanpur.

80WAS CU2 4-8

CHANDA PAINTS

FOR QUALITY & ECONOMY
FOR BETTER COVERAGE

IN WIDE AND VARIED USE THROUGHOUT OUR COUNTRY
BOTH FOR INTERIOR AND EXTERIOR PURPOSES

RENOWNED FOR DURABILITY AND FINISH

“INERTOL” PAINTS

For Iron, Concrete, & Steel — the best aseptic water proofing
compound — for use on Piers, Quay Walls, Foundations
Granaries, Locks, Lock Gates, Cranes and etc.

INERTOL PAINTS ARE USED ON EVERY COACH THAT LEAVES THE
INTEGRAL COACH FACTORY

MANUFACTURED BY:

Messrs. P. C. Chanda & Co. Ltd.
CALCUTTA

Represented in the South including

Madras, Mysore, Kerala & Andhra Pradesh

By

The South Indian Export Co. Ltd.

20 General Patters Road, Madras 2

Telegrams : Dieselage Madras

Telephone : 84127

RAILCOACH

(INTEGRAL COACH FACTORY MAGAZINE)

EDITORIAL NOTICE

All contributions must be clearly typed and doublespaced on one side of the paper only, and signed, not necessarily for publication, but as a guarantee of good faith.

Manuscripts and photographs, not accepted for publication, will not be returned unless the sender so requires. Intending contributors from outside our Factory, if they intend to get back unaccepted articles and photos, should send a suitably stamped and self-addressed envelope along with the material sent by them.

Contributions should be addressed to the Editor, not by name, and reach him not later than the 25th of every month for consideration for publication in the next month's issue.

The Editor does not assume any responsibility for the accuracy of the news supplied by correspondents or for opinions expressed by contributors. Opinions expressed in the “RAILCOACH” whether editorially or by contributors should be regarded as having no official authority.

Annual Subscription ... Rs. nP.
3 00

CONTENTS

JULY 1959

	PAGE
C. R. B. Retires	4
Editorial	5
What is News & Why	6
Monthly outturn	7
Harnessing human nature to work	8
News from Switzerland	11
Inauguration of I.C.F.'s Non-destructive Testing Laboratory	12
Antarctica-World's greatest cold weather factory	15
March of Science	17
Role of Production Manager	21
Annual Awards for the best kept tool crib and machines	26
A trip to the sacred isle	27
Mother	29
Grants from S. B. F.	31
A week-end picnic	32
Our I.C.F.	33
Testing New Locomotive design in Rolling Laboratory	35
Visitors to the Factory	36
Brain Teasers	38
Wit and Whistle	
Last inner wrapper	

C. R. B. RETIRES

P. C. MUKERJEE
CHAIRMAN

GOVERNMENT OF INDIA
MINISTRY OF RAILWAYS
(RAILWAY BOARD)
NEW DELHI

June 29, 1959

MY DEAR SWARUP,

I am writing this just before relinquishing office. I thank you and your officers and men for all the co-operation I have received.

There have been many changes in the working of the railways in the recent past and the work that has devolved on the railwaymen of all grades is more onerous. In spite of this, railwaymen of all grades have done a magnificent job. Special credit goes to those who have in many cases been called upon to shoulder heavier responsibilities with comparatively very much less experience.

With the heavier tasks required to be performed to develop the country, the railways will be called upon to make yet greater efforts and I am sure they will meet the challenge and prove that they are fully capable of doing all that is required for helping the Nation in its struggle for economic prosperity.

Having been with the Railways for 34 years, it is indeed a wrench for me to part. All living and growing organisations must have changes. It is the test of a good organisation to have the men who have been given the training and opportunities to enable them to come to the forefront, and to undertake higher duties with greater credit than their predecessors.

I wish you and Indian Railways a very fine future.

Yours sincerely,

SHRI K. SWARUP,
Chief Mechanical Engineer,
Integral Coach Factory,
Madras.



editorial

A SUCCESSFUL MONTH

June 1959 was a successful month in many respects. From the production point of view a step forward was taken by the Shell Factory by turning out 38 shells. This shows that the Second Shift which is being gradually built up has already started yielding results. Hereafter it will be a question of consolidating the progress made and at the same time continuing to march ahead as we are committed to increasing the outturn to 60 shells a month by the end of the Second Plan period. A right beginning has been made and there is no doubt about achieving the tasks set for us.

Readers will be aware of the rigid inspection to which the work in the Factory is being subjected to. The inspecting arrangements were further strengthened by commissioning the Non-Destructive Testing Laboratory, details of which are given elsewhere in this issue. The soundness of weld, particularly in the running-gear, will hereafter be thoroughly and critically checked to ensure a high standard of workmanship.

The I.C.F. gained recognition in the Sports Field also. The Hockey XI, which has been gradually establishing itself, became the leading team in the City by annexing the First Division League Championship. Now that the Foot-Ball and Hockey XI have registered their supremacy, we trust that the Cricket Team will not lag behind and will emulate the examples set up by the other two teams. Our hearty congratulations to the Hockey Team on their well-deserved victory.

WHAT IS NEWS AND WHY

Spurt in earnings of railways

A spurt in both goods and passenger earnings of the Indian Railways during the first two months of the current financial year marks a beginning in the recovery in railway revenues from the setback they had received in 1958-59.

This is disclosed in the latest official railway statistics which show an increase in both passenger and goods traffic in April and May, 1959 as compared to the same period in the previous year. The spurt which has been particularly noticeable in the goods traffic is attributed to the greater tempo of Second Plan activity.

Last year, the railways had suffered a fall in both goods and passenger traffic due to a "variety of reasons" including depression in trade. The additional goods traffic during 1958-59 had fallen from the anticipated twelve million tons to five million tons.

According to latest statistics, the goods traffic earnings of the railways went up from Rs. 36.50 crores in May, 1958 to Rs. 42.03 crores in May, 1959, while the passenger traffic earnings recorded a rise from Rs. 22.51 crores to Rs. 23.47 crores in the corresponding period. The total earnings during this period had gone up from Rs. 63.57 crores to Rs. 70.29 crores.

The statistics also showed an increase in the percentage of wagon loadings both in the broad gauge and metre gauge systems during the months of April and May, 1959 as compared to the corresponding period last year.

Railway signalling equipment

The Railway Board has invited global offers to supply certain specialised items of railway electrical signalling equipment and to develop manufacturing capacity of this equipment in the country.

The total value of such equipment needed by the Railways is about Rs. 2 crores. Firms

making these offers will have to provide for collaboration with Indian signalling equipment manufacturers for assembly of imported parts here and eventual establishment of regular manufacturing capacity of this equipment in India.

These firms would also have to make provision in their offers for training of Indian railway personnel, in the manufacture of signalling equipment in their plants. The procurement of signalling equipment covered by the present offer would enable the Indian Railways to expedite the execution of signalling improvement works on modern lines.

The offer covers nearly 170 items including block instruments, signalling relay cables, relay interlocking panels, colour light signals and other ancillary equipment.

Manufacturers of this equipment have been asked to submit their offers in three parts. They have to specify items which are already being manufactured in India, items which can be assembled in India from imported parts and urgently required items which have to be wholly imported.

Uniform for pupils in Railway Schools

With effect from the school session starting from July 1959, all children studying in railway primary schools throughout the country will be required to come to school in uniforms. The Railway Board has directed that the uniforms should be simple and inexpensive.

Free uniform will be supplied by the railway administration to children of all employees drawing pay, including dearness allowance, below Rs. 200 per month. The parents of other children would themselves have to provide the uniforms.

The Railway Board has authorized the various Railway administrations to prescribe uniforms to suit local conditions.

In his speech presenting the Railway Budget for 1959-60, in the Lok Sabha earlier this year, the Railway Minister, Mr. Jagjivan Ram, had

indicated that compulsory wearing of uniforms had been decided upon as this would "help to create a feeling of discipline and equality" among the children studying in railway primary schools.



	Monthly Outturn	
	Target	Actuals
	Indigenous coaches	Indigenous coaches
June 1 1959	30	38
Cumulative total for the first three months of the year 1959-1960 (Financial)	90	108
RAILCOACH		

HARNESSING HUMAN NATURE TO WORK

(A summary of the lecture delivered by Shri A. V. Subramanian, Personnel Officer, I.C.F., at the Technical Training School on the 18th June 1959 to Supervisory Staff)

As the Supervisory staff of the Workshops, you have to know your machines so that you may deal with them efficiently. How much more necessary is it to know your men before you can get the best out of them? But to know the men is much more difficult than it is to know the machines as the men have a mind which is a very complex thing. It is the human mind which has measured the temperature of the sun and the distance of the stars. It is the same mind which, when diseased, creates an illusion in the mind of a common citizen of Madras that he is the Shah of Persia. Industrial psychology has made it its business to study the mind of the worker and therefrom, to formulate ways and means to harness his nature to work. It is the purpose of my lecture to give you a very brief idea of some of the results which have been arrived at by Industrial Psychologists.

You would have noticed during the course of your life that many people who do not work very sincerely at their workspot, throw themselves heart and soul into some hobby in which they are interested. If it is any occupation which interests you, you do not mind the expenditure of money, time and energy that its pursuit involves. But you go ahead and derive a great deal of pleasure from it. Would it not be worthwhile to create the same type of interest in the minds of the workmen under you, in the work which they are called upon to do? That man is the happiest who has his life's interest as his profession. But it may not always turn out to be as happy as all this. A square man sometimes has to fit in in a round hole. But if he co-operates, you, as the Supervisory Official, can interest him sufficiently in his work and make him feel happy



Shri A. V. Subramanian,
our Personnel Officer

while at his job. This is of considerable importance, as psychologists have discovered that the pursuit of an unpleasant job produces fatigue and boredom out of all proportion to the physical labour involved. If you find that the employees working under you are stealing production time by finding various excuses, you will have to take up vigorously the question of how to interest the men in their jobs. The I.C.F. is breaking all its targets and our men are doing really excellent work. It would be easy to create in the men under you a sense of pride in the work they are doing and in the institution to which they belong. During the course of your everyday contacts with the men, you must be able to put it across to them that the work they are doing is of national importance and every worker at his lathe or at the anvil is a soldier in the war against poverty. I am sure you will find very salutary results flowing from such a step.

As Supervisory Officials, you have got to expect a certain outturn of work from your men.

It might become necessary during the course of your duties to drive the men under you and occasionally to take up sharply with one who lags behind. It has been found that the men will respond better to such a drive if they have the feeling that the Supervisor is also looking after them. The men will obey better the Supervisor who listens to their grievances and takes effective steps to ameliorate their condition. Every Chargeman has about 30 men under him and it should not be difficult to keep an eye on every one of them. If there is discontent in the face of one of them, it is clearly the duty of the Chargeman to enquire into it and if it is within his powers, to remove its causes. The Welfare Inspectorate and the Officers of the Personnel Branch and the Works Managers are waiting to help you to help him. It has been demonstrated beyond doubt that the workmen obey only those for whom they have regard and the best way of building up this regard in you in the minds of the men working under you, is to give them the confidence that you are there as a champion of their rights.

There are four golden rules for the Supervisory Officials to follow if they want to keep the employees under them contented and interested in their work. The first rule, the significance of which will be rather obvious, is that you should not be harsh in your judgment. This rule is easier enunciated than followed. But you would agree with me that the extent to which you will be able to follow it, is the measure of your success as a Supervisor. Nobody wants to be insulted or talked to sharply and the tendency to expect very good treatment is on the increase with the growing emphasis on individual rights. A peevish Supervisor automatically creates a spirit of mutiny in the minds of the men working under him and, throughout the life, he has to contend against this negative force. One concept that would help you to keep your temper when dealing

with the men is that you know the work much better than the workmen, and therefore, you should behave towards them in the same way as you behave towards a less well-to-do man in society. If, in the other case it is a difference of worldly wealth, in this case it is equally well a difference of the wealth of knowledge.

One thing that workmen resent most bitterly is discrimination and favouritism. Even the Supervisor, who is uniformly harsh, is not so much resented as the one who discriminates between man and man. The Supervisor, who is known to be fair-minded by one who does not have an active brain, is automatically respected not only in the Workshops but in the larger spheres of life. The Supervisor, who listens to tale-bearers and toadies, destroys the morale of the whole Workshop. Hence the second rule is 'Be fair to everyone and avoid the twin sins of discrimination and favouritism.'

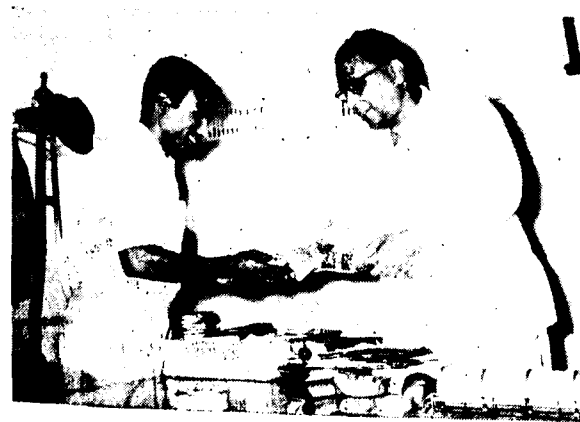
The labour force in these days is not to be compared with that of the olden days, as the modern day workmen are literates, some of them very highly qualified. It would be easier for a Supervisor to get the best out of the men under him if he briefly explains the technological basis of the orders he issues. The Supervisor, who issues peremptory orders in a spirit of "Yours not to reason why, yours but to do and die," is not likely to get enthusiastic response from the intelligent section of the men working under him. This does not mean, of course, that you are expected to deliver a long oration on every little order that you are to give. It should be possible for you to indicate the reason for your orders during the conversations you have with the men in the course of your everyday work. This enables them to understand fully what is expected of them and they get interested in their work and they learn to be better workmen. Even if a person is expected to speak a few words in a play, he is given an idea of the whole story. The knowledge of

the background enables the actor in the play and the workman in the shop to do his own little job in a better way.

The home owes its success and durability as an institution from prehistoric times to the fact that all of its members are bound by ties

of affection, mutual esteem and a spirit of sacrifice. The day these qualities are developed by all of us manning the Workshop, from the Supervisor to the junior-most Khalasi, will be the day the Factory becomes a home and an atmosphere of benevolent homeliness is diffused in the Factory.

Shri D. Loganathan, Skilled Machanic of the I.C.F. Plant park receiving The Railway Week Award from the Chief Mechanical Engineer, Shri K. Swarup.



NEWS FROM SWITZERLAND

(Published through the kind courtesy of the Consulate-General of Switzerland)

A new industry in Switzerland

There exist several glass-works in Switzerland which supply the domestic market with articles required for current use, but, until this year, Switzerland did not possess any crystal-making factory. Certain difficulties experienced in regard to imports have led to the setting up, at Sarnen, of a factory which can produce articles of blown or cut crystal. The quality of the manufactured products and the state of the market will, no doubt, make it possible for this firm, which employs some sixty workers, to develop in a favourable manner and even engage in the export trade.

Swiss chocolate for export

The increase in exports of Swiss chocolate is the result of the relaxation of import restrictions and the growing popularity of Swiss brands in the main buying countries. This branch of Swiss industry continues to bring out a large number of delicious novelties each year.

Switzerland's contribution to amateur cinematography

A quarter of a century has already elapsed since the famous Paillard-Bolex E.16 camera for substandard films of 16 mm. was first put on the market. Although its shape may have

remained the same, its mechanism has been constantly perfected. The latest model adds to all its previous improvements, that of a variable shutter, which opens and closes automatically, thus making it possible to modify the length of time required for posing, and achieve blendings similar to those obtained with professional cameras. The same Swiss manufacturer now produces, also, cinematographical cameras of 8 mm. equipped with three lenses fitted into a turret and with an exposure measure incorporated behind the objective. This model, which enables one to take pictures at 7 different speeds, also possesses an automatic changeable obturator. The range of Bolex cameras is completed by a third novelty, namely, an 8 mm. pocket camera which, in spite of its simplified construction, offers numerous advantages.

80th birthday of a great Swiss Engineer

The Swiss Engineer, Mr. Othmar Ammann, has just celebrated his 80th birthday, in the United States. He is the builder of some of the most famous suspension bridges in America, namely, the George Washington Bridge in New York, and the Golden Gate Bridge in San Francisco. He has been, for very many years, the chief engineer of the port of New York.

INAUGURATION OF I.C.F.'S NON-DESTRUCTIVE TESTING LABORATORY

BY

K. N. R. RAO

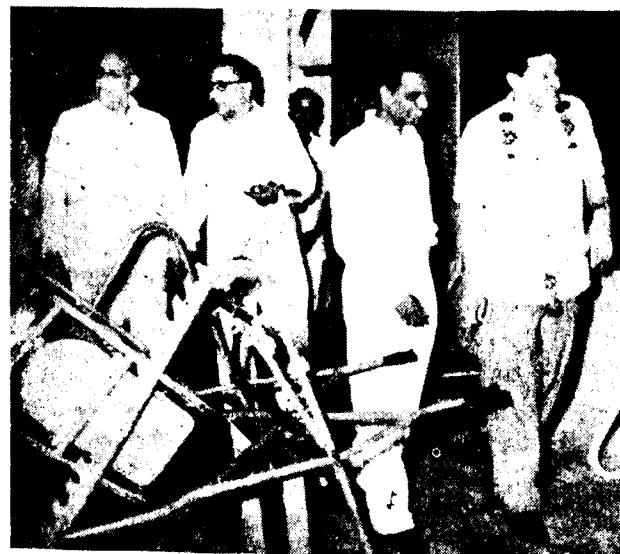
At a pleasant function held in the 'B' Shed, Mr. W. J. Braem, Joint Director, Swiss Car and Elevator Manufacturing Corporation, Ltd., Schlieren, Zurich, Switzerland and our ex-Chief Technical Manager, who was in Madras on a short visit, declared open the Non-destructive Testing Laboratory in the I.C.F. on the 22nd June 1959. The small building in 'B' Shed where the laboratory is housed was gaily decorated. Mr. Braem was received on arrival by our beloved Chief Mechanical Engineer, Shri K. Swarup, and Shri G. Mukherjee, Chemist and Metallurgist. Mr. Braem formally cut the ribbon at the entrance of the laboratory to declare it open. Mr. Braem was then

conducted round the Laboratory by Shri G. Mukherjee who gave him a short sketch of the work obtaining in the Laboratory and its usefulness.

What is a Non-destructive laboratory

A non-destructive laboratory houses industrial X-ray, Gamma-ray, Ultrasonic or Supersonic Flaw Detectors, Magnaflux, and Fluoroscopy equipment to carry out inspection of components and finished goods to find out any flaws in their manufacture.

(i) *The place of Radiography in Modern industry*: The past decade has seen an enormous expansion in the industrial use of X-ray



Mr. W. J. Braem being received by Dr. G. Mukherjee, our Chemist and Metallurgist, while he arrived for formally inaugurating the Testing Laboratory. Shri K. Swarup, our Chief Mechanical Engineer, and Shri Srinivasan, the Chief Auditor, can also be seen in the picture.

methods of inspection, especially as a consequence of the demands for greatly increased production of components for aircraft and the vital need for complete reliability of such components. Indeed, without the assistance of radiography, it would have been impossible to produce aircraft of the quality essential for the success and safety of air operations.

Although the aircraft industry provides the most conspicuous example of the increased use of radiography in industry, it is far from being the only one in which radiography is used. The factors which made radiography essential to the light metal industry apply equally well to many other industries and the technique is now being applied in an increasing extent not only in the production of light alloy castings, but also in the inspection of ferrous castings and of welds in pressure vessels, shipbuilding and in the manufacture of Railway Rolling Stock. The scope of the non-destructive inspection method has been further extended in recent years by the availability of radio material arising from atomic energy research.

(ii) *A Non-destructive Inspection technique*: The primary value of Industrial Radiography is as a rapid, non-destructive technique, which can be applied, without restricting the speed of production, to a wide variety of components and manufactured products. Used as a supplement to visual or other direct methods of inspection, it forms the most dependable means for the detection of hidden, internal faults, and, in many types of examination, provides the only dependable method available. The internal inspection of castings and welds, for example, forms a wide field in which radiographic inspection has fully established itself.

It is called non-destructive inspection because it does not involve the practice of sectioning trial castings for inspection purposes. The vivisectionary method of inspection is subject

to the limitation of economic sampling and may not be representative. Radiographic inspection has important advantages, notably because it is non-destructive and can be applied to all individual specimens. Sectioning trial castings is none too dependable because, even if a trial casting or a suspected casting is sectioned, it is possible for us to lose trace of a serious flaw on the line of section. So that, a mistaken conclusion is drawn. If a radiographic inspection is carried out, the presence of any serious flaw is almost certain to be indicated and sectioning can then be carried out, if desired, with foreknowledge of the precise location of the fault. Moreover, radiographic inspection leaves the specimen entirely unaffected, whereas a sectioned casting is no longer a sound casting.

The I.C.F. laboratory

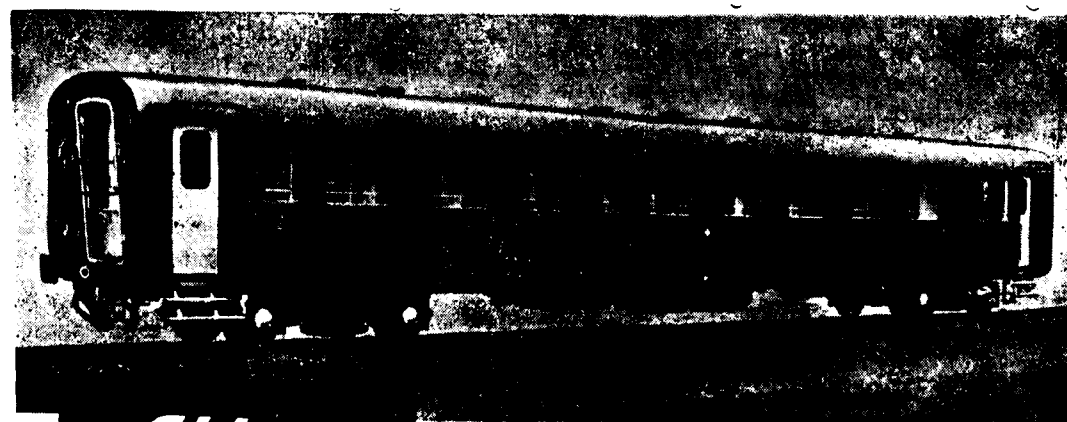
The Non-destructive Testing Laboratory in the I.C.F. is designed to have two Magnetic Crack Detectors and an Industrial X-ray Unit.

The X-ray Unit which is being installed is of 260 kV capacity. The utility of the radiographic study of welded connections is to see any flaw inside the weldment, which is not detected by the Magnetic Crack Detector or by any other available equipment. With the help of X-ray, defects like lack of penetration, lack of fusion, cracks, porosities, slag inclusions etc., can easily be detected. To have greater safety and better quality, the highly-stressed welded connections should be tested radiographically. By the installation of this unit, it will be possible for us to check the forged items, castings and other heavy stress-bearing members to give longer life to our coaches. This Laboratory is also equipped with a modern well-planned dark room to develop and process the exposed films.

There are two Magnetic Crack Detectors which can detect the surface flaws in welded joints. The Magnetic Crack Detector is very

useful to detect surface flaws like hairline cracks, surface blow-holes, slag inclusions, etc., which are detrimental to the material, since from these minute defects fatigue type failures may occur when the fluctuation in load is experienced by the joints. The Magnetic

Crack Detectors available in this laboratory are of portable type and the probabilities are such that the welded junctions in corners and crevices can be approached, where it is difficult to apply radiographs. The Magnetic Crack Detectors are already in commission.



Schlieren

**Mainline Coach type B4ü for
International Traffic built by
SCHLIEREN**

9 compartments totalling 54
seats.
Air-heating combined with press
air-ventilation for summer ser-
vice. These coaches are equip-
ped with the latest bogie type
SCHLIEREN w. helical springs.

Length over buffers 23,7 m;
Tare weight: 33 tons.

Swiss Car and Elevator Manufacturing Corp., Ltd., Schlieren-Zurich (Switzerland)

ANTARCTICA—WORLD'S GREATEST COLD WEATHER FACTORY

Antarctica, the coldest and most inaccessible region in the world, was systematically studied for the first time during the International Geophysical Year, which ended on December 31, 1958.

Here, at the frozen bottom of the world, scientists of 12 nations manned 48 observation stations in the first co-ordinated programme of Antarctic research and discovered many new and, in some cases, very surprising facts.

For the first time, during the I.G.Y., Antarctica was explored extensively and a station was established at the South Pole.

The nations that co-operated in the I.G.Y. Antarctic programme were Argentina, Australia, Belgium, Chile, France, Japan, New Zealand, Norway, Union of South Africa, U.S.S.R., the United Kingdom and the United States.

While the I.G.Y. ended officially at the end of 1958, there is still so great a need for further research in Antarctica that the work will be continued. For this purpose a special committee has been established. It is known as S.C.A.R., or the Special Committee on Antarctic Research. The one unknown white land will probably never again be unpopulated.

I.G.Y. scientists found that the vast 6,000,000-square-mile continent of Antarctica is probably not just a single land mass, as had formerly been believed. Instead, it now appears to be either two large land masses or else a group of islands overlaid with a blanket of ice much thicker than was formerly assumed.

Final proof that Antarctica is either a continent or a group of islands may be found in the months immediately ahead as the result of studies now being made, according to Dr. Hugh Odishaw, Executive Director of the U.S. National Committee for the I.G.Y.

Another surprising I.G.Y. finding was that the amount of ice in Antarctica is far greater than was previously estimated. Scientists discovered so much ice there, in some areas as much as 14,000 feet thick, that it was necessary to revise upward by some 40 per cent the amount of ice and snow in the world.

It is now estimated that more than 90 per cent of all the world's ice is in Antarctica. If it should ever melt, it would raise ocean levels 200 feet.

Temperature recordings made at Little America, a United States research station, showed that the cold areas of the world are warming up rather rapidly. At Little America the annual mean temperature has increased about 5 degrees during the past 50 years. At Spitzbergen in the Arctic, on the other hand, the warming has been twice as great.

One of the principal aims of I.G.Y. research in the Antarctica was to gather new facts about the weather there and its effect on world-wide weather conditions. Because Antarctica has the coldest atmosphere and the most intense and most persistent low pressure areas on earth, it probably has a very great influence on weather in the rest of the world.

By the establishment of permanent observation stations at the bottom of the world during the I.G.Y., weathermen now have for the first time a relatively complete picture of the weather in the Southern Hemisphere and therefore, scientists say, of weather throughout the world.

For the first time, daily weather forecasts are now available for Antarctica. And—partly as a result of these forecasts—weather forecasting throughout the Southern Hemisphere has already been very much improved.

I.G.Y. weather observers discovered a great, semi-permanent cold air mass the central part of Antarctica. The influence on weather in the Southern Hemisphere is now being carefully studied.

This great reservoir of cold air "erupted" from time to time into areas to the north, it was found. Likewise, warm air sometimes invaded the atmosphere over the Antarctic, causing "battles" between the two contrasting air masses. These battles of ten continue for many days, causing intense storms over large portions of Antarctica.

During these storms the upper air winds reach speeds of 200 miles an hour. This information, scientists have pointed out, will be of extreme importance in planning future air travel to and from the bottom of the world.

Another interesting discovery was the so-called Antarctic polar night jet, a current of cold air that blows westward around the coastline of Antarctica at speeds as great as 150 miles an hour.

It was also found that temperatures in Antarctica fall very rapidly as the season changes

throughout the year. From the Antarctic summer high temperatures in January, they drop to 50 or 60 degrees colder by April. They then tend to level off, due apparently to warmer air being blown inland from the surrounding oceans.

This and other information gathered during the I.G.Y. about weather and other conditions in Antarctica is so great that it will take many years to analyze and interpret all of it. Ten tons of data covering the first season's operations of the United States observation stations alone were sent to the United States in March, 1958. A similar or even greater quantity of records was gathered during the second season.

"That Antarctica is the world's greatest cold weather factory is now evident," says Dr. Laurence M. Gould, Director of the U.S. I.G.Y. Antarctic programme. "But how extensively its products affect the weather over the rest of the world will be revealed only by more extended observations and analyses."

—USIS



Mr. W. J. Braem of the Swiss car and Elevator Manufacturing Corporation addressed the I. C. F. Technical Society Meeting held on the 24th June 1959

MARCH OF SCIENCE

Non-stop sun gazing yields valuable data

Scientists made "the most detailed record of the sun in history," by watching and photographing it continuously, minute by minute, during the entire 18-month duration of the International Geophysical Year.

This was reported recently by Dr. Hugh Odishaw, Director of the U.S. National Committee for the I.G.Y., in a summary report of the discoveries made during the world's great year of world-wide scientific research.

The unprecedented watch kept on the sun during the I.G.Y. yielded ample returns in new knowledge to scientists in all parts of the world. In particular, it enabled scientists to make an intensive study of solar flares or eruptions, and their effects on the earth's atmosphere and weather.

This was expected, since the period of the I.G.Y.—July 1, 1957 to December 31, 1958—coincided with the period of maximum sunspot activity during the sun's 11-year activity cycle. As a result, scientists were able to study the greatest number of solar flares that have ever been studied in an 18-month period.

One of the most spectacular eruptions occurred in February 1958, when a huge solar flare spewed forth an enormous cloud of solar gas. This cloud streamed past the earth and enveloped it for 24 hours, and during this time the world-wide network of I.G.Y. observing stations recorded many unusual phenomena.

Sheets of light spread around the dark, or night side of the globe. Powerful electric currents flowed under the oceans. Radiation in the space surrounding the earth tripled in intensity.

The recording of these and other effects of the sun's activity is regarded by scientists as

one of the major achievements of the International Geophysical Year. It would have been impossible, were it not for the worldwide spacing of the I.G.Y. observation stations and the fact that the United States Explorer I Satellite, equipped with a Geiger counter for measuring radiation, was then in orbit around the earth.

As a result of the presence of the enormous gas cloud, the strength of the earth's magnetic field was greatly increased. This caused great currents of electricity to flow through the crust of the earth in North America and Europe, and even through the ocean between the continents. Some of the current passed from Newfoundland to Scotland over the Atlantic undersea cable.

The solar gas cloud also caused brilliant displays of the red and green aurora borealis (Northern Lights), which lighted up the night sky from the Arctic to as far south as Cuba and decreased cosmic ray intensity very markedly on the earth's surface. This decrease was probably due, scientists believe, to intensification of the earth's magnetic field, which diverted the cosmic rays.

All these effects were caused, it is believed, by the impact on the earth's atmosphere of high-energy electrons from the sun.

Scientists at the University of Minnesota have already made an intensive study of the various phenomena. They estimate that the cloud of gas that caused them was about 46,000,000 miles long. Its width is believed to have been about 4,000 miles and its speed 875 miles a second, or 3,150,000 miles an hour.

Scientists had already known that at the time of solar flares, ionization or electrical charging of the upper atmosphere greatly increases and

that radio waves are then absorbed in the atmosphere, instead of being reflected back to earth. This causes radio blackouts. It was not known, however, what type of solar rays produced radio blackouts.

An important accomplishment of the United States I.G.Y. Research Rocket Programme was the discovery that this increased ionization is caused by the sun's emission of bursts of powerful X-rays that penetrate to within 30 miles of the earth's surface. These rays apparently create a blanket of absorbing ionization that prevents radio signals from reaching their usual reflection layers higher up.

Perhaps one of the most important immediate scientific results to come from the I.G.Y. studies of the sun and the upper atmosphere is strong evidence that the density of solar gas in the interplanetary regions is greater than had previously been assumed. It now seems probable that there is a very thin "atmosphere" created by this gas, which may extend throughout the entire solar system.

* * * *

Atomic Heat to distill sea water—U.S. Plans

The United States is planning to use atomic heat in a new plant designed to convert sea water to fresh water at a rate of one million gallons a day.

In reporting that he had selected a multi-stage flash distillation process for the second saline water demonstration plant, Interior Secretary Fred A. Seaton said :

"Our studies on the feasibility of the use of atomic energy as the heat source for large-scale sea water distillations are definitely promising

"We have asked the Atomic Energy Commission (A.E.C.) to provide a low-temperature atomic reactor as the heat source for this plant."

Before reactor heat can be brought into the distillation process, Seaton acknowledged,

"several technical considerations must be resolved." He expressed the hope that the first of a series of sites for conversion plants will be selected by the end of the month.

The United States has authorized \$ 10 million for the construction of at least five demonstration plants for producing, from sea or brackish water, water suitable for agricultural, industrial, municipal and other consumption uses.

Secretary Seaton said the new project will "open new horizons for the peaceful application of atomic energy."

In the flash distillation process, sea water is heated progressively and piped through multi-stage pressure chambers. The resulting vapour is condensed by the plant.

Secretary Seaton said most major conversion plants now in commercial operation use flash distillation. He said improved design and performance specifications are expected to reduce capital cost by 45 per cent.

The first process for the demonstration plant programme was selected March 2. It is known as long-tube vertical multiple effect distillation. An important feature of this process is its ability to eliminate scale formation on equipment operating at very high temperatures. Scale formation long has been a major unsolved technological problem of all distillation processes.

The first two demonstration plants and another to follow are for converting sea water. In addition, two plants will be built for treating brackish water.

* * * *

New Lubricant for High Speed Jets

A new high-temperature synthetic lubricating oil for jet engines has been developed by the Celanese Corporation of America and the U.S. Air Research and Development Command. It is believed that it will remove one of the major obstacles to the development of super-high-speed jet aircraft.

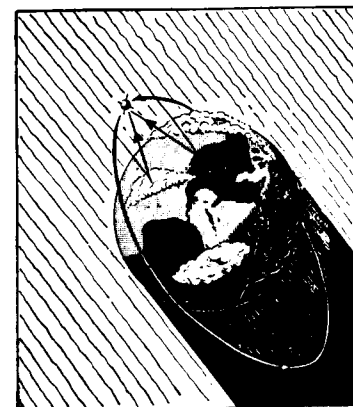
The lubricating oils now used in jet planes are good only up to about 300 degrees Fahrenheit (149 degrees Centigrade), and as a result, are not suitable for aircraft with more powerful engines and higher speeds than those of today.

The new lubricant will withstand temperatures of 400 degrees Fahrenheit (204 degrees Centigrade) for sustained periods.

—USIS

DO YOU KNOW

By SCIO



Experts say the vanguard earth satellite recently launched by the U.S. has ushered in a new era in meteorology, and that it may bring about global forecasting of the earth's weather. The sun's reflections on clouds and the earth's surface are recorded and transmitted to earth by the device. In a 24-hour period, the satellite can report cloud data over 25 per cent of the earth's sunlit surface in a series of 300-mile-wide "pictures."



The bamboo plant, a grass, is used for making raincoats, beer, fishing poles, candle wicks, candy, spoons, umbrellas, water pipes, bird cages, bows and arrows, ropes, flutes, kites, houses, rakes, phonograph needles, fans and scores of other devices, foods and implements.

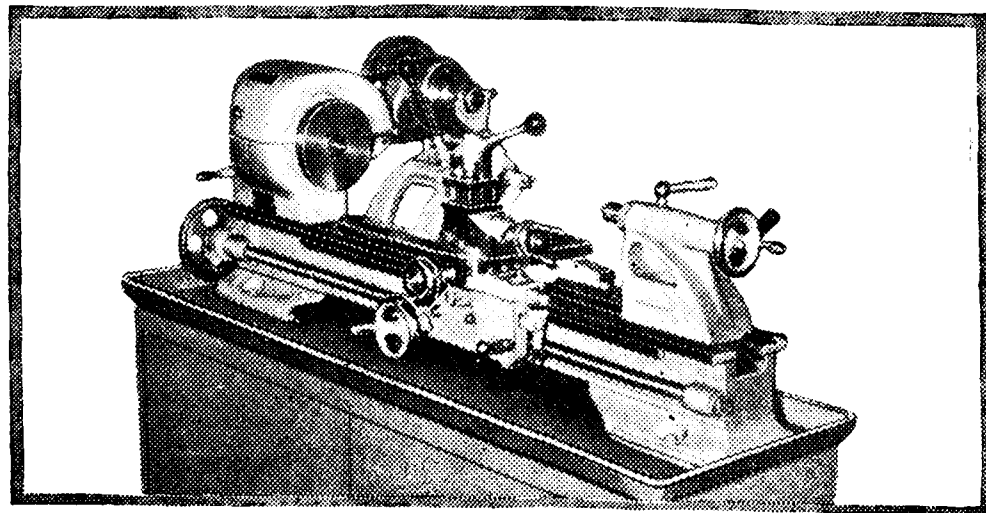


Some large sea anemones which lumber across the ocean bottom are so poorly coordinated that they may leave fragments of their bodies behind. Experts say these fragments then grow into completely new animals.

—USIS

Amar 6⁰⁰

PRECISION BENCH LATHE



Centre Lathe: "Amar" Indian make, Precision Sliding, Surfacing and Screw Cutting Centre Lathe

Available in 3½' (35 series) and 4½' (45 series) Bed Lengths:	Technical Data:
Model: 45AE with straight bed	Height of centre 6"
Model: 45AEB with straight bed and change gear box	Distance between centres 18" (35 Series)
Model: 45AEG with gap bed	Distance between centres 30" (45 Series)
Model: 45AEGB with gap bed and change gear box	Swing over bed 12"
	No. of spindle speeds 16

Sole Selling Agents:

THE EAST ASIATIC CO. (INDIA) PRIVATE LTD.

Bombay - Calcutta - Bangalore - Delhi - Madras - Secunderabad

Manufactured by: Amar Electrical & Mechanical Engineering Works, Ludhiana

ROLE OF PRODUCTION MANAGER

BY

B. S. GANESH, B.E., GRAD. I. PROD. E.

Production Managers are highly essential nowadays for any factory to be run efficiently and this profession is gaining increasing importance.

In the past there were very few factories and most of these factories were managed by single individuals who were the salesmen, planners and executives all combined in one, and profit was the only motto, and there was no competition in trade also. Nowadays, there is keen competition among the industries and service to the public and earning their goodwill are the main conditions for the prosperity in the industries. Industries are at present fairly big also and they are difficult to be managed by one person. So, some specialists are to be employed to guide the administration in the most economical and efficient lines for Production and Management. The Production Manager is a specialist in the line of guiding the administration in the most economical and efficient way of Production.

The function of the Production Office in an Organisation is similar to that of the nervous system of the body and this office has to guide the shops and advise the administration to achieve the desired result of economical and efficient production.

Just as a Welfare Officer looks after the welfare of the employees, the Production Manager looks after the welfare of the administration by making an economical and efficient use of Men, Materials and Machines.

The different important functions of the Production Manager in achieving the desired effect of economical and efficient production are :

(1) Process Planning.

- (2) Plant Layout and handling of material.
- (3) Production Equipment design.
- (4) Estimating.
- (5) Time and Motion Study and Rate Fixing.
- (6) Machine Loading and Scheduling.
- (7) Production Control.
- (8) Material Control.
- (9) Tool Control.
- (10) Quality control.
- (11) Development and Design.
- (12) Suggestion Scheme.

A brief explanation of the functions of the different sections specified above are given below :

(1) Process Planning

The work consists of finding the different ways of manufacturing the components, assemblies and installations, adopting a proper sequence of operations so as to avoid unnecessary transportation of men and materials. Importance of this section will be appreciated when there are different ways of executing the same job.

(2) Plant layout and design

This is one of the very important functions which taxes the talents of the Production Manager. The layout of the factory depends on—

- (1) The Production of the factory.
- (2) The Raw Materials used.
- (3) Availability of Man-Power.
- (4) Nature of transport available.
- (5) Bi-products that are manufactured, etc.

Plant layout involves a lot of expenditure and the efficient and economical working of the factory depends on the plant layout.

The design of the plant depends on the target set for manufacture and the expected expansion of the plant. Plant layout and design depend on the sequence of operations. Erection of hoists, cranes, traversers and conveyors must be decided, taking into account the materials that are to be handled.

(3) Production Equipment Design

This function consists of deciding the types of jigs, fixtures and tools necessary for manufacturing components and assemblies and justification for installing them.

(4) Estimating

For any work to be undertaken, an estimate has to be prepared. Before preparing estimates, availability of suitable jigs, tools and machines and their capacity to meet the new work to be undertaken have to be considered. The cost of manufacture is the sum of the cost of raw material, labour and overhead expenses. In overhead expenses there are three kinds, factory overhead, administrative overhead and stores overhead. The factory overhead consists of the expenses incurred in the factory on men, materials and machines which cannot be attributed to direct labour and raw materials. This is a percentage of the direct labour. The administrative overhead consists of the cost of men, materials and machines which are used for the purposes of efficient administration and this will be a proportion of the direct labour. Similarly stores overhead is a percentage of the expenses incurred on the raw materials. Thus, by adding together the cost of raw materials, the cost of direct labour, cost of factory overhead, administrative overhead and stores overhead we get the estimated cost. In the case of mass production, where production is in batches, the total cost for the whole batch must be found out, and this total cost must be

divided by the products in the batch to get the unit cost. This procedure is adopted as the set-up time is independent of the number of components.

(5) Time and Motion Study and Rate Fixing

This is an important section under the Production Manager. This makes a scientific analysis of the methods, operations and equipment used in doing a piece of work, the development of the best method of doing the work, and the determination of the time required to perform it.

The rate fixing determines the appropriate wage rates and incentives, after allowances have been made for unavoidable losses such as fatigue, delays in commencing the work, equipment break-downs, changing tools, power failures, etc.

The time and motion study and rate fixing section must be constantly working to explore the possibilities of reducing the cost of labour. The function of this section will be very important if the factory adopts the incentive bonus system.

(6) Machine Loading and Scheduling

This section deals with the balanced co-ordinated use of installed machinery capacity. This section gives justification for increasing the number of machines, to work overtime or to adopt shift system. This section advises also the possibility to undertake work and finish before a certain target date.

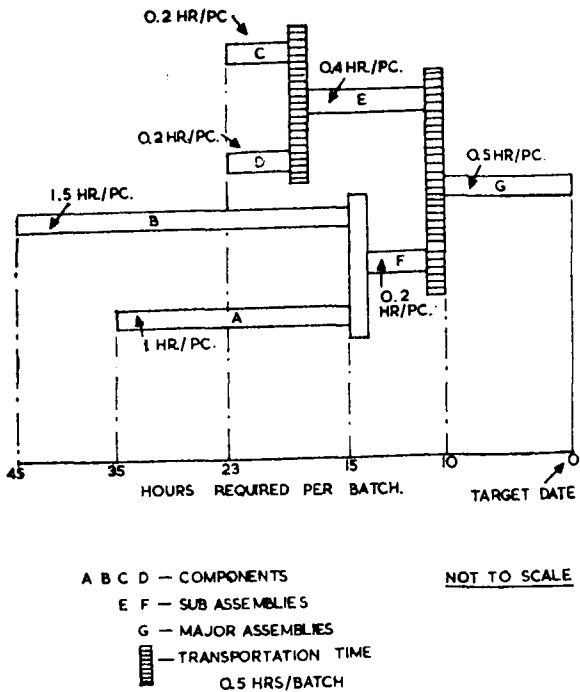
The use of the machines is expressed in terms of machine hours and the hours the machine is used is called the loading of the machines.

Scheduling is a process of deciding scientifically when the job is to be started. This is a very important section and requires special care in calculating the starting time. If the calculations are wrong, it affects the delivery date of the product. The scheduling becomes very complicated in the cases where there are a

large number of components, some are purchased in the finished condition, some in the semi-finished condition and some to be manufactured, as in the case of locomotives, railway coaches, etc.

In the case of factories dealing with particular types of production, with a definite number of products for each batch, Master Production Schedules are prepared based on the hours required for the completion of the batch of components, sub-assemblies, major assemblies and installations. This schedule is carefully checked so as to avoid any mistakes upsetting the production schedule.

A brief example of the Master Schedule is explained below, for a Major Assembly with 2 sub-assemblies, and 4 components, the batch containing 20 major assemblies, 40 sub-assemblies, and 80 components.



Transportation time from the place where the component or sub-assembly is completed to

the next assembly point is assumed to be 0.5 hours per batch.

The total time required per batch is calculated as under—

		HOURS
Component C ...	0.2×20	= 4.0
Component D ...	0.2×20	= 4.0
Component B ...	1.5×20	= 30.0
Component A ...	1.0×20	= 20.0
Sub-Assy. E ...	0.4×20	= 8.0
Sub-Assy. F ...	0.2×20	= 4.0
Major Assy. G ...	0.5×20	= 10.0
Transport Time...	0.5×3	= 1.5

It is seen from the above example 81.5 Machine hours are required for the complete batch of major assemblies. So, if any particular date is fixed as the target date for the completion of the batch of the major assemblies, the different dates on which the different components and sub-assemblies must be started and completed can be fixed.

Now representing graphically the timings required for each operation, it is possible to find out how many hours are required for the completion of the job. For purposes of Scheduling and Machine loading, we can assume an average of $7\frac{1}{2}$ hours per day, giving allowance for holidays, Saturdays and fatigue of the workers.

It is seen from the diagram that the component B must be started 45 hours earlier than the target date, component A must be started 35 hours earlier than the target date and so on. So by considering $7\frac{1}{2}$ working hours per day, if the target date for the completion of an installation is the 31st, the component B must be started on the 25th and the component A must be commenced on the 27th. Thus we can arrive at the starting and completion dates for every operation of the components. In bigger factories where the batch content is very large,

the processing time, if expressed in hours will be very big and so it will be expressed in terms of units by dividing the hours by an arbitrary number, say 20 or 30 calling it as 20 hours = 1 unit or 30 hours = 1 unit.

(7) Production Control

This section is considered to be essentially a service department to the shops and it watches the progress of each work order from the time it is issued to the time of completion. It pinpoints the delays and assists the shops to stick to the schedule.

Production Control is divided into despatch section and follow-up section. The despatch section releases the work orders in accordance with the predetermined schedule set up by the Scheduling section.

(8) Material Control

This is one of the vital sections under the Production Manager. The function of this section is to co-ordinate with the stores department in selecting the best materials and keep tally cards of the materials upto date, authorise the raw materials required for production work, and to maintain the charts indicating the quantity of raw materials available. This section deals with the authorising of alternate materials in case the prescribed material is out of stock or not available in the market.

(9) Tool Control Section

This section deals with the proper procurement, distribution, and use of the different small tools and the consumable stores. This section prepares the schedule of tools and consumable stores required for the whole factory and arranges procurement and distribution with the help of stores department. This section keeps a record of the breakages and wear and tear of the tools and studies the performance of different makes. The breakages and wear and tear are graphically represented to give a comparative performance of the tools used in the

factory over different months of the year, so as to facilitate remedial steps being taken to reduce tool breakage.

(10) Suggestion schemes

All modern industries nowadays adopt the suggestion scheme which invite suggestions from the employees. These suggestions are to be carefully scrutinised and implemented in cases where they are economical.

(11) Quality Control

This is one of the essential sections under the Production Manager. This pertains to inspection of components, assemblies and products, so as to see that the products of the desired quality are sold in the market. It is well known that the reputation of any firm depends mainly on the quality of the product. So controlling the quality of product so as to maintain it at a given level is a major problem with all manufacturers. From the early days of industrial production, manufacturers have tried to use the same men, machines and similar raw materials in the hope of manufacturing products of uniform quality. In spite of this, causes of irregularity creep in inadvertently. As a result, rejections in finished materials are common and inspection and screening become necessary. By a simple analytical study of the product and graphical representation of the quality of the product at different stages of production it is possible to have the quality at the desired level with the minimum rejections.

(12) Development Section

This is one of the very important sections under the Production Manager. This section must be equipped with fully qualified and experienced engineers. They must study the technical journals and closely watch the new developments and try to incorporate new techniques to the firm and make the firm upto date in the field of manufacture and sales.

Thus, the Production Manager's Office represents the whole factory in a miniature form

with graphs and tabulated data ready at hand and all alterations and additions are to be incorporated only through the Production Manager's Office with the approval of the Production Manager. Thus, the Production

Manager's Office always helps the administration in increasing the productivity of the factory, by efficient use of men, materials, machinery and indirectly raises its status and goodwill.

DO YOU KNOW

By SCIO



Following the eruption of the volcanic island Krakatoa, near Java, in 1883, a tidal wave at times 80 feet high completely circled the world. The explosion, called the loudest noise in history, was heard in Australia 2,000 miles away and dust particles that filled the air took two years to settle.



Recent studies by U.S. scientists suggest that some forms of life known on earth could be living on Mars. Experimenters placed bacteria and fungi in nitrogen-filled jars which corresponded to the Martian atmosphere, then exposed them to sudden temperature changes—from 77 degrees to minus 13 degrees (Fah.). Organisms requiring oxygen died, but those needing little or no oxygen survived and even grew.



The Gnu, a South African animal, has the body and legs of an antelope, the head of an ox, the tail of a horse, looks like a buffalo, is often called the wildebeast, but actually is an antelope.

—USIS

ANNUAL AWARDS FOR THE BEST KEPT TOOL CRIB AND MACHINES

The following two schemes are being introduced in the I.C.F. as an incentive to staff to maintain the Tool Cribs and their respective machines in a good condition.

I. Award for tool cribs

A committee consisting of AWM-1 (Convenor), AWM-11 and AME/P will jointly inspect all the Tool Cribs once a quarter and award points for efficient maintenance, taking into consideration the various factors which contribute to efficiency.

II. Awards for the best kept machines

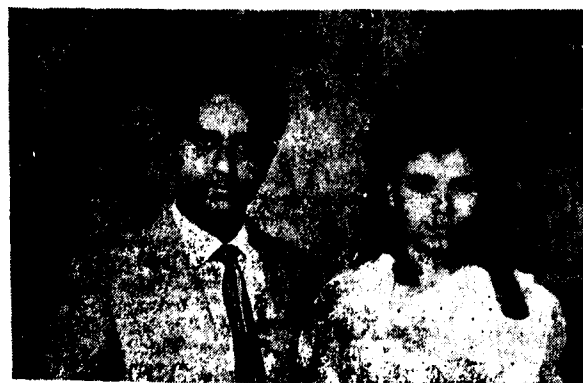
A committee consisting of WM-1 (Convenor)

WM-11 and AME/P will inspect the machines in Shops A, D, E (including Shop 12), F and J, once a quarter and award marks for efficient maintenance of machinery.

Based on the recommendations of the above committees, prizes will be awarded during Railway Week Celebrations, each year commencing from 1960.

All staff are therefore requested to give maximum attention to their tool crib and machines, and endeavour their best to get the award.

WEDDING BELLS



Our hearty felicitations to Mr. S. A. MacDonald, Clerk, C. M. E. (G)'s Office and Miss Cecilia who came together in holy wedlock on the 20th May 1959

A TRIP TO THE SACRED ISLE

BY

(M. N. KRISHNAMURTHY, *Ward Keeper, I.C.F.*)

The second batch of the Ceylon excursion party from I.C.F. numbering 80 left for Ceylon on 20-5-59 under the stewardship of Mr. T. A. Taylor, Foreman, Furnishing. Mr. L. Balakrishna/P.W.I. was in charge of Law and Order, Mr. S. S. Krishnan/I.O.W. was in charge of cash and Mr. P. N. Srinivasan was the General Secretary.

The party reached Colombo on the 22nd May which was a sacred day for Buddhists, being Vaishak Poornima, the birth-day of Lord Buddha.

The party first went to Colombo, the capital city. This is one of the greatest ports in the East and ranks among the loveliest garden cities of Asia. As the capital city for the last

2,000 years, it has been an important trade centre and is a Gateway to the East. The population is roughly 5 lakhs, consisting of a variety of races like Sinhalese, Tamilian, Parsee, Chinese, Afghan, etc. Colombo is naturally a place of Churches, Mosques and Temples.

The fort, an area of a quarter of a square mile, is in the heart of the city. Adjacent to the Fort is petta, a typical oriental bazaar with a large number of shops. Colombo is reputed to be the garden city of Asia, but its reputation cannot be fully appreciated in a short stay.

Visits to Kelaniya or Asokarcarmaya temple, the national museum, Mount Lavinia Beach,

The I.C.F. Excursion party in front of the Vivekananda Society at Colombo—Photo by the author.



One of the bridges over backwaters enroute to Kadirgama—Photo by O. T. Rao, AIOW/Fur.



the Zoo, riverside drives, the cinnamon gardens, petta bazaar, the Gale face promenade are worth performing for interest and pleasure.

The party thereafter left Colombo to see other places of interest in the isle by bus. Two buses were engaged to carry us and the distance covered was 600 miles in 3 days. The following places of interest were visited :

Galle.—A small town of great natural beauty, where in the Dutch fort is a place worth seeing.

Dondra Point.—This is the land's end of Ceylon, similar to Kanya-kumari. There is a Light House by name Dondra, and the name of the town is derived from it. On our way to Dondra we saw Matara, a small town of great natural beauty.

Tissamahra.—This is a sacred place where there is a Buddhist Stupa and temple, built by King Karanti in 300 B.C.



The enchanting Diyaluma falls 628' above road level—Photo by O. T. Rao, AIOW/Fur.

Kataragama.—Holy Kshetra of Kataragama is a household word in Ceylon and is known in Tamil Nad also. Kataragama is a place similar to Benares of the north and Kanchipuram of the south. The holy place lies in the very heart of virgin forest in southern Ceylon, and has a perennial river flowing beside. Muruga or Skandha and the Kataragama God have been worshipped by thousands of pious pilgrims every year from days of old, but Kataragama came into greater prominence because of an Indian monk Swamy Kalyanagiri, known in Ceylon as Muthulingaswamy.

In Kataragama there is no image or idol of the God in the temple. The lord Subrahmanya is worshipped here as "the all-pervading spirit of the universe." In the *sanctum sanctorum* of the temple are hung a number of curtains one behind the other and nobody except the "Kapurals" (priests) are allowed inside these curtains, which are never raised. Some think that there is a Yantra with the divine power and grace behind the curtains. Besides the main temple at Kataragama, there are two other scared places associated with Lord Subrahmanya, four miles from this place at Sella Kataragama or Little Kataragama, with temples and shrines, and at Khataramali where the Lord's weapons are worshipped. The Ramakrishna Mutt at Kataragama is another place of interest and provides boarding and lodging free of cost to all pilgrims.

Diyaluma Falls.—On our way to Newara-Eliya we passed through this waterfalls dropping down from a height of 628 feet. The place in which this is situate is above 3000 feet above mean sea level. This is a place worth seeing.

Hakgala Garden.—The botanical garden at this place is noted for its giant ferns, sunken rose gardens and ornamental pools. The garden was established in 1851.

Seetha Parameswari Temple.—This is the place where Ravana kept Seetha in asylum

and we can still see Asoka flower-beds at the place.

Nuwara-Eliya.—This place is 6199 feet above sea-level. It is an ideal summer resort in the tropics. Every thing in this place looks clean and fresh. The name in Sinhalese means the "City of light." The botanical gardens of this place are a great attraction. Horse-racing during specific seasons is very popular here.

Kandy.—Last strong-hold of the Sinhalese kings, Kandy has a long history behind it, embellished by legend and romance. Every hill and every ridge in the place tell the story of an epic fight for freedom. By the side of a vast blue lake, majestic hills provide a vista of scenic grandeur, unsurpassed in its beauty. The temple of the Tooth, Buddhism's most hallowed shrine, finds its place in Kandy. The world famous Peradiniya Botanical gardens which contain live samples of every plant, flower and tree growing in the tropics is another place of interest in Kandy. The 150 acres of the Royal Botanical Gardens at Peradiniya contain tropical plants from all over the world. The buildings of the University of Ceylon stand on a magnificent site within easy reach of the river Mahavelli.

Rock temples.—A 47-foot figure of a recumbent Buddha, cut from a solid rock, may be seen at Damballa's rock temple.

Sigiriya Fortress.—This is noted for the ruins of an impregnable fort at a 400 feet high mass of granite in which there are life-size frescoes done in the fifth century A.D.

Anuradha Pura.—The history of ceylon is recorded from the reign of King Vijaya in 543 B.C., when the island was known as Lanka.

Anuradhapura was the first great capital of the Sinhalese Kings. Here we can see colossal

pagodas, monuments of stone and mortar built by the ancient kings, which could well compare with the pyramids of Egypt.

The sacred Bo tree, the Thapaparama, oldest of all the pagodas built in the 3rd century B.C., the Ruwanveli, built by Ceylon's warrior king, the lovely Isuramaniya temple, one of the most beautiful Buddhist shrines, all find their place in Anuradhapura.

The Kuttam Pokuna, magnificent royal baths, are places of surpassing architectural skill.

The party left Anuradhapura for Colombo with a heavy heart, leaving a wonderful city behind. From Colombo we made the journey back to our mother country.



The Sigiriya fortress whose 1500 year old frescoes are inspiring examples of ancient Buddhistic art. Photo shows the special staircase provided for going up the hill—Photo by O. T. Rao, AIOW/Fur.

MOTHER

BY
M. V. B. S. SARMA

You are the manifestation of both Vidya and Avidya ;
A practical joker that you are, you have blessed me with tons and tons of the latter;
What an unkind, cheeky and undeserving measure, Mother !
I revolt. Because it is I who have to bear the brunt of the result.
Look ! What a prospect? From the wallowing state in the mud,
To the unfathomable depths of the oceans of ignorance and darkness?
This, they say, is 'From frying pan to the fire !'
Vidya or Avidya, resourceful ignoramus that I am,
To me, Mother, they are all names. And meaningless.
You send me there. And there I go, cheerfully.
Verily, I like this ignorance and its enveloping darkness.
This inky darkness like the cavities of the ocean caves
Reminds me of your long, lovely black tresses.
The little ripples on the water of ignorance bring vividly to my mind
The peals of your laughter that sound like silver bells.
You are everywhere and it matters little where I am,
So long as you keep my spirits bubbling up and your name echoes in my heart.

Like an idiot I rave and look hither, thither and everywhere. And at the sky.
Ah ! What a serenity and what freedom from fiery passions !
From East to West. North to South. The Beginning, the End and the Middle ;
And not to speak of the glorious crimson-coloured horizon.
Is this then what you are and your real Nature?
A crawling insignificant insect, how to reach those unattainable immense heights?
I close my eyes : I chant your name.
The condensed darkness in the heart recedes,
To give place to an everlasting and everwidening radiant horizon.
Sometimes, Mother, I am really filled with pity at your miserable life.
Supplications and applications : they come to you from all quarters ;
Some direct and some indirect. All in one great multiplicity.
Whether "proper-channelled" or not, you have to consider them with due attention,
Without fear or favour as they say. Yes in a strictly chronological order.
No blessed Secretary, Assistant, Deputy, under or otherwise, Nor a blessed Secretariat.
Peremptory fools and confirmed beggars like me cling to your feet, hard, till your rosy feet redden.
"Not so hard, my children. Wait. Your turn will come".

Just then He returns with His staff, skin and bowl, from His wanderings.
Like a bull that enters a shop of burnished bronze and brass,
His bull sniffs and bellows and adds to the confusion.

True, as a Husband, He is entitled to get irritated with His ever busy wife.
But Oh ! He is dragging you by hand, clumsily, as a senseless chap would do in drunken brawl,
Soft. Soft. You Brute. You injure my Mother's hand.

GRANTS BY STAFF BENEFIT FUND
COMMITTEE, JUNE 1959

The following were the grants sanctioned in June 1959 from the Staff Benefit Fund :

	Rs.	nP.		Rs.	nP.
I. Assistance for the prosecution of studies of children of employees.	1,084	21	V. Towards assistance for employees during sickness :		
			(i) Employees ...	1,358	00
II. Towards recreation and amusement of employees :			(ii) Families of employees ...	170	00
I.C.F. Institute ...	3,000	00	VI. Towards the purchase of note books and pencils for conducting literary classes to sweepers employed in the I.C.F.	50	00
III. To I.C.F. Colony School ...	250	00			
IV. Relief of distress among families of employees.	50	00			

A WEEK-END PICNIC

BY

A. VENUGOPALA MENON, J.L.W.I.

On Sunday the 17th May, 1959, a party of staff of the Personnel Branch and Welfare Inspectors, including Shri A. V. Subramanian, our genial Personnel Officer and Shri T. D. Jaya Ram, our popular Welfare Officer, left early in the morning by the Bangalore Passenger. After a short, but lively journey, the party alighted at Trivellore and boarded the specially chartered bus for Satyamoorthy Sagar, Poondi, the venue of our Holiday Camp, which is situated at a distance of 34 miles from Madras.

We reached Poondi at 8-15 a.m. and lodged ourselves at the "Poondi House," the ideally situated P.W.D. Inspection Bungalow, which has all modern comforts, including 3 suites, kitchens, dining hall, amidst beautiful lawns and gardens. After light refreshments, we set out for sight-seeing. Satyamoorthysagar, named after the famous statesman and freedom-fighter, the late Shri Satyamoorthy, former Mayor of Madras, is formed by a dam across the Courtliar River, constructed by the P.W.D. in a period of 4 years and brought into use on the 14th June, 1944. The following are some of the interesting engineering details of the dams :

1. Catchment Area ... 760 sq. miles.
2. Maximum computed flood discharge. 1,20,000 cusecs.
3. Maximum water level (from the bed level). 30 feet.
4. Water spread ... 12.6 sq. miles.
5. Capacity of the reservoir. 2,750 million sq. feet.
6. Length of the masonry regulator ... 770 feet.

7. Number of vents ... 14 of 40' x 15'.
& 2 of 20' x 10'.
8. Cost of the scheme ... Rs. 65 lakhs.

There is a concrete road 18' wide over the dam. Being in a valley between two ranges of hills, the reservoir appears to be a natural one. The water flow is regulated by the iron shutters worked on the counter concrete weights system. Besides the usual interesting features one could find in a dam, the importance of Satyamurthysagar is unique in that the Irrigation Research Station is situated here. General models in brick, steel and concrete of Arch Dam, Multiple Arch Dam, Duck Bill Spillway, a small aquarium, Morning Glory Spillway, different kinds of reservoirs, sluices, canals are displayed. Besides, specific models of almost all the major irrigation works in the Madras State, such as the Amaravathi Canal System, Sathanur Dam, Kodivery Anicut, Manimuthar Canal Siphon, Krishnagiri Dam, Vaigai Pen-stocks, Kattalai High level canal, Vaigai Dam, Malattar Odai, Grand Anicut comprising of Vennar, Cauvery and Vellar, Lower Bhavani Dam, Palar Anicut, the famous Mettur Dam, Periyar Scheme and Pullambadi Dam are available here. The most exquisitely executed model is the Satyamoorthi Sagar itself. When difficulties are encountered in the actual execution of irrigation schemes, such as scourge, erosion, etc., the researchers at this station rush to the rescue of the maintenance engineers and, by means of working models built to scales and proportions, find out the cause of the difficulties and solve the problem.

The lunch we had was a hearty one arranged by enthusiastic members of the party. After

lunch, some of us sat down to rest on the lawns under the shades of trees while others inside the Rest House entered into interesting discussions on all subjects ranging from pictures to philosophy and art and culture obtaining in various regions, etc. Then we moved to the spacious gardens, thickly planted with shady trees on the right flank of the river and enjoyed the variety entertainment of music, dialogues and mimicry provided by some of the members of the party, amongst whom the unassuming

Shri Servaran is worth mentioning. After tea in the gardens, we left by 5-30 by bus to Trivellore station, boarded the train and reached Madras by about 8 p.m. Thus came to an end a short but an exhilarating excursion, which provided us an opportunity to forget our routine humdrum of life and to enjoy ourselves thoroughly and to understand each other better in a cordial atmosphere, incidentally paving the way for better efficiency in work also.

OUR I. C. F.

BY

Mrs. MYTHILY GOPALAKRISHNAN

It is I.C.F. calling all of you,
To tell you folk its latest review ;
Now it is to make prototype wagons,
Safe and quick transport are its slogans.
The bogies, designed by the R.D. & S.O.,
To carry sixty tons of iron ore or so,
All-welded and very light,
Extreme heat or rain they can fight.

I entered through the great iron gates,
In the happy company of my dear mates,
With the kind permission of the Security forces
To visit the vast Factory premises.

The number of shops in the I.C.F. are ten,
With a labour strength of seven thousand men,
Sheet Metal is the first shop,
To look at it you will fail not to stop.

The assembly, painting and fitting shops,
Follow in order,
The machine, window and door shops complete
the border,
The flow of production runs quickly thus,
Like the conductor-driven passengers in a bus.

I confronted the furnace red aglow,
Like a hungry monster his mouth opened,
The steel is heated and thrown below,
Into the dies to be shaped and finished.

Look at the machine cutting sheet of steel
To make the side walls of the coach shell ;
Even heavy sheets of lengths—a few feet,
Are cut quickly as butter as well.

Like an angry river rushes the coolant,
From the machine—a mixture of oil and soap.
It is the main feature of the polishing plant,
And without it, the product a flop.

The billets are shaped like hats,
Taken out with huge tongs, hot and red,
They roll out quietly like stealthy cats,
Their colour changeth to that of lead.

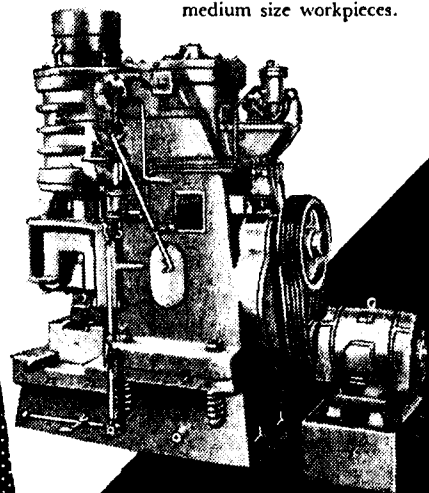
The traversers and conveyors that convey the
parts
To the concerned shops, like wonder,
Attract the attention of those apart,
To stand aghast and ponder.

BÊCHÉ

PNEUMATIC DIE FORGING HAMMER LG 6

WEIGHT OF TUP 660 lbs.

In latest execution for high production and economical die forging, with machine body of sphero special casting, with shorter and reinforced tup, equipped with servo-motor to operate hydraulically the pedal control for easy and continuous regulation of blows. Capacity 120 to 1430 mkg per blow, with 220 to 130 blows per minute. Eminently suitable for Roll Forging, Bending, and Die Forging of small and medium size workpieces.



SOLE DISTRIBUTORS
**FRANCIS KLEIN & CO.
PRIVATE LTD.**
1, ROYAL EXCHANGE PLACE, CALCUTTA-1
SHOWROOMS: 13A, GOVT. PLACE EAST.

Resident Engineer in South India :

I. S. SOMASHEKAR

10, Prithvi Avenue, St. Mary's Road, Madras-18

TELEPHONE: 71938

Long arms of the cranes grip the parts,
And carry them like babies to required spots,
Landing them carefully in trolley carts,
To be used in the shops in lots.

Another machine is cutting fast
Aluminium parts of windows and doors,
They lie shining like silver in a host,
Waiting to be conveyed along the floor.

Dream not you are in a wonder-land,
The dazzle is due to the sparks that shine ;
Witnessing the arc welders you stand,
Watching the hands of the welder move in a line.

This is the shop of the Carpenter,
He is sawing the pieces of the seats ;
The strips of wood are screwed in the centre,
Shaped comfortably and very neat.

The many rows of wooden racks,
Are made for storage of completed doors and windows ;
Arranged like the rows of cards in a pack,
They look like the warrior's arrows.

On this platform the coaches are spray painted,
Getting ready to be used for a journey ;
They are painted red and silver-tinted,
Tempting travel like the taste of honey.

Most of the coaches are indigenous,
Self supplied by our rich sources,
Used for the service by man's genius,
And put to use in gradual courses.

There is a very efficient Canteen,
Maintained for the use of the Workers ;
It is interesting to watch its daily routine,
With its electric grinders and water coolers.

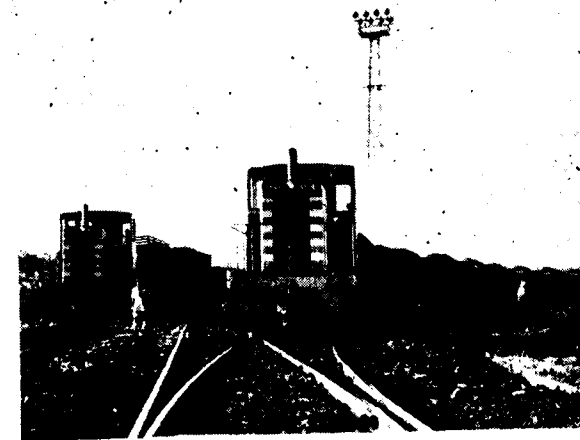
A shell costs a quarter less than two lakhs,
At the initial stages of the turn-out.
It is now reduced by about a lakh,
A laudable progress in the work no doubt.

It's I.C.F. in glory and pride ashine,
In gardening, sports or any other line,
I.C.F. Coaches are comfort forever,
Best made out of all manpower.

To encourage the employees in every way,
Is one of the essential duties of the day ;
I.C.F. Staff are famous everywhere,
This side, that side, here and there.

To work in the I.C.F. is a great pleasure,
Since the heat is fought in a large measure ;
Thanks to the efforts of our C.M.E. in the lead
We are supplying our country's growing need.

TESTING NEW LOCOMOTIVE DESIGN IN ROLLING LABORATORY



Two of the many General Electric (U. S. A.) industrial haulage type diesel-electric locomotives in operation at the Tata Iron & Steel Co., Jamshedpur

An experimental diesel-electric locomotive built by General Electric's (U.S.A.) Locomotive and Car Equipment Department will soon undergo exhaustive tests in a unique "rolling railway laboratory," the firm announced recently.

The rolling laboratory is a four-unit diesel-electric locomotive built by G-E and operated in regular heavy freight service by the Erie Railroad between upstate New York and Chicago, Illinois. It has been in operation since 1954 and has been used to develop and prove locomotive components under actual operating conditions on a main line railroad.

Many of the engineering refinements made possible by the unique laboratory on wheels have been incorporated into General Electric's line of universal-type diesel electric locomotives. These locomotives, which can be used in any type of railway service, are currently in use on many major railways throughout the world.

The new locomotive design will be tested by using it in place of two units of the four-unit laboratory locomotive. This combination will then be operated as a three unit diesel-electric locomotive. The new unit will be periodically inspected by General Electric engineers.

The new unit will replace two 1200 horsepower units of the present laboratory locomotive. The remaining units are each rated at 1800 horsepower. The new three-unit set up will be controlled by one engineer in the same manner as the original four-unit rolling laboratory.

The new three-unit locomotive will be operated by the Erie Railroad. Like its predecessor, it will be used to evaluate advanced concepts of locomotive design and construction.

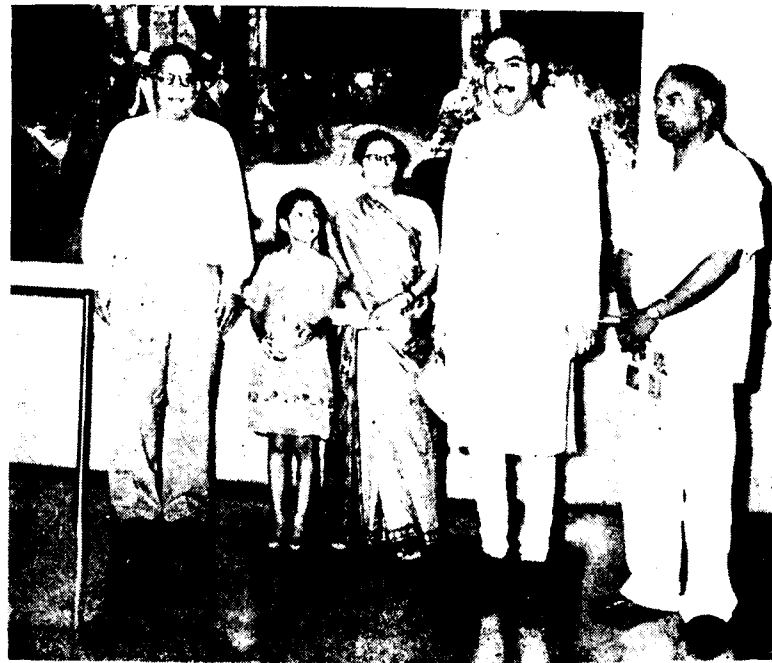
—Globe Press Service

RAILCOACH

R-4

35

VISITORS TO THE FACTORY



Shri S. N. Mishra, Union Deputy Minister for Planning, with his wife and child. To the extreme left is Shri K. Swarup, our Chief Mechanical Engineer.

The High Power Evaluation Committee set up by the Ministry of Commerce and Industry, consisting of Messrs P. N. Dhar, R. K. Dhawan, L. C. Jain, S. A. Tekchandani and R. Rao of the All-India Handicrafts Board visited the Factory on the 1st June 1959. At the conclusion of the visit they observed : " It is one of the finest factories we have seen. Gives a sense of pride in our national endeavour. Equally we were impressed to learn that the workers behold it as their own enterprise."

On the 5th June 1959, Shri C. Nanjappa, Member of Parliament visited the factory. He recorded in the Visitors' Book as follows : " Was very happy to go round the factory and was much impressed with the work carried on by all young men. A few years ago we would not have dreamt of having such magni-

ficent works. I was much impressed by the rapid progress made."

Shri S. N. Mishra, Union Deputy Minister for Planning, visited the Factory on the 6th June 1959. He was received by Shri K. Swarup, Chief Mechanical Engineer, and shown round the various shops. Shri Mishra, on the conclusion of his visit, expressed his great appreciation of the work done in the factory and offered his congratulations to the workers of the factory. He said " This factory is indeed a magnificent national achievement. Each year is a year of increasing efficiency and higher production."

On the 8th June 1959 Dr. Herbert Ashton, Transportation Consultant from Washington D.C., visited the factory. At the conclusion

of his visit he observed that this factory was one of the most interesting and efficiently operated plants he had seen.

Three Members of Parliament headed by Shri Biswanath Das who were in South India on a study tour of various projects, visited this factory on the 10th June 1959. They were shown round the workshops and the Technical Training School. They were highly impressed with the progress made in the factory. They opined that with years of experience and increased production the cost of a coach would

further come down. They thought that the training of technicians should be considerably increased and the research section in the factory should be improved.

On the 19th June 1959 Rear Admiral A. Chakraverti of the Indian Navy, visited the factory along with some Naval Officers and Sailors. Shri A. Chakraverti observed at the conclusion of the visit that this factory was very well conceived, planned and run and compared favourably with the best they had seen in England and Europe.

Three Members of Parliament headed by Shri Biswanath Das. On the left extreme is Shri M. Lal, our P. T. S., and to his left is Shri K. Swarup, our C. M. E.



Brain teasers

1. A group of school boys on an excursion went to a restaurant. Each of the boys paid exactly the same order and their total bill came to Rs. 6.82, excepting one boy who refused to be drawn in the restaurant. If only half the total number of boys had entered the restaurant and paid in the order, the total bill would have been Rs. 3.30 less. How many were there in the group?

2. Add to the following five letters three letters in front and the same three letters in the same order in the rear and thus form a familiar word :

..... ERGRO

3. Shri Chandulal, a Bombay businessman, went for a holiday to Ooty and left instructions to his assistant to carry on his business and forward his letters. Owing to oversight, of course, he forgot to give his assistant the post box key and hence at the end of some days he called on the "Trunk" and asked his assistant why he had not forwarded his letters. The assistant promptly told the reason whereby Shri Chandulal realised his mistake and sent the key immediately by next air-mail. Still no letters were received. Hence, on his return, he dismissed his assistant in the first instance. Was he justified in doing so?

4. Find six digit number in which the numbers formed by its first three digits and its last three digits are consecutive. The number itself is a perfect square of a number below 500.

5. A group of 42 boys went on an excursion and it was quite unfortunate for one of them who got caught by the gardener of the orchard where they were stealthily helping themselves.

It was fortunate for Vasu and Narayan that the gardener was known to them, but the gardener was intent on not exposing the influence to others. Hence he arranged all of them in a circle and punished and sent out every third man until the last two remained who were incidentally Vasu and Narayan whom he set free without punishment. At what position from the start had he placed Vasu and Narayan?

6. Three men and three women are to get across a river in a boat holding only two persons. How shall it be done so that there are never more women than men at any time on either bank.

SOLUTIONS TO LAST MONTH'S TEASERS

1. (a) EAGLE and STAG ; (b) Coot and Stoat ; (c) OWL and MOLE ; (d) PARROT and PANTHER ; (e) GROUSE and HORSE.

2. The correct list was A-Kattabomman B-Tantia Tope, C-Lajpat Rai and D-Bhagat Singh.

3. The fractions were 16/64, 26/65 and 19/95.

4. A regular pentagon is drawn and its five sides produced to form the star. The coins are placed on the intersecting points which total ten.

5. Mulberry-Persia, Onion-Egypt
Potato-America, Radish-China
Horse Chestnut-Tibet and Oats-North Africa

6. Vengu has the probability $1/2^n$ of winning 2^n-1 rupees. Hence no matter how much Vengu bets, he is always in an advantageous position.

Wit and Whistle

1. "What is an alibi", the Professor asked one of the Law students.

"An alibi is to prove that you were in the class when you were not in order to show that you were not in a cinema where you actually were."

2. "Will you please define 'accident', Sir" asked the student who had sufficiently made a name for his notoriety in the College.

"An accident means" replied the lecturer who knew that the boy was trying to pull his leg "is something which happened by chance."

"Example please" questioned the student

"To quote one example if you were to pass the examination."

3. Doctor was explaining to his clients the importance of cleanliness. While he was examining one of the sick persons he said,

"It is hard to believe that you people

take bath. If it were to be the case you should not get this illness."

"Why sir, I have been taking bath regularly in spring."

"All the more better. It is after all a natural source of water."

"No, sir, he means in Spring season" the doctor was corrected.

4. The lady was coming all the way from her village in order to act as a witness in a case of accident. She was tired of it as it was nearly the eighth time and yet the case was not disposed off.

During the course of her statement she was finding it hard to explain the "moving stairs."

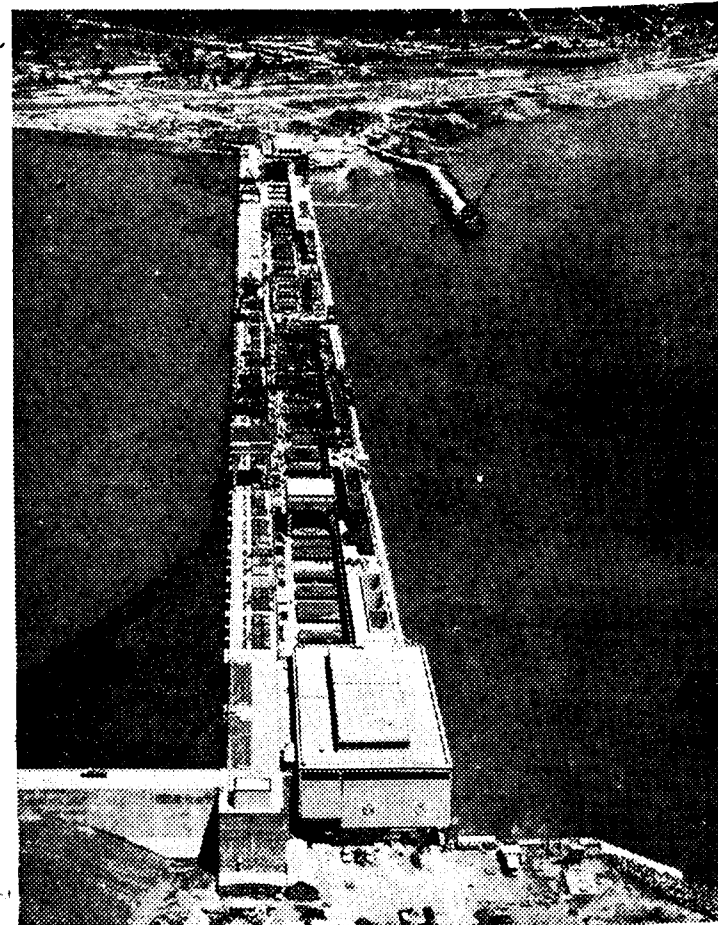
The judge interrupted,

"Escalator, Escalator."

"No Sah, please ask me now and I can't come any more" was the pleading reply.

643

307
4-89

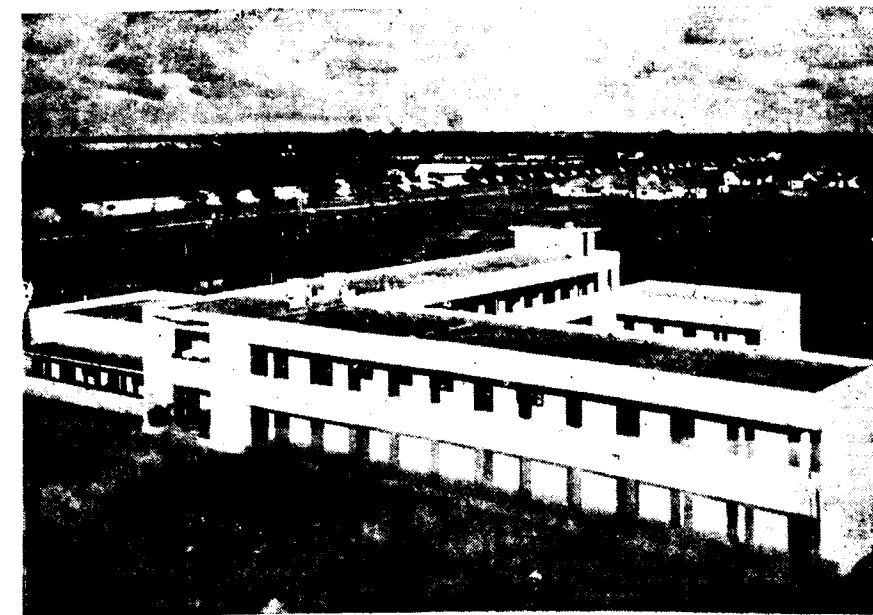
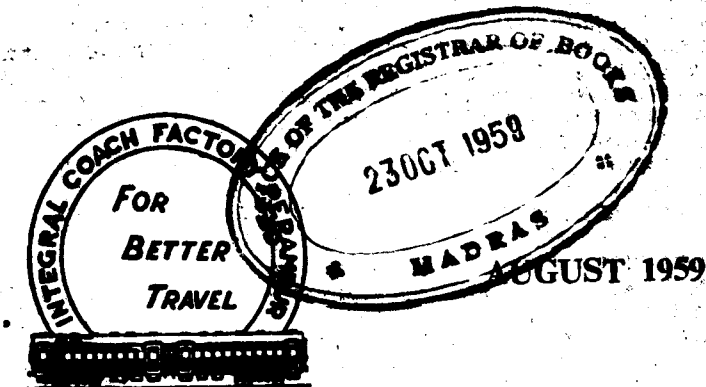


THE HEART OF THE NEWLY COMPLETED POWER PROJECT on the St. Lawrence River in North America is this dam built jointly by the State of New York, U.S.A., and the Province of Ontario, Canada. This view of the dam shows the Ontario shore at the top of the picture. The electric power generated is shared equally by Americans and Canadians. The St. Lawrence Power Project is associated with the St. Lawrence Seaway Project jointly undertaken by the two countries to provide a deep channel for ocean-going vessels into the heart of the continent.

Edited and Published by K. Santhanam, Secretary to the Chief Administrative Officer, Integral Coach Factory, Madras 23 and Printed by M. G. Daniel at Thompson & Co Private Ltd (Minerva Press), Madras 1.

RAILCOACH

VOL. III No. 11



The Technical Training School of our factory is fast expanding its activities to meet the increasing demands due to the gradual introduction of the second shift.

PRICE 25 NAYE PAISE

RAILCOACH

Published by the Integral Coach Factory
ISSUED ON THE 15th OF EVERY MONTH

Devoted to all Railway problems, Technical Matters
and other problems of General Interest

Rates for Advertising

Per insertion

ORDINARY—

Full page	Rs. 100
Half page	Rs. 55
Quarter page	Rs. 30

COVER —

Front	(Not available)
Back	Rs. 250
Inside Front	Rs. 200
Inside Back	Rs. 200

SPECIAL POSITIONS—

Facing	
(i) Front inner cover	Rs. 150
(ii) Back inner cover	Rs. 125
Facing Editorial—	
(i) Full page	Rs. 125
(ii) Half page	Rs. 70

By the side of Contents —	
Half page	Rs. 70
Facing contents —	
(i) Full page	Rs. 125
(ii) Half page	Rs. 70

Mechanical Data

Blocks	Screen 100
Full page	8" x 5 1/2"
Half page	4" x 5 1/2"
Quarter page	4" x 2 3/4"
Cover page	Art paper one colour
Inside page	Imitation art paper

CIRCULATION

The "Railcoach" circulates among Officers and staff of the Integral Coach Factory, General Managers and other important Officers of all Railways in the country, the Union Minister for Railways and Transport, the Union Deputy Minister for Railways and Transport, the Chairman and Members of the Railway Board etc.

TERMS

1. Blocks or lay-outs are to be supplied by the Advertiser or will be charged for extra.
2. Advertisement materials to reach the Editor before the 1st of every month for the month's issue.
3. Cheques should be drawn in favour of the Editor, "Railcoach", Integral Coach Factory, Perambur, Madras 23.
4. Texts of advertisements are subject to approval by the management.
5. A 5% rebate is allowed for 12 consecutive insertions.

Further particulars from

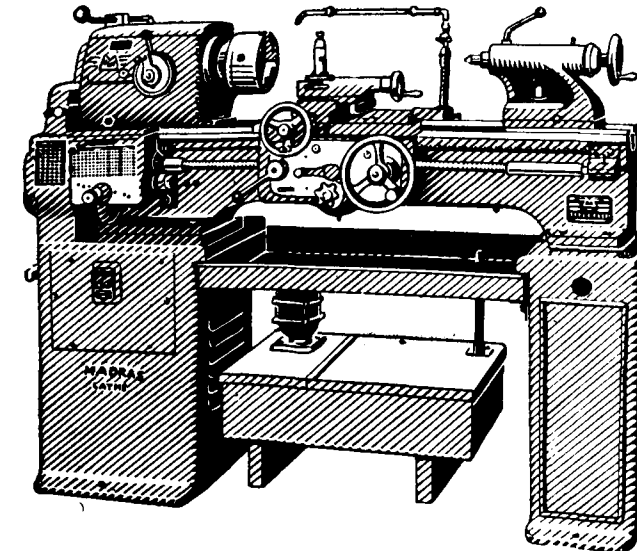
The Editor

RAILCOACH

Integral Coach Factory, Perambur, Madras 23



**STREAMLINED LOOK
BETTER PERFORMANCE**



Strikingly modern in design, MADRAS LATHES (Height of Centre 165 mm, admits between Centres 750 mm) have many up-to-date features which include eight spindle speeds ranging from 48 to 1000.

Precision-built with best quality material these GEARED HEAD lathes have unusual strength to render perfect service for many years of regular operation.

Ask for illustrated details - a study of its features will convince you that MADRAS LATHES are unbeatable in their group for target production.

Thoroughly inspected and first graded by the Inspection Wing of the Government of India.

MANUFACTURERS:

THE MYSORE KIRLOSKAR LIMITED

YANTRAPUR P. O., HARIHAR.

SOLE DISTRIBUTORS:

BATLIBOI (PRIVATE) LTD.,
SILVER JUBILEE PARK ROAD, BANGALORE 2.

CHANDA PAINTS

FOR QUALITY & ECONOMY
FOR BETTER COVERAGE

IN WIDE AND VARIED USE THROUGHOUT OUR COUNTRY
BOTH FOR INTERIOR AND EXTERIOR PURPOSES

RENOWNED FOR DURABILITY AND FINISH

"INERTOL" PAINTS

For Iron, Concrete, & Steel — the best aseptic water proofing
compound — for use on Piers, Quay Walls, Foundations
Granaries, Locks, Lock Gates, Cranes and etc.

INERTOL PAINTS ARE USED ON EVERY COACH THAT LEAVES THE
INTEGRAL COACH FACTORY

MANUFACTURED BY:

Messrs. P. C. Chanda & Co. Ltd.
CALCUTTA

Represented in the South including
Madras, Mysore, Kerala & Andhra Pradesh

By

The South Indian Export Co. Ltd.

20 General Patters Road, Madras 2

Telegrams : Dieselage Madras

Telephone : 84127

RAILCOACH

(INTEGRAL COACH FACTORY MAGAZINE)

EDITORIAL NOTICE

All contributions must be clearly typed and doublespaced on one side of the paper only, and signed, not necessarily for publication, but as a guarantee of good faith.

Manuscripts and photographs, not accepted for publication, will not be returned unless the sender so requires. Intending contributors from outside our Factory, if they intend to get back unaccepted articles and photos, should send a suitably stamped and self-addressed envelope along with the material sent by them.

Contributions should be addressed to the Editor, not by name, and reach him not later than the 25th of every month for consideration for publication in the next month's issue.

The Editor does not assume any responsibility for the accuracy of the news supplied by correspondents or for opinions expressed by contributors. Opinions expressed in the "RAILCOACH" whether editorially or by contributors should be regarded as having no official authority.

	Rs. nP.
Annual Subscription	... 3 00

CONTENTS

AUGUST 1959

	PAGE
New Chairman, Railway Board	4
Editorial	5
Letter from Member, Staff	6
What is News and Why	7
Deputy Railway Minister tours the country	10
Corrosion of steel coaches	15
Production, planning and control	22
A few hints on welding	26
News from Switzerland	32
Opportunities for promotion of class IV staff on Railways	33
Quickening pulse of the Industrial Age	35
Diesel-Electrics help build World's Highets Dam	38
Visitors to the Factory	40
A trip to Ennore	41
Sundar Raj Challenge Trophy-Hockey Tournament	43
Brain Teasers	45
Wit and Whistle	46

NEW CHAIRMAN, RAILWAY BOARD



Shri K. B. Mathur, erstwhile Member, Transportation, has taken over the office of the Chairman, Railway Board, from Shri P. C. Mukerjee, who has proceeded on leave preparatory to retirement.

Shri Mathur becomes India's Number One railwayman at the end of about 31 years of service on the Indian Railways, during which he held many important appointments. He was General Manager of the Eastern and Northern Railways from 1951 to 1954, when he joined the Railway Board as its Member, Transportation.

Since early 1955, Shri Mathur has personally directed a countrywide drive for greater operational efficiency on the Indian Railways, as a result of which practically all transport bottlenecks have been broken. He has been intimately connected with negotiations for the three World Bank loans totalling \$ 225 million for the development and modernization of the Indian Railways during the Second Plan period. In 1956, he went with the Indian Railway delegation which undertook a tour of Chinese and Japanese Railways.

editorial

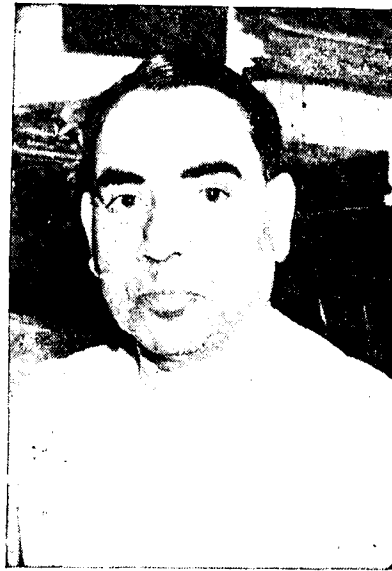
DEPUTY MINISTER'S VISIT

Shri Shah Nawaz Khan, Deputy Minister for Railways, who visited the Factory last month, made an appreciative reference to the manner in which the staff applied themselves to their work and how they concentrated on their work unmindful of distractions. In fact a number of other distinguished visitors have commented on this attitude of our staff. It is this devotion to duty that has enabled us to bring down the manhours required for the manufacture of Third Class shells from 19000 to 9000. All of us realise that this figure could be improved further and, with sustained efforts, there is no reason why the manhours now consumed should not be equal to, if not better than, those obtaining elsewhere in the world. Many a foreign dignitary has commented that, with the gaining of experience, our staff should be as proficient as workers in the other parts of the world. It is gratifying to note that we are well on the right track and, in the matter of a few years, would be able to turn out coaches as fast as, if not faster than, the most efficient coach building workshop in the world.

MEMBER, STAFF, RETIRES

GOVERNMENT OF INDIA
MINISTRY OF RAILWAYS
(RAILWAY BOARD)
NEW DELHI

Dated, the 30th July, 1959



M. N. CHAKRAVARTI
• MEMBER, STAFF

MY DEAR SWARUP,

On the eve of my relinquishing office, may I take this opportunity to thank you, your officers and men for the co-operation that I have received. It made my task lighter in the thirteen months I have been in the Board. It was my good fortune that cordial relationship between Labour and Management prevailed in this period. I have no doubt that the future will continue to be as peaceful in the interests of progress. This speaks so eloquently of the railwaymen and their leaders that serve the Nation.

Though I shall be taking over an assignment with the Atomic Energy Commission, parting with the Railways after more than 31 years of service has not been easy. Long association develops attachments which are not shaken off at bidding. It will continue to be a matter of personal pride to me to watch the Railways prosper more and more.

I wish the very best to every railwayman.

Yours sincerely,

(SD.) M. N. CHAKRAVARTI

SHRI K. SWARUP,
Chief Mechanical Engineer,
Integral Coach Factory,
Perambur, Madras.

WHAT IS NEWS AND WHY

Supplies for railways

The Railway Board have agreed to purchase certain railway stores exclusively from small industries. This follows the negotiations conducted by the National Small Industries Corporation with the Railway Board.

This is in conformity with the Government of India's policy of assisting small-scale industries to participate more fully in the Government purchases consistent with the requirements of quality and timely supplies.

Items of railway purchases have been divided into four groups, items which can be purchased only from large-scale units, items which can be purchased from large-scale units but where it is possible for large units to sub-contract ancillaries and components to small units. Others are items which can be produced from both large and small sectors and items which are entirely reserved for purchase from small-scale industries. The small-scale industries enlisted for participation in the railway stores purchase programme will be given a suitable and reasonable price preferential upto a maximum of 15 per cent over large units if the Purchase Officer is satisfied that the overheads of small industries is higher than that of large units.

Items exclusively reserved for small-scale units are brass padlocks, G I. padlocks, brass dampers, all leather and cloth requirements.

Productivity drive

The National Productivity Council has undertaken a programme of audio-visual activities with a view to promoting productivity consciousness in industries.

The programme includes organising film-shows of productivity films, exhibitions in various industrial centres in the country and radio

programmes for workers as well as management.

The N.P.C. has already placed orders for about 350 films dealing with various techniques and processes for increasing industrial productivity, and these films will be shown in various parts of the country through the five regional directorates of N.P.C. and through organisations and institutions interested in this field.

It is also proposed to organise exhibitions on productivity in general and various productivity techniques in particular.

World Bank loan for railways

Two officials of the Railway Board formally signed an agreement with the World Bank at Washington on July 15, 1959 for a loan of 50 million dollars to aid railway development in India.

Negotiations for the loan started on June 22 between the Indian delegation comprising of Mr. K. B. Mathur, Transportation Member of the Railway Board, and Mr. J. Dayal, Financial Commissioner of the Railways. This will be the third loan to be sanctioned by the World Bank to the Indian Railways during the Second Five-Year Plan. The other two loans totalled 175 million dollars.

The new fifty-million dollar loan is expected to be made available to India in the currencies of a number of foreign countries. India would thus be able to buy her railway requirements, not manufactured here, from these countries. A part of the new loan will be utilised for the purchase of electric locomotives and signalling equipment. The Indian Railways have launched on the modernisation of the signalling section on a big scale. This will entail large use of mechanical and electrical devices.

Co-ordination of Rail and Road Transport

The Government of India have set up a high powered committee, with Mr. K. C. Neogy as Chairman, to go into the question of rail-road co-ordination and transport development and make recommendations.

The members are : Mr. Vishnu Sahay, Secretary of the Planning Commission, Mr. R. L. Gupta, Secretary, Department of Transport, Ministry of Transport and Communications, Mr. K. B. Mathur, Chairman of the Railway Board, Mr. A. K. Roy, Secretary, Department of Economic Affairs, Ministry of Finance and Mr. S. Ranganathan, Secretary of the Ministry of Commerce and Industry.

Mr. K. L. Luthra, Director of the Transport Division, Planning Commission, will be the Secretary of the Committee.

The Planning Commission and the Ministries of Railways and Transport and Communications have had under consideration for some time past questions relating to the co-ordination of different means of transport, especially rail and road transport, and their future development, having regard to the needs of the growing economy of the country.

It has been agreed in consultation with the Ministries of Railways and Transport and Communications to constitute a committee to study the problems involved, and to make recommendations on the measures required to secure the necessary co-ordination between different means of transport and on long-term policies and considerations which should guide their future development.

Taking into account the existing stage of development of the various means of transport and the economic, political, social and strategic purposes which the transport machinery is designed to serve, the committee is to recommend what broadly should be the long-term transport policy of the country, so that the development of the transport machinery may

be effected in consonance with our growing needs, with economy and efficiency, avoiding duplication to the maximum extent practicable. It will also define the role of the various means of transport in the country during the next five to ten years, and indicate the best mechanism for the regulation and co-ordination of the various means of transport, so that the transport needs of the country are met in an efficient and economic manner consistent with the larger interests of the country.

New Railway Signal System

The scheme for providing modern route relay interlocking system at the Madras Central Station has been approved by the Railway Board.

The Southern Railway has already invited offers from manufacturers for the design, supply of equipment and technical supervision of the project.

The route relay interlocking system enables the railways to handle heavy traffic more expeditiously and with enhanced safety, and perfect ease of operation, resulting in conservation of line capacity.

Similar equipment was installed on the Western Railway at Bombay and this has enabled the railway to deal with more than 400 trains daily between Churchgate and Bombay Central, resulting in more expeditious movement of trains on this busy section. The installation was set up by Indian signal engineers on the Western Railway with the assistance of a private engineering firm. The equipment came from West Germany.

The Central Railway is also providing route relay interlocking at Kurla near Bombay with the help of a British firm. This project estimated to cost about Rs. 25 lakhs is nearing completion. When the new interlocking system is commissioned, Kurla Junction will be able to deal with about 700 trains daily.

Similar interlocking is to be provided at Delhi Main station, where the control of an area of more than five miles from Mathura, Bhatinda, Ambala and Gaziabad would be centralised in one or two cabins. The project is likely to cost Rs. 30 lakhs.

Also under consideration are similar schemes for providing the system at Howrah at an estimated cost of about Rs. 25 lakhs and at Bombay V.T. Station. With the completion of these projects, signalling in India is expected to take a big step forward in handling heavy traffic.

The Railway Board's Signalling and Tele-Communication Department is also taking steps to encourage manufacturers in India to produce more signalling equipment within the country so as to conserve foreign exchange resources. A measure of success has already been attained by these efforts.

The total expenditure on signalling schemes on the Indian Railways during the Second Plan period is likely to be of the order of Rs. 30 crores, a six-fold increase over the First Plan provision.

Monthly Outturn

	Target Indigenous coaches	Actuals Indigenous coaches
July 1959	30	38
Cumulative total for the first four months of the year 1959-1960 (Financial)	120	146

DEPUTY RAILWAY MINISTER TOURS THE COUNTRY

At Bombay : Mr. Shah Nawaz Khan, Union Deputy Minister for Railways, said in Bombay on July 15, 1959, that the Central Government were considering steps to increase wagon production from 23,000 to 36,000 a year. He said that if they were able to attain this target figure, the Railway Ministry would consider the possibilities of exporting wagons, locomotives and coaches abroad.

Mr. Shah Nawaz Khan, who was addressing a joint meeting of the representatives of the Chambers of Commerce and the Passengers Traffic Relief Association in Bombay, said that with regard to passenger coaches the railways were self-sufficient and they had enough passenger coaches to meet the requirements. He disclosed that they would stop import of passenger coaches.

Mr. Shah Nawaz Khan appealed to the members present to create public opinion in favour of putting down ticketless travel. He said the railways were losing annually about Rs. 5 crores by way of ticketless travel.

The Deputy Minister referred to the controversy over road and rail competition and said that this competition was going on in all industrially advanced countries. This was a new phenomenon in India because the railways had almost a monopoly in goods transport. He said, "We do not feel anything in a healthy competition. We should try to avoid cut-throat competition. What we desire is that we should supplement each other."

The railways were opening more and more out-agencies which would connect the rail heads. The Ministry was also taking a greater interest by investing funds in State Transport Corporations.

The Union Deputy Minister referred to the completion of the interlocking system at the Kurla station on the Central Railway and said that by the new system the Central Railway would be able to run 800 trains daily, instead of 600 as at present. The cost of the interlocking system was Rs. 35 lakhs, he said.

Mr. Shah Nawaz Khan said that the maximum utilisation of the coaches on the Central Railway was availed of. He said that the yearly mileage of a coach on the Central Railway was 96,000 as against 70,000 on the British railways. The utilisation of coaches compared much favourably with the Danish railways, where the annual mileage of a coach was 59,000. In the South African and the London underground systems, it was 57,000 and 55,000 miles respectively.

At Madras : Inaugurating the conference of the Southern Railway Honorary Magistrates at Madras on July 18, at the Meeting Hall of the Southern Railway Headquarters, Mr. Shah Nawaz Khan, Deputy Minister for Railways, said that the loss of revenue to the Railways because of ticketless travelling was around Rs. 5 crores a year and the pernicious habit of pulling the alarm chain had consequences far more substantial than the mere delay in the running of the particular train.

Mr. Shah Nawaz Khan added that he had no doubt that the enhanced punishments, which were now permissible, would be used by the Honorary Magistrates with good judgment, balancing between the need to eradicate the several evils on the one hand and the merits of the case and the circumstances in which the offence was committed on the other.

Elaborating on the evil of ticketless travelling, Mr. Shah Nawaz Khan said that two years

back the Railway Board organised four special ticket checking squads to make a series of special checks and to assess the extent of ticketless travel that prevailed. As a result of those checks, it had been assessed that the extent of ticketless travel on the Indian Railways taken together was about four to five per cent and the loss of revenue on that account was about Rs. 5 crores every year which was certainly not a very happy position. Over certain specific sections of the Southern Railway the extent of ticketless travel was well over five per cent. For example, during the period of special check by the Railway Board's squad, it was 7.7, 6.9, 7.9, 9.8 and 10.4 per cent over Madras Egmore-Villupuram, Rajahmundry-Waltair, Maniyachi-Tirunelveli, Guntakal-Dharmavaram and Hubli-Harihar Sections respectively.

After referring to the important amendments that had been made in the Indian Railways Act in regard to the provisions dealing with ticketless travel and allied matters, Mr. Shah Nawaz Khan said that the pernicious habit of pulling the alarm chain prevailed extensively. Though, in the South, its incidence was somewhat less than in certain other parts of the country, in itself, the number of cases of pulling of alarm chain had consequences far more substantial than the mere delay by a few minutes of a particular train. A train which was held up at one spot held up other trains on the route for crossing, overtaking, etc., and those trains again, in their turn, affected the running of other trains on the section similarly. Thus, a vicious circle was created, and if they were to compute the number of manhours lost cumulatively by the unauthorised use of the alarm chain each year, it would indeed work up to a colossal figure.

Another pernicious habit, Mr. Shah Nawaz Khan said, was intimidation of railway staff in the discharge of their duties by the public on the slightest provocation. Such acts by

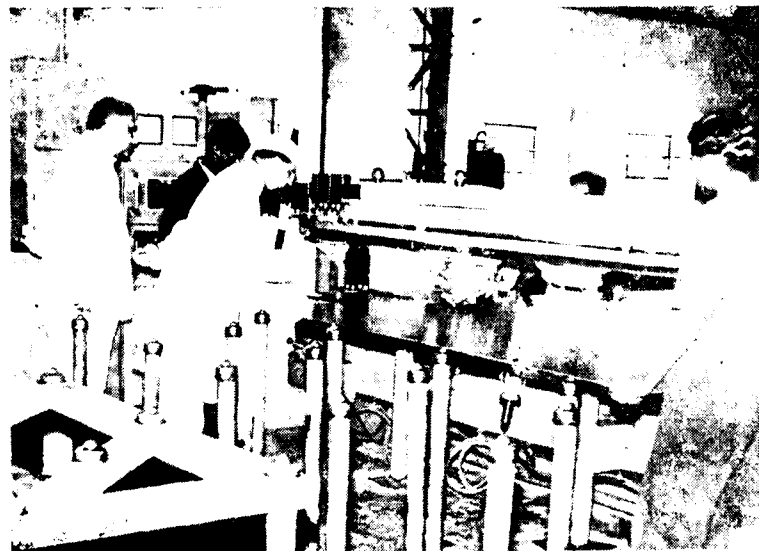
irresponsible elements made it extremely difficult for honest railway servants to discharge their duties. Unauthorised vending and hawking caused considerable inconvenience and annoyance to passengers. "I have no doubt," he added "that the enhanced punishments which are now permissible will be used by you with good judgment, balancing between the need to eradicate the several evils that I have mentioned on the one hand, the merits of the case and the circumstances in which the offence was committed on the other."

Mr. Shah Nawaz Khan acknowledged the fullest co-operation the Railways had from the Railway Magistrates all over the country in keeping under control such offences and expressed appreciation of the good work they had been doing.

Inspection of I.C.F.

Shri Shah Nawaz Khan, Deputy Minister for Railways, visited the Integral Coach Factory on the 16th July 1959. On arrival he was received by Shri K. Swarup, Chief Mechanical Engineer, who after explaining to the Deputy Minister the salient features of the Integral Coach and the Factory, took him round the workshops of the Shell Factory, the Furnishing Annexe and the Technical Training School. Shri Shah Nawaz Khan, addressing the officers of the Factory at the conclusion of his visit observed :

"It is a matter of great pleasure to me to be able to visit the I.C.F. after about 5 years. I did come here previously when the structures were going up. At that time the first batch of apprentices, 35 in number, had just come in. It is indeed a very great pleasure to see the remarkable progress that has been made during the brief space of four or five years. By your hard work and the good discipline that you have instilled in your workers, you have set a very high



Shri Shah Nawaz Khan, Deputy Minister for Railways, witnessing a side-wall being spot welded. Shri K. Swarup, Chief Mechanical Engineer, is to his left.



Shri Shah Nawaz Khan witnessing two plates being seam welded.

example for other workshops and national undertakings to follow. Every Indian has a right to feel proud of the I.C.F. You have recently decided to almost double the output by introducing a second shift. I am told that the incentive scheme is also going to be introduced shortly. I am sure this will add to the efficiency of the workers and increase your output. I must say that I have been immensely impressed by the discipline amongst the workers in your workshops. It is not often that one finds workers so absorbed in their work when outside persons visit their factory or workshop. I congratulate all of you for instilling that spirit and sense of duty in your workers. I wish all of you and this factory good luck and success in your endeavours to serve the nation."

At Madurai : Mr. Shah Nawaz Khan, Deputy Minister for Railways, said in Madura on July 21, that the Railway Administration was of late feeling the strain of competition from road transport and that the Government were trying to find out ways and means of avoiding cut-throat competition.

The Deputy Minister was declaring open the new building of the Divisional Office at Madura at the Railway Colony.

This building which is built at a cost of Rs. 9.5 lakhs provides for air conditioning at

a future date and accommodates 700 employees working in this division.

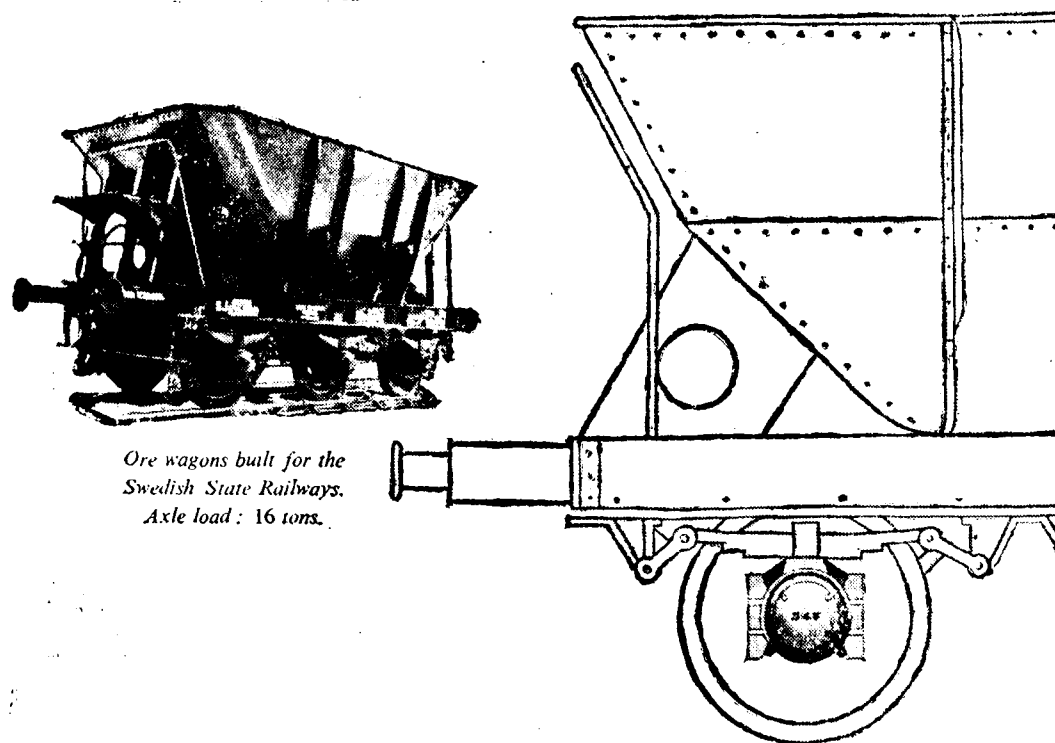
Mr. Shah Nawaz Khan paid tributes to the Southern Railway staff on the efficient running of the administration of this section. He said that during the short period after divisionalisation, Madurai division, which was the biggest of the eight divisions on the Southern Railway, had progressed remarkably and he found during his tour that the passenger amenities and catering arrangements on this section were satisfactory. Taking over of the Quilon-Ernakulam line on this section in due course would add to their burden and a great responsibility devolved on them to conduct the administration of this section efficiently.

The Minister said that right from the beginning of the Second Plan period the whole country knew that the heaviest burden would fall on the Railways and "I am very glad to say that so far we have lived up to the expectations of the nation. I am glad to notice wherever I go whether in the north or in the south there is a spirit of great determination amongst railwaymen. Railwaymen are determined to see that the Second Plan is fulfilled. I was told by representatives of labour that they may have many grievances and hardships to face but they will work with vigour and will do nothing which will retard the progress of the plan. This is a very commendable spirit and it prevails amongst all officers and staff of the Railways in the country."

1 000 000 SKF AXLEBOXES

1,000,000 **SKF** roller bearing axleboxes! Seven figures proving more conclusively than many words the confidence in which **SKF** roller bearing axleboxes are held by railway engineers all over the world!

Experts in no less than 50 countries know from experience the advantages offered by **SKF** axleboxes in reliability and economy. Manufactured from the finest quality raw material to the highest degree of accuracy, and backed by a world-wide service organisation, **SKF** axleboxes have built up a reputation second to none.



Ore wagons built for the
Swedish State Railways.
Axle load: 16 tons.

SKF MEANS THE RIGHT BEARING IN THE RIGHT PLACE

SKF

THE SKF BALL BEARING CO. PRIVATE LTD.

P.O. BOX 71
BOMBAY

P.O. BOX 588
CALCUTTA

P.O. BOX 66
MADRAS

CORROSION OF STEEL COACHES

Discussion by I.C.F. Technical Society

A meeting of the I.C.F. Technical Society was held at 5 p.m. on the 24th June 1959 in the auditorium of the Technical Training School of the factory. Officers and staff numbering over 150 assembled at the auditorium for the meeting.

The subject for discussion was "Corrosion of Steel Coaches." Mr. Roth of Paul Lechler, West Germany, and Mr. W. J. Braem of the Swiss Car and Elevator Manufacturing Corporation, who visited the factory, were the principal speakers and they delivered lucid lectures on the subject. Mr. Roth spoke in German and his speech was translated into English by Mr. W. Stolz, the Superintendent/Designs. Mr. Roth spoke on the prevention of corrosion by proper use of paints and by proper methods being used for the preparation and application of paints. Mr. Braem lectured on the design aspect of the coach *vis-a-vis* corrosion. Shri K. Swarup, Chief Mechanical Engineer, wound up the discussion and dealt with the steps

being taken in the I.C.F. to prevent corrosion. A vote of thanks was proposed by Shri M. Lal, the Secretary of the Technical Society and the Principal of the Technical Training School.

At the outset, Shri K. Swarup, our Chief Mechanical Engineer, made a short introductory speech. He referred to Mr. Braem's association with the factory as the leader of the Swiss Team who were our consultants in the initial stages and said that he was mainly responsible for the fast pace in which the know-how of coach-building was imparted to us. He welcomed Mr. Braem who had come to the factory to advise us on corrosion problems. He also made mention of the presence of Mr. Roth, representative of M/s. Paul Lechler, the famous West German firm who are manufacturers of bituminous paints, and said that he had come on a deputation to India to advise us as to how preventive painting could be adopted to prevent corrosion of coaches. In conclusion he requested Mr. Roth and Mr. Braem to deliver their addresses.

Speech delivered by Mr. Roth and translated by Mr. W. Stolz, Superintendent/Designs

"Protection against corrosion is a special problem and covers a vast field. Therefore, the reference in this speech will be particularly confined to corrosion in connection with steel. It is a well-known fact that considerable amounts of money are lost due to corrosion. Since we know today why and how corrosion takes place, we are also in a position to prevent

it. I would like to draw your attention to the fact that there is a vast difference between theory and practice in prevention of corrosion. In theory, each and every problem of corrosion can be solved. In practice, this is more difficult, since in certain cases, the prevention against corrosion would result in high prices of the product. I would like to give you an

example. For instance, five years back, all gas reservoirs in gas-producing factories have not been painted, *i.e.*, not protected against corrosion, but were just left in service until they completely corroded, and they were replaced, afterwards, by new ones. The reason for it was that no suitable paint against corrosion was available at that time, or the cost of a suitable paint was so high that it was not an economical proposition to use such paints. Paint technique has, however, developed fast and new methods of prevention against corrosion were found. On the other hand, new technical problems came up also due to latest developments in techniques. In the years gone by, you did not find so much corrosion due to exhaust gas, but today, with all the new machines, engines and diesel engines incorporating the latest development in fuel, the danger of corrosion has become more and more acute.

"From what I have said, it must appear obvious that there is a constant race between the latest developments in technique, and consequently latest developments in paint technique, in order to safeguard the products against corrosion.

Corrosion in Railway Coaches

"For obvious reasons, you cannot afford to have corrosion in Railway Coaches and therefore, it is absolutely necessary to provide for preventive measures. There are two main reasons why you cannot afford to have corrosion in Railway Coaches. The first one is the safety, and the second one is the vast investment of money which a railway coach represents. Therefore, it is obvious that coaches have to be protected against corrosion.

"Corrosion in this particular case means protection of the steel surface against water and atmosphere. This is possible with a good construction of paints, which has to resist water, atmosphere, oxygen, alkali and acid. It must be mentioned that in practice, as you know, you seldom find concentrated acid in

Railway Coaches. But we must also remember that even slight traces of acid can be dangerous in course of time. The first problem which has to be tackled in the prevention of corrosion in a Railway Coach is the choice of the proper construction of paints. There is no product or brand in the world market which is good enough for each and every application. I would like to mention that it would be a great advantage for any paint manufacturer if such a universal product would be available, since it would mean that the paint manufacturer would only have to deal with 3 to 4 products instead of the 150 as they have to deal now. On the other side, not only the choice of the construction of the paint, but also the technical service, *i.e.*, the knowledge as to how to use the paints is highly important.

"In practice, there will always be a compromise between the best protection against corrosion, *i.e.*, the most expensive paints, and the economy of the whole painting, which has an influence on the price of the product. It is very unfortunate that I have to tell you that most of the consumers, at the first, look at the price and not at the product. Good paints cost money and no paint manufacturer can afford to sell a good quality of paint for a low price. It is absolutely wrong, when considering paints, to just choose the cheapest. In almost all countries, specifications for paints are usual, but in my opinion, a specification should not only give the minimum amount of the ingredients to be used in a paint, but should also give the minimum results expected from a certain composition. Specifying minimum amount of ingredients means that a less serious paint manufacturer will, naturally, resort to the use of the minimum material, which is not the case with a highly reputed paint manufacturer. You have a great advantage if you buy paints according to brands, since in such case, the producer of a certain brand takes the full responsibility. If paints are ordered accord-

ing to specifications, the specification has to take the responsibility and not the paint manufacturer.

"It is not the purpose of my speech to talk about different kinds of paints, since in this respect, a large variety of books are available in the market dealing with this matter. I would like to give you examples from my experience which we make use of in the day-to-day collaboration with our customers and users.

"The difference between practice and laboratory tests is sometimes so pronounced that even in our own laboratories we cannot exactly follow what the result actually asks for, but we have to come to a compromise.

"Protection against corrosion means, to safeguard steel and not the rust. Consequently you have to remove all the rust from the steel before you start painting. In other words, very important is the surface preparation. An absolutely clean surface of steel can practically only be achieved by shot or grit blasting. American experience (Dr. Foster) has shown that the steel surface after grit blasting is getting porous, that means, pores upto a depth of 2 milles (2/1000 m.m.) will occur, if you use a graduation of grit which lies between .7 and 1.2 m.m. Therefore, if you are sand blasting or grit blasting, you should always remember this point. A common rule says that the thickness of the paint film should be 3 times thicker than the deepest pore in the surface.

"The first important point to be watched in order to obtain a satisfactory paint is that the surface of the steel is absolutely clean and dry. Consequently, you cannot use wet sand or grit for grit-blasting. Furthermore, if compressed air is used for cleaning purposes, such system should incorporate oil or water separators.

"There are different schools of thought how rust can be prevented. One says that you

should protect your steel surface by cathodic protection. Another says, by phosphating. A third one calls for various coats of paints. Not all the 3 systems can easily be used in practice. Nowadays opinions are coming closer for a primer which provides for penetration into the steel surface, *i.e.*, into the pores, giving a cathodic protection to the steel surface. Generally, all paint experts are clear on one point, *i.e.*, the system as already used 25 years ago with linsced oil based red lead would be the best. Today, when everything should be done with great speed in order to serve the mass production belt, such a procedure has become impracticable since the drying time of red lead comes to about 4 to 5 weeks. It is not only important to use a good paint to have a clean and dry surface; it is also not so very important if you reach a paint film thickness of 8 milles or 10 milles (8/1000 or 10/1000 m.m.), but it is very important that you can achieve a film thickness of 200 milles (200/1000 m.m.) in 4 coats, since this is much better as when you could achieve a paint film thickness of 250 milles (250/1000 m.m.) in 1 or 2 coats. The reason for this is that each paint which dries physically (not in drying cabins) remains porous. Therefore, there is a better possibility of obtaining a non-porous paint film with 4 coats than with one or two coats. Also from the point of view of porosity in a paint film, brush application is still today preferred to spray application, if you can afford it for cost reasons. Spray painting definitely allows the application of thicker layers. On the other hand, still-remaining dust on the steel surface will not go into the paint when spray painting, but will be pressed on to the steel surface. In order to avoid this difficulty, it is a common practice to provide the first primer coat by hand brushing in case you resort to spray painting. A further important point is the drying time of the various paint materials. Drying times of the various coats have to be maintained carefully, since otherwise it may happen that

if you apply a second coat over a coat which has not yet settled properly, the paint will start blistering. We have to distinguish clearly between a certain drying time to be allowed for between two applications of paints and the complete drying time for the full paint construction. It must be mentioned that, between subsequent coats of paints, only a certain drying time is required and not the full drying time. Generally speaking, fast drying paints are desirable, but do not always bring the best results. The practice has shown that great care is required in economising labour for paint work. Particular attention is drawn to the fact that economy in labour in this particular case leads to unsatisfactory results, since for easy and quick application of paints, this will be thinned excessively. The danger, as you can yourselves imagine, will be a too thin paint film which does not provide for the necessary protection.

"Now comes a very important point, *i.e.*, the maintenance of the painting. The paint work on a Railway Coach is not finished when the last coat has been applied. If you want to economise money, it is the best to examine your paint from time to time. Small defective places can be touched up at once since preven-

tion is always better than costly repairs of the paint work after a certain period. A lot of money can be economised in proper maintenance of paint work and in doing so, you will not find yourselves confronted with a completely broken down paint.

"In the years gone by, the collaboration between the designer and the paint manufacturer was not always very good. Each one was working separately for himself on a certain problem. But today we have fortunately come to an excellent collaboration between design engineers and paint manufacturers and it must be mentioned that by such collaboration we have been able to obtain excellent results. If the designer watches on the design side that there are no pockets and no inaccessible parts provided, which cannot be painted during maintenance or even right from the beginning, if the manufacturing shops ensure proper surface preparation, proper drying time and well trained labour, if the maintaining railway plays its part in the maintenance of the paint work, and if the proper paint is produced and proposed by the paint manufacturer, then the final result must be a construction of paint which itself can protect your product against corrosion over a long period of years.

Mr. W. J. Braem's Address

Rising amidst cheers Mr. Braem said :—

"I am asked by Mr. Swarup to add some specific remarks on the corrosion problem from the designing side of machinery, of course specifically coaches. And you all know that we are gathered here or we have gathered in meetings here, to solve the problems when the test came up, unfortunately I must say, due to certain circumstances which I may explain a little bit afterwards.

"Mr. Roth has just finalised his words with

the sentence "if the designer has properly done and that, that and that of painting, then the corrosion problem can be solved." That means, not only the painters or the paint manufacturers have to do their share but also the designers and, in this respect, I would draw your attention to some points we have kept in mind since long in Switzerland when designing coaches.

"First of all, I can tell you that the light weight all welded steel coach not only has been

created for the sake of lighter coaches or for a modern design. It has also been created due to the fact that, when welding, we can eliminate many many overlapping joints which are unavoidable when rivetting. Unfortunately of course I have to mention that still in our coaches we have some overlapping joints on stiffeners or at the place where we spot-weld the window pillars to the side wall sheets. But we are trying to eliminate all these overlapping joints to the very minimum and we have also started to do special protection underneath these joints. In the earlier years when we started the all welded coaches, we did not have any proper paint for overlapping joints when they were spot welded. The paint, when spot welding, got burnt and formed some kind of dust that needed some space and so on. Today we have special paints already so that such paints simply flow little bit away when coming in joining parts where they would harm afterwards to lead to corrosion. We have on the other hand for our bogie, we have here avoided to take girders, box girders for the framing, because we were afraid that it is simply not possible to make them fully airtight. So that here or there one of the long welding seams may leak a little bit. When I say the leak I mean not that water drops can go through, but that these girders can breathe the air. At night when it is cooler the volume of the air inside the girder gets smaller ; then it sucks in air from the outside. During daytime the same air is being heated by sunshine, by temperature, especially in your country, and the heated air, the warmer air, needs more room and is pressed out against this air. So there is, as we call it, breathing. This breathing, of course, brings inside the girder humidity and air and that is just the point where we cannot watch and check it. But Mr. Roth said we should design it in such a way so that every spot can be checked in time. That is why we have in our bogies, as in Switzerland as well as in your bogies, chosen the open girders,

i.e., formed girders. We are well aware of the fact that in these girders more dust can in a way collect. We are also well aware that, when overhauling such bogies, the cleaning needs a little bit more time, that we have no closed pockets and no parts on which we have no control. We know what would have happened on the shell if we had box girders on the bogies ; we would have to be afraid that there we would have done a wrong thing in designing.

"Then, a very dangerous point. These are all ends where we apply shearing or nibbling or similar kinds of operations. These sharp edges can in fact never be painted correctly. That is why we have on our drawings always mentioned that we have to take away the burrs and, on thicker plates, we even chamfer the edges so that the paint be better covered. But these different special points we have to specifically hear. Then we must know that corrosion prevention means stopping the start of the corrosion when we can.

"I once more may mention about the two different procedures, spray painting or applying the paint by brush. Here also quite some discussions have gone on and I may say there are experts who are for that and all other experts are pleading for this. There is the matter of corners. I think here of a side wall sheet which is welded on window pillars, each pillar to the side wall, corner here, corner there and it is a fact that corners are not likely to be painted correctly by spray painting. Because the compressed air that should bring the paint into the corner does not reach it and in the rear corner where we would like to have a good layer, a thick layer of paint, we get very rarely a good protection. For this reason we in Schlieren spray paint the outside coach but today we also still apply the prime coat in the shell with brush. That when doing so again here I see once again the same what Mr. Roth has also

mentioned that we have to stick extremely well to the rules and regulations given by the paint manufacturer. That means we have to adopt the schedule that is given to us for applying the first coat, then in the intermediate time, drying time, apply the second coat. It may be so when we are applying the first coat and there may be not long enough when you take away with the second coat and the first coat with the brush. But it is not thick enough ; that is clear here. And on the other hand if we wait too long, it may happen that the second coat does not stick properly or does not fit in properly any more because it has already too dried or too seasoned, if I may say so, on the first coat. These are facts we have to keep in mind and in addition to that, if you claim it, I would also like to draw the attention that the climatic conditions are quite different here and there. At least in India or in Switzerland or in winter in Delhi and in winter here. The humidity of the air, the outside temperature all that counts and all that has to be taken into consideration.

“Now I would like to mention a few words about the case we are dealing with just at the very moment. I don't think that this is secret that we have some coaches now which show signs of corrosion underneath in their

girder parts just underneath the underframes. As I have said it now I have done, I must admit that Schlieren was overruled with the question of climate to a certain extent. What we have done in your coaches that the skirting from the side walls down at the joining with the underframe. That this is similar what we have in Switzerland stands out wonderful. But for your climate, especially for your wet climate and for humid climate what we have done in ventilation, in precautions for ventilating the in between spaces of the outer, of the outside skin and the inside furnishing linings—that was too little or has proved to be too little, because the draining holes, fairly large draining holes, of 1" diameter have also got blocked by dust that is coming in between the flush down by the side walls and the windows down into the window pockets and sticks there and forms a dangerous mess that leads to corrosion. On the other hand I am very happy that I can state all above as to that wonderful and I feel that we now change the design what just I have discussed. This must go hand in hand for corrosion protection when changed design in a proper way the solution has been found. We will not have any more trouble. We will also clearly have solved this problem. The I.C.F. shall continue with making integral coaches for the benefit of Indian Railways.”

Concluding Remarks by C.M.E.

In his concluding remarks, Shri K. Swarup, Chief Mechanical Engineer, observed :—

“The most important one to my mind seems to be the preparation of the surface, the proper application, the proper drying times and then the proper maintenance of the coaches.

“Mr. Braem has also told us that in Switzerland the same coaches with the same construction, with the same application of paint, have been standing well for the last 20 years. In our country we find that after 7 years, certain

amount of corrosion is taking place on the skirts just below the sole bars.

“That proves two things. The first is that our climatic conditions are different to that of Switzerland or Germany. The second may be that our maintenance is not as good as in Switzerland.

“For the design aspect, as Mr. Braem has told you, we are already taking remedial action to prevent collection of dust and water in the skirt. There again from what we saw in these

last 2 or 3 days it is very necessary to work very carefully as far as paint is concerned and especially the grit blasting. We found in quite a lot of places lot of grit having collected. Grit mixed with water has formed into heavy dust and that has started the corrosion. In many other places we noticed that due to the bad workmanship lot of wood shavings, rubber from the cables, rubber from the window holes and quite a lot of bolts and nuts were found lying in between the exterior panelling and the interior panelling. You will all agree with me that all these things tend to increase the corrosion. Therefore, my request to the I.C.F. workers is that we must be careful in seeing that all these extraneous materials do not fall between the exterior and interior panelling and that every precaution is taken to suck the grit that may fall in these places. For the furnishing side the important thing to watch would be that when decoliting, the solution from the decolite does not fall within this skirt and the carpenters and the Electrical Fitters don't

throw in wood shavings and cable joints inside the skirts. We are providing bigger holes so that if due to carelessness some of these things fall, due to the vibrations they will fall out. But prevention is better than cure. We have, therefore, to prevent this careless working.

“To my friends on the Southern Railway I would request that they should look after these steel coaches as if they would look after their car. They need proper attention and if they are properly looked after, I am sure, we can get the same life of these coaches as on the Swiss Federal Railways.

“One thing more that we noticed was that the corrosion can also not be only due to water and atmosphere, but also due to abrasive action. We found lot of dust going in and possibly with the suction there was blast of air with the sand which went and abraded the painted surface thereby exposing them for corrosion.”

PRODUCTION, PLANNING AND CONTROL

(Speech delivered by Shri K. Swarup, Chief Mechanical Engineer, at the inauguration of the Production, Planning and Control course under the auspices of the Regional National Productivity Council.)

"Our country is one of the poorest and the standards of living are probably the lowest. Our constant endeavour is to raise these. The Five-Year Plans, the promises made to the people of India, and our very existence depend upon our ability to meet the challenge to produce more and more in order to meet the consumers' requirements at a cheap and reasonable rate.

"The aim of the National Productivity Council is to impart knowledge and education amongst the technical men and others interested in the management of national and private industries, as to how the productivity could be increased.

Though we have taken up this work belatedly and have a long leeway to make up, I am sure that with the co-operation of the leading industries, the Government and the labour leaders, we can go a long way to meet this challenge and make available the consumer goods at reasonable and cheap prices.

"We hear so much about Productivity, but I wonder how many of us appreciate its full significance. Productivity may be defined as 'the full, proper and efficient utilisation of available resources for maximising production of and minimising waste in goods and services of the kinds most wanted by the consumers

at the lowest possible cost.' This definition of productivity is rather awe-inspiring but with proper planning and production control methods, a lot can be achieved. Our conception so far has been to produce goods in India and ask for a protection tariff to protect the goods produced, without any consideration whether consumers are in a position to pay for it. This might have been alright in the initial stages when he had to start industries to be self-sufficient and to eliminate dependence upon foreign countries for our requirements. If we have, however, to increase the standards of living, making available to the men at large most of the modern amenities and goods, we have got to think of producing them at a reasonable rate which a common man can pay. If we do not do that, inflationary tendency will develop and though our average income may increase, the actual benefit enjoyed by the common man will be negligible.

"In the context of these, the programme of the National Productivity Council deserves special consideration and encouragement by all of us. They are going to have various services at the disposal of the industries, and from what I understand, they are going to get foreign experts to give this expert service.

"The programme drawn up by the National Productivity Council covers broadly the following :

Information activities

(a) *Library* : An up-to-date library containing productivity and related literature is projected for the N.P.C. Headquarters at Delhi.

(b) *Publications* : The N.P.C. proposes to bring out a series of pamphlets on various subjects relating to industrial productivity.

(c) *Inquiry and Documentation service* : Technical Inquiry Service and Documentation Service will receive enquiries from the industries and process them within the country as well as abroad for supplying answers to them. Documentation of the latest publications and

periodicals will be made in the N.P.C. for supplying to the industries.

(d) *Productivity Films* : A comprehensive library of productivity films is being organised for launching the audio-visual activities.

Training programmes

A comprehensive programme for organising training within the country in various subjects of industrial productivity to suit all the different levels of management, has been prepared and is being organised by specialists in the subjects.

Inter-plant visits

Training is sought to be achieved also by promoting and stimulating inter-plant visits for exchange of experience and knowledge.

Productivity study teams

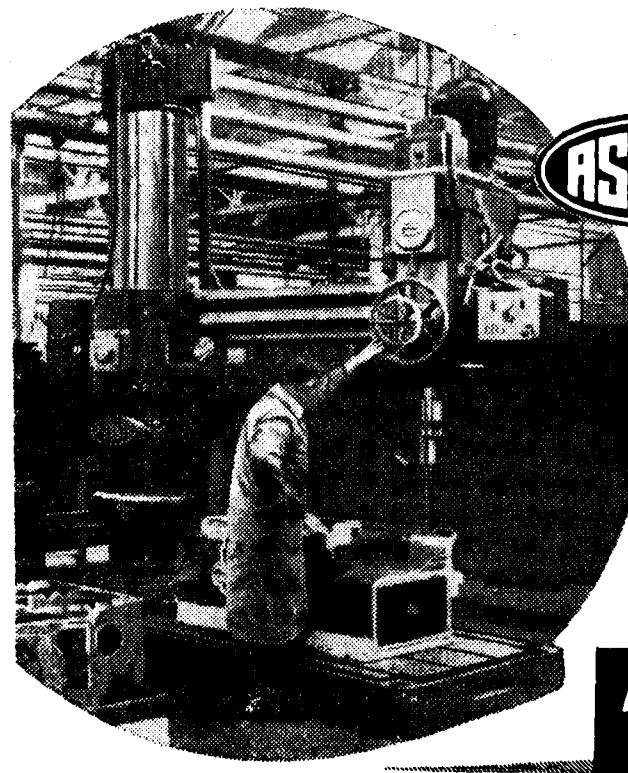
Development of techniques of scientific management and industrial engineering, as well as study of technical operations in specific industries, is sought to be promoted by sending abroad Productivity Study Teams of the various industries.

Productivity research

The N.P.C. proposes sponsoring research in subjects of industrial productivity.

"I would recommend that all these services should be taken full advantage of. In addition, the leading industrialists and labour leaders will have a common forum where they will be able to discuss their day-to-day problems and exchange ideas. These forums have proved very useful in the western countries and I believe that they will also be very helpful for us in India if run in the proper spirit and with proper guidance.

"Before I touch on the subject of the day, it may perhaps be worthwhile to give the experience that we have obtained in the Integral Coach Factory. As most of you will know, the production in the Integral Coach Factory was inaugurated on the 2nd of October, 1955, and that we had entered into a technical collaboration with a Swiss Firm. Certain targets were laid by the Government of India





For
 ● **Rapid**
 ● **Continuous &**
 ● **Accurate**
Production

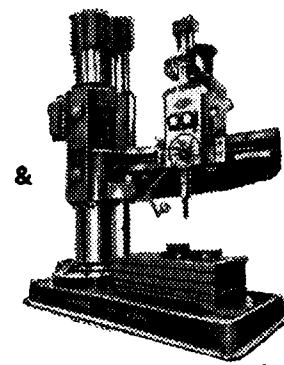


Illustration shows the O.D.3 model radial drilling machine. Capacity up to 3 in. from the solid in mild steel. Available up to maximum arm radius of 10 ft.

MADE BY
WILLIAM ASQUITH LIMITED
 HALIFAX, ENGLAND.

MACHINE TOOLS (INDIA) PRIVATE LTD.

CALCUTTA
 BOX 585

BOMBAY
 BOX 512

BANGALORE
 BOX 697

in consultation with the foreign collaborators which it was thought was possible to be achieved. It is common knowledge that these targets have been beaten and have been far exceeded. It may be also mentioned that in achieving these targets we have been able to bring down the cost of manufacture considerably. Within the first three years we were able to produce the shell at a cost equivalent to the cost prevalent in the European markets. During the last 12 months we have been able to bring it down still further and we are now producing at about 20% less than the ex-works price in Europe. The man-hours employed in the production of a coach also compare very favourably with those prevalent in Europe. The general belief that the output of an Indian worker is about half of that of a European worker has been exploded. Our workers are producing nearly as much as a Swiss worker does in Switzerland. All this has been achieved due to systematic planning and production control methods employed. The greatest contribution can be attributed to the Training Programme that had been introduced in the Integral Coach Factory. We trained our supervisors and workmen in a very thorough manner and did not flinch the expenditure. This has paid us good dividends and, as mentioned earlier, it is because of the detailed knowledge that each man had on the shop floor that it was possible to beat the targets and produce the coaches at a lesser cost. From my own experience, therefore, I can definitely state that if our supervisors and men know exactly what to do and are given the suitable equipment and plant, they are second to none. I must also mention here the full co-operation, rather family-spirit, that pervades the Factory right from the top of the ladder to the lowest in the rung, and this had contributed very largely to the success achieved in the Factory.

What is meant by Production Planning and Production Control. Planning means the determination of a proposed method of action.

It is a methodical technique of looking ahead in order to anticipate possible hindrances and eliminate them before they take place. Planning is a constant reviewing of future needs, so that present action can be adjusted in view of the established goal.

Planning is necessary as a means of waste elimination and cost control. Planning, therefore, has to be done at all levels; and in a Factory, it is confined to the following three phases :

- (a) Research and exploration ;
- (b) choice of resources, facilities, methods and procedures to be employed ; and
- (c) codification of plans.

I will not go into further details at this stage, because I am sure you will be told more about it in your course.

Scheduling : Scheduling may be defined as a fitting in of specific jobs into a general timetable so that orders may be manufactured in accordance with the contracted liability, or in mass production. The work of scheduling, in particular in job-order manufacturing firms, calls for considerable care and thought.

Progressing : For the follow-up of instructions issued by Planning and Scheduling Departments, you must have a systematic chasing organisation which will follow up the work during the various stages, which will watch for delays and take remedial action and which will, above everything else, maintain a proper record for future guidance.

Methods engineering and time-and-motion study : This is also a very important subject and should receive special consideration, as it is a well known maxim that no process is perfect. Existing methods and processes must, therefore, be subjected to continuous scrutiny.

Time-and-motion study is a science in itself, and suffice it to say that since the advent of time-and-motion study, methods have been defected for measuring the time required for a particular job, resulting in proper labour-

management relationship ; and a powerful searchlight has been made available for focusing on the attention of management on time and material consuming practices, material control and handling. This is one of the subjects which has been sadly neglected in this country.

There are various other phases of production control, which I am sure, you will be learning during your course.

I would like to mention that the productivity in our country is unfortunately very low as compared to that in more developed countries. For instance, in our Iron and Steel Industry, labour productivity expressed in tons per man-hour is as low as 25 compared to about 125 in U.S.A. The same thing applies to our Textile Industries and so many other industries. This low productivity cannot be attributed to less outturn from men, but due to various organisational and other policies.

Another thing that I would like to impress is that the quality of the product should be standard and every possible care given to maintain it at that level. I hear of so many complaints that the quality of goods available in the market cannot be depended upon. My own experience is the same. There is, therefore, a general tendency is most of the industrial concerns of repute in India to manufacture everything themselves instead of subletting it to the others who can specialise, mass produce and supply it at a cheaper rate. Somehow or other, the specifications are not adhered to and the quality keeps on deteriorating after first supplies have been found to be satisfactory. In the case of the consumer goods you generally find the same complaints. It is, therefore, of paramount importance that proper quality control should be exercised, if we have to develop subsidiary industries and export markets.

In conclusion, I would like to stress the following for the benefit of those who are

taking this course on Production Planning and Production Control :

(i) By proper planning and visualising various pitfalls you can make any business a success.

(ii) Production controls must be exercised by business executives to ensure that they are obtaining the results planned. If not, detailed investigations and remedial actions are necessary. It is not enough to plan well and hope for the best.

(iii) The third important point I would like to mention is that in the present world by individual effort one can obtain very little. The whole management and the workers must work as a team and develop a team-spirit so that there is absolute confidence and interchange of ideas in the whole organisation. From my experience, I can say that this is one thing from want of which Indian industry suffers most and if we have to find our place in the industrial world this has got to be developed.

(iv) The fourth and a very important point to which I would like to draw your attention is the human relationship. This is a very wide subject and all that I would mention here is that there should be a clear demarcation of duties and delegation of powers in every organisation. It is also necessary that proper contacts from the highest to the lowest to develop a sort of a family spirit should be encouraged. The aim of everyone should be to understand difficulties and grievances of every other member and help to solve them satisfactorily in the overall interests of the organisation. It is only then that the best results could be obtained and the organisation progress from success to success.

A FEW HINTS ON WELDING

Penetration

Penetration as defined by the U.S.N. is the ratio of the volume of base metal remelted by the deposition of a single electrode and the entire volume of weld metal created by it.

Some of the factors relating to penetration are

- (a) A machine setting of low open circuit voltage and high amperage.
- (b) A short arc length.
- (c) Positive polarity type electrodes, all positions.
- (d) By weaving electrode in and out of weld puddle.
- (e) Plates properly spaced.
- (f) Melting point of the base metal.

(g) Speed of travel should be slow.

(h) A low carbon electrode in place of a high carbon one.

(i) A high carbon base metal in place of low carbon.

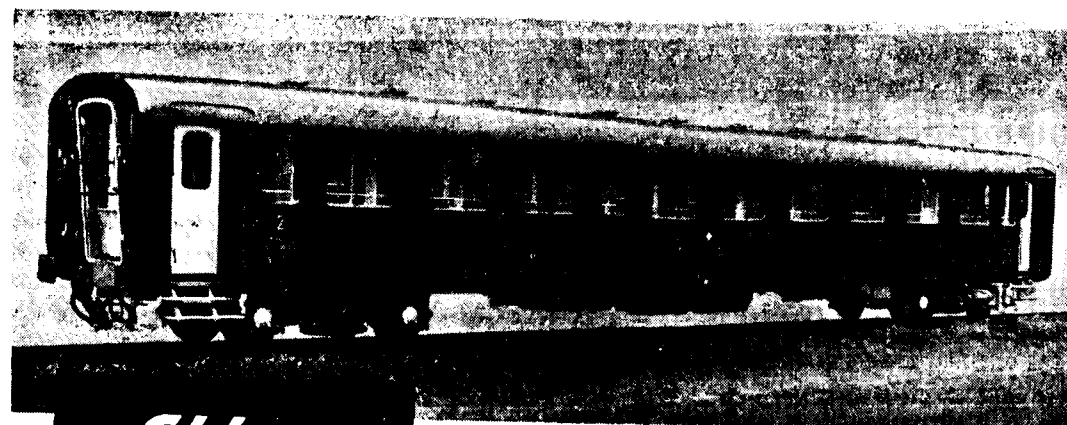
(j) Melting point of the electrode.

(k) Tilting the work a few degrees from horizontal and welding toward the high point increases penetration and if less penetration is desired weld from high point to low point.

(l) Pre-heat increases penetration.

The effect of alloying in metallic arc welding

If the base metal and electrodes are of a dissimilar analysis, the weld will be of still a third analysis.



Schlieren

**Mainline Coach type B4ü for
International Traffic built by
SCHLIEREN**

9 compartments totalling 54 seats.

Air-heating combined with press air-ventilation for summer service. These coaches are equipped with the latest bogie type SCHLIEREN w. helical springs.

Length over buffers 23,7 m;
Tare weight: 33 tons.

Swiss Car and Elevator Manufacturing Corp., Ltd., Schlieren-Zurich (Switzerland)

If the weld is made in multiple passes the weld analysis will vary from top to bottom.

The amount of alloying is much greater in the first bead than in the succeeding ones.

The amount of base metal in the first bead will be about the same as the amount of the deposited metal.

On 1/4" plate with 5/32" electrodes, plate and electrode being dissimilar, 50 per cent dilution was obtained on first bead with only 10 per cent in the next one.

To increase the alloying effect

- (a) Use of narrow bevels.
- (b) High current values.
- (c) Use of deep penetration electrodes.
- (d) Single pass welds over multiple pass ones.
- (e) Double V bevels over single V.
- (f) Close fit up.
- (g) Use alloyed electrodes.

Craters

Craters often are sources of cracks, because the crater cools more rapidly than the remainder of the bead, and because the crater solidifies from all sides toward the centre, thus favouring shrinkage cracks.

The shrinkage cracks in craters are related to the drawing away of the solidified boundary metal from the mushy centre of the crater.

The crater appearance should be smooth, free from any porosity or blisters and not too shallow.

Crater cracks are encouraged by porosity or a blister because the shrinkage stresses concentrate around this condition.

Blisters are caused by overheating the crater.

Porosity is caused by the trapping of Gas and Slag. Proper technique used in the manner the electrode is withdrawn from the crater, prevents this condition. Insufficient current for the size electrode being used can cause slag

and porosity in the crater, while excessive current may cause a blister in the crater.

Undercutting

Is a condition where the melted base metal has not been filled with the deposited metal. This condition is more frequently found in fillet or semi-fillet welds, but can occur in any type of weld.

It is most generally caused by

- (a) Excessive arc length
- (b) Too much current
- (c) Improper angle or electrode
- (d) Poor fit up.

Overlapping

A condition where the base metal has not been melted previous to deposition, and is frequently found in fillet welds but as in the case of undercutting, this condition can occur in any type of weld.

Overlapping is most generally caused by

- (a) Carrying too much metal in the weld
- (b) Not hesitating long enough to melt the base metal; by moving the electrode so fast that it cannot form a crater properly and deposit all of the electrode material into the crater.

Segregation

Is the difference in composition between the centre and outer portions of the solidified ingot. When rolled into sheets, if this condition is serious, it can cause hot shortness and porosity.

It is caused by the freezing of the material in the mould, the first material that freezes is rich in iron, the remaining liquid at the centre is richer in carbon and sulphur. Segregation is not observed in fusion welds unless the sulphur content is high; in that case hot shortness and porosity may be noticed.

Laminations

Slag inclusions that occur in the ingot are elongated when the ingot is rolled into sheets;

if these fibres are unusually large they are called laminations.

When heat is applied on a laminated sheet the laminations will open apart ; should they be detected the sheet should be discarded ; very seldom do they get by the steel mills inspection.

Slag inclusions

Under the arc the slag is churned into the weld melt, which is benefited by it ; farther from the arc the slag particles gather to form the covering for the solidifying weld metal. The larger the slag particle the more rapidly it rises to the surface where it joins the rest of the slag ; if globules of slag are trapped among the growing crystals, slag inclusions will appear in the weld metal upon cooling.

The depth of the melt has little effect on the trapping of slag ; the hotter the melt the more fluid and the less resistance is offered to the rise of the slag globules. So the faster the rate of cooling ; the greater the likelihood of trapping slag ; the fact that slag inclusions are more frequent in overhead welds where fast rate of cooling is necessary to keep the metal from falling out of the melt proves the above.

Causes of slag inclusions

- (a) Excess current to the extent it overheats the electrode thus speeding up the deposition of the metal and slag to a point where it impedes the rise of the slag globules, some of them being trapped in the solidifying metal.
- (b) The electrode heating up also decreases penetration causing slag to be trapped.
- (c) An uneven weaving motion of the electrode can trap slag.
- (d) If the slag is not cleaned out of the crater before the arc is re-struck, slag is sometimes trapped.
- (e) Insufficient current is another cause of slag pockets.

(f) Slag running ahead of the arc is sometimes trapped at the bottom of the bevel.

(g) In multiple pass welds, any uneven surfaces of the bead can hold small particles of slag ; if not cleaned properly the next pass sometimes does not remelt the surface completely, thus trapping the slag.

Blow Holes

Blow-holes are smooth, bright cavities of rounded contour, sometimes observed in fusion welding ; they represent bubbles of gas in the liquid metal that have not risen to the surface, due to the lack of time and to the viscosity of the weld melt.

Causes of Blow Holes

- (a) By overheating the weld melt.
- (b) An uneven speed of travel.
- (c) The gas solubility of the metal.
- (d) Oxidation.
- (e) Vaporization.

Summary

To prevent blow-holes, avoid overheating the weld melt. Arrange that the weld melt solidifies continuously. Agitation of the melt tends to favour absorption of the gases.

The surface of the weld melt is always at a higher temperature than the bottom of the melt, which causes the weld melt to freeze from the bottom up. This is favourable in forcing the gases out of the weld melt.

Fish-eyes

The dark gray rounded particles which serve as centres of the rupture known as "Fish-eyes" are identified as minute slag inclusions in all cases.

The rupture centres are present in layers of all grain sizes. A longitudinal separation of metal from the initiating inclusion precedes the transverse rupture that defines a fish-eye.

Fish-eyes are so minute that they are not considered to be very harmful. It is believed

that a full annealing will overcome this local weakness of the metal.

Weldability of steel

A piece of steel is said to be weldable when it can pass through the heat cycle of a normal welding process without developing a serious tendency to crack.

The tendency to crack depends upon two things, the residual stresses of welding and the ability of metal to withstand these stresses without cracking.

Factors affecting weldability

Oxidation—

- (a) Produces gaseous oxide of one of the elements causing gas pockets.
- (b) Produces solid oxide having higher melting point than the metal causing slag inclusions.
- (c) Produces oxides soluble that sink into the molten metal causing low strength and brittleness.

Vaporization—

- (a) Burning of an element at a lower temperature than the melting point of the metal.

Non-metallic inclusions—

- (a) Remelted inclusions forming visible slag pockets.

Change of structure—

- (a) The re-arrangements of the elements by the arc causing a change of the physical properties.

Gas solubility of metal—

- (a) Elements effect gases at some temperature ; a decrease of solubility with a decrease of temperature at chilling point may cause porosity.
- (b) Burning out an element may cause the capacity of the metal for a given gas

to decrease, causing an increase of gas in the molten state producing porosity.

- (c) Absorption of gases forming stable compounds with elements changing the composition and strength of the metal.

Coefficient of expansion—

High contraction of the weld metal upon cooling.

Hot shortness—

- (a) Low strength of the metal at high temperatures in the solid state.

Heat conductivity—

- (a) The rate of transfer of the heat from welded zone.

The heat effect on base metal

A weld area has three zones : Deposited metal, fused metal and the heat affected zone just outside the fusion zone.

The weldability of any metal to a large extent is a function of the welding heat effect on its physicals. Briefly the results of the heat effect are air-hardening if alloyed or high in carbon, the changing of grain size, the elimination of the cold rolled or drawn effect, locked up stresses, relief of existing stresses, the increase or decrease in hardness, the loss of desirable physical properties such as heat resistance, corrosion resistance, machinability, a change in the constitution of the metal or a change in the composition of the metal.

The grain size in relation to the heat affected zone is as follows : deposited metal fine grain because of the temperature above the critical point and a quick quenching effect, the fusion zone coarse grained because of the gradual slowing down of the quenching effect and the heat affected zone just outside the fusion zone a gradual decrease in the grain size because of the decrease in heated area. The time the metal is actually above the critical temperature

is so short that the quench action is sufficient to result in an increase in strength and hardness.

The width and nature of the heat affected zone is a function of the welding technique, welding speed and thickness of base metal. A common practice of heat treatment of welds is the partially relieving of the heat effects by heating to the temperature high enough to relieve strain (1100 to 1200 degrees Fahr.) but not changing the micro-structure. The other procedure is to heat above the critical point (1600 degrees Fahr.) resulting in changing the micro-structure and physical properties producing uniformity in the weld and base metal.

By this normalizing effect the heat affected zone disappears. Previous to this heat treatment the weld was stronger, harder and less ductile but the impact resistance was less than the base metal.

A decrease in the strength of the metal in the coarse grained area does not exist when the correct technique is used.

The critical temperature of low carbon structural steel is between 1300 to 1600 degrees Fahr.

Above the critical temperature, steels become non-magnetic ; as the temperature falls below the critical the metal suddenly becomes strongly magnetic ; this with other abnormal conditions sometimes produces magnetic bow of the arc.

Expansion and Contraction

It is a perfectly natural property of practically all metal to expand when heated and contract when cooled. The amount of expansion and contraction that takes place varies with the different analysis and condition. Some of the factors in expansion and contraction are :

- (a) Difference in the amount of expansion for a given temperature.
- (b) The rate at which the different metals will conduct heat.

- (c) That the expansion force cannot be entirely eliminated.
- (d) Expansion effects can be localized by using heavy chill plates to conduct away the heat.
- (e) The extent of the residual stress in the plates previous to the welding operation.
- (f) Steel is elastic when stressed to a point slightly beyond its yield point and when stressed to this point it yields, resulting in a plastic flow of the metal and permanent deformation.
- (g) As a general rule, metal will contract slightly more than it expands, therefore setting up stresses within itself if held rigid or changing its dimensions if left free to move.

Methods to reduce expansion and contraction

- (a) Always weld away from point of restraint.
- (b) The greater the width of the bevel the more distortion.
- (c) Make the weld in as few passes as is possible.
- (d) Proper distance plates are spaced.
- (e) Proper number and size of tack welds.
- (f) Keep fillet and butt welds parallel, don't cross welds with welds if it can be prevented.
- (g) Single fillets tend to pull out of line, weld on both sides whenever possible.
- (h) In multiple pass welds reverse directions of weld each pass.
- (i) Preheat and anneal whenever possible.
- (j) Use weights and clamps in setting up for welding.
- (k) In butt welding a thick plate to a thin one, bevel the thick one to the thickness of the thin one.
- (l) Plan welding sequence to cancel stress concentrations.

- (m) Use back step method in tacking and welding.
 - (n) Slow cooling allows better distribution of stresses reducing distortion.
 - (o) Thick plates impart a degree of fixed position counteracting distortion to some extent.
 - (p) Shrinkage stress concentrates in partly filled bevels setting up distortion.
 - (q) Do the welding on heavy chill slabs when possible.
 - (r) Finish the welding where distortion is the greatest once started.
 - (s) Peening properly done reduces distortion.
 - (t) Size of the weld.
 - (u) Operating factor.
- Factors relating to the hardness near the weld**
- (a) Welding speed.
 - (b) Size weld.
 - (c) Size electrode.
 - (d) Current density.
 - (e) Arc length.
 - (f) Preheat temperature.
 - (g) Heat treatment after welding.
 - (h) Number of passes.
 - (i) Carbon content of base metal.

- (j) Alloyed base metal.
- (k) Massiveness of base metal.

Heated area in arc welding is increased by

- (a) A decrease in speed of welding, current being constant.
- (b) A decrease in arc length, the energy being constant.
- (c) An increase in current, speed of travel being constant.
- (d) A decrease in the mass of parent metal.
- (e) An increase in preheat or removal of chill.
- (f) Use of thermal insulators for backing up of weld.
- (g) The number of passes.
- (h) The size of the weld.
- (i) Conductivity of the base metal.
- (j) Time of slag removal from weld.
- (k) Operating factor.
- (l) Climatic conditions.

In practically all cases any chilled bead will show an air hardened effect and generally the deposit has gas pockets.

The further you drive the air hardened zone away from the weld, the less it gets.

NEWS FROM SWITZERLAND

(Published through the kind courtesy of the Consulate-General of Switzerland)

Swiss Federal Railways introduce "Push-and-Pull Trains"

"Push-and-Pull" or "shuttle" express trains which operate on the major lines of Switzerland's railway network appear for the first time in the Swiss Federal Railways' new guide valid from June 1, 1959. These trains, consisting of six first class and six second class cars plus one dining car, do not have to shunt when changing the direction, as the engine can be operated from the other end by remote control, i.e., the engine will pull in one and push in the other direction. The doors of the whole train are closed automatically from the engineer's cabin. The new "push-and-pull" combination is especially time-saving at railhead stations, and it displays the considerable speed of 80 miles per hour.

The Simplon Orient Express is 40 years old

It was in 1919, a year after the Armistice of the First World War, that the Simplon Orient Express was first created. That famous train, which passes through Switzerland diagonally, from Vallorbe to Brigue, connects London and Paris with Milan, Trieste, Belgrade, Bucarest, Istanbul and Athens, passing through the Simplon tunnel which, with its twenty kilometres, still remains the longest tunnel in Europe.

A Swiss watchmaking masterpiece in America

During a trip to Switzerland, an American banker saw a very decorative universal clock and immediately decided to have a similar one placed in the hall of the new bank, which he was having built, at East Orange, in New Jersey. This is how Messrs. Gubelin Sons of Lucerne received an order for a replica of their universal clock. This piece not only shows the local time, but also the time at that very

moment, in any part of the world. This complex apparatus consists of a universal clock, a perpetual calendar and an indicator of the phases of the moon, the whole being driven by a central electric time-pieccé. This masterpiece possesses a mechanical complexity which is impossible to describe; we will restrict ourselves to saying that one of its cogged wheels takes four years to accomplish one revolution. It took a year-and-a-half to make this clock, and the two dials, the enamelling on which has been designed and executed by famous artists, are works of art in themselves. We would add that only three clocks of this type are to be found in the whole world.

An automatic vending machine of Swiss design

The "Zirobot," which was shown for the first time in the world, at the AIDA Exhibition, in Lausanne, is a real automatic "salesman." Contrary to what happens in the case of the usual automatic vending machines, into which it is necessary to introduce money, in the shape of coins belonging to a specified category, the Zirobot accepts all kinds of coins. It verifies them, adds them up and gives back the change. This machine has been invented by a Swiss engineer, Mr. Zindel, and was built in Zurich. Capable of presenting the customer with a hundred, or even more different articles, at prices ranging from 5 times 5 centimes to six francs (in other coins also) the Zirobot functions very simply. All one has to do is to indicate the number of the article chosen, by means of a dial (like those used on telephones) and to introduce the amount of money required. This automatic machine is very honest, as it not only gives the right change and throws back false coins, but it also returns all the money put in, should the sale not take place.

OPPORTUNITIES FOR PROMOTION OF CLASS IV STAFF ON RAILWAYS

The Government of India have accepted the recommendations made by the Railway Class IV Staff Promotion Committee which was appointed in May 1957, to examine the existing channels of promotion for Class IV railwaymen and determine new channels of promotion for them, preferably for uniform application over all the railways.

Class IV Staff (staff whose maximum pay does not exceed Rs. 60 per month) total 6.54 lakhs, out of 10.54 lakhs on the payrolls of the Railway Ministry.

The Committee made, in all, 30 recommendations, and decisions have been taken on all except two, which are under examination. Orders have already been issued to all railway administrations.

Pointing out that the chances of promotion for Class IV employees differ from department to department and even between units of the same department, the Committee has recommended that for the categories of employees for whom at present there are no avenues of promotion, new channels should be opened up by considering them for higher grades in their own departments or by transferring them to other departments. Grouping of posts so as to form larger units has also been recommended in order to avoid dead ends which at present occur in certain categories of posts. Both these recommendations have been accepted.

Government have also accepted the Committee's recommendation that no direct recruitment should be made to higher grades in Class IV except in certain special circumstances.

Another recommendation which has been accepted is that junior Class III posts like clerks, material checkers, store clerks and

issuers, cabinmen, shunting jamadars and brickmen, should, in future, be filled wholly by promotion.

In regard to clerical posts in the grades Rs. 60-130 and Rs. 60-150 such as commercial clerks, ticket collectors, office clerks, train clerks, etc., it has been decided that the proportion of posts available to Class IV employees for promotion should be raised from 10 per cent as at present to 15 per cent. The position will be reviewed periodically to consider the possibility of raising the percentage still further. (The Committee has recommended that the proportion should be raised from 10 per cent to 25 per cent and in certain cases to 50 per cent. Promotions should continue to be made by selection and posts will be linked with specific categories in lower grades on broad affinity of work so that roughly equal chances of promotion are assured for all categories.)

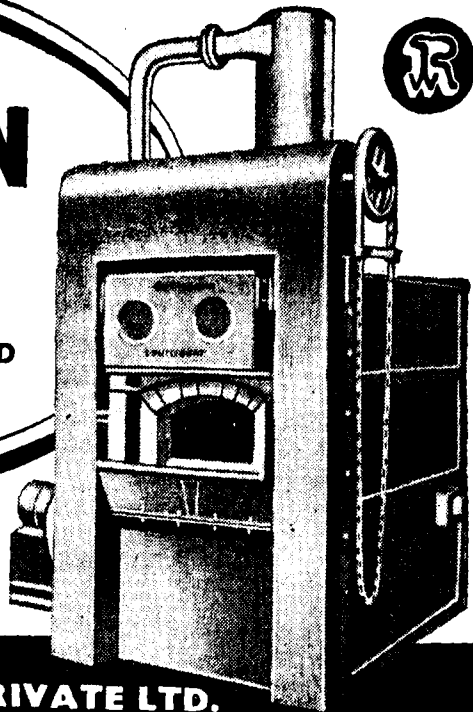
In the case of artisans, who comprise a substantial proportion of railway employees, the Government have accepted the Committee's recommendation that the proportion of vacancies for promotion from lower grades to the skilled grade of Rs. 60-130 should be raised from 33-1/3rd per cent to 50 per cent. However, this would be subject to the condition that the employees concerned attain the prescribed standard in the relevant trade tests. The total number of posts in the Rs. 60-130 grade is about 1,10,000.

The more important among the other recommendations accepted by the Government are :

The existing large number of designations of Class IV posts should be avoided, and designations and duties of Class IV staff on all railways should be standardised.

Where minimum educational qualifications are prescribed, railway administrations should hold examinations instead of insisting on formal educational certificates. In the drive for imparting literacy to Class IV workers, the co-operation of trade unions and social and voluntary agencies should be sought. A committee at the headquarters of each railway with two representatives of the administration, two from the union and one educationist should supervise the literacy drive.

The Committee's other recommendations, the majority of which have been accepted, relate to the training of certain categories of staff and increase in the avenues of promotion for certain specified categories of employees.



RUPPMANN

FURNACES

FOR GAS OR OIL FIRING, OR
ELECTRICALLY OPERATED

★

AVAILABLE IN A WIDE VARIETY
OF TYPES AND SIZES

FOR
FURTHER
DETAILS
PLEASE
CONTACT

SOLE DISTRIBUTORS

FRANCIS KLEIN & CO. PRIVATE LTD.

1, INDIA EXCHANGE PLACE, CALCUTTA-1 ● SHOWROOMS: 13A, GOVERNMENT PLACE EAST.

Resident Engineer In South India: I. S. SOMASHEKAR
10, Prithvi Avenue, St. Mary's Road, Madras-18. Telephone No. 71938

QUICKENING PULSE OF THE INDUSTRIAL AGE: OIL'S HUNDRED YEARS

Hundred years ago this August a man named Edwin L. Drake drilled a hole in the ground. The great venture, which had its initial setbacks, proved out to be one of the most creative of man's visions. For, the stubborn will and courage of a man thus heralded the birth of the oil industry which has during the last ten decades quickened the pulse of the whole age and changed perceptibly the face of this earth. The most efficient source of energy tapped from the underground, oil today powers machinery and vehicles of every description, and heats homes and buildings of every type. Increasing quantities of it are converted into a myriad of useful products through the science of petro-chemistry. Here is how it began.

ductor. While recuperating, he was named General Agent of the Seneca Oil Company and was sent to Titusville in 1858 to try to discover a means of obtaining commercially usable quantities of oil from company owned lands.

"Colonel" Drake, as he was called, was hardly fitted for the job ahead. He had only a grammar school education. Ironically, one of his qualifications was that he possessed a pass that allowed him to ride free on eastern railroads. Consequently, his train ride into Pennsylvania in quest of oil cost his backers no money.

In the next year Drake tried several methods for producing oil. First, he tried skimming it from the top of creek water by means of a series of specially-constructed traps. This method, already tried by others, produced only ten gallons of oil a day. At the same time, he had a crew of men attempting to sink a well. When this, too, failed, Drake decided to "bore" for oil in the manner used by salt drillers nearby.

Difficulty in obtaining a driller stalled operations until the spring of 1859 when a blacksmith named William A. "Uncle Billy" Smith agreed to undertake the task.

A series of cave-ins caused by ground water plagued the project which began to be known locally as "Drake's folly." After a time Drake decided to drive a six-inch pipe down to bed rock and then attempt to drill through the pipe. This principle, still in use, opened the way to eventual success.

In August of 1859, drilling operations began again in earnest and averaged about three feet a day. However, by this time Drake's backers,

Nineteen fifty-nine marks the 100th anniversary of the birth of the oil industry,

Petroleum— or "rock oil" as it has been called—actually has been known to and used by man for centuries. The Bible contains many references to it. In ancient Egypt the extremes of its uses ranged from lubrication, water-proofing and painting to use in mummification. Many centuries ago, the Chinese used natural gas for heat by piping it through long bamboo pipes from oil seepages.

But despite the myriad uses of the product through the ages, it was not until August 27, 1859, at Titusville, Pennsylvania, that commercial oil was obtained by drilling.

The man credited with giving oil to the world on a commercial basis was Edwin L. Drake, who had been forced by illness at the age of 40 to quit his job as a railroad con-



OXYGEN SERVES THE RAILWAYS

The Indian Railway system is Asia's largest and is a vital factor in the country's development.

The nation's arteries have to be maintained in sound health. Railway engineers rely increasingly on welding for maintenance of the permanent way, bridges, locomotives, wagons and coaches.

Indian Oxygen with its countrywide organisation, serves the Indian Railways in many ways. Besides the supply of industrial gases, welding materials, welding and cutting equipment, this service covers technical advice, tuition and expert assistance in all problems relating to welding and its allied processes.



INDIAN OXYGEN LTD

having put \$2,500 into the venture without success, directed him to pay all bills and shut down the works. But before receiving the notifications, Drake had borrowed \$500 on his own.

It was these funds which enabled the work to continue until Saturday, August 27, when the drill lodged in a fissure 69½ feet down. Inspecting the well the following day, Uncle Billy Smith discovered oil standing in the drill pipe.

Uncle Billy's shout, "Struck oil" echoing through the Titusville streets that Sunday, heralded the birth of an industry and an era.

Until that historic August day, adequate illumination in homes was a luxury few could afford. In the United States, gas lighted some streets and public buildings, but homes depended on dim and expensive candles, smoky whale oil lanterns, or lamps fuelled with camphene, an extremely dangerous mixture of turpentine and alcohol. Early settlers in the States of New York, Pennsylvania and Ohio had considered "rock oil" a potent cure for many ills. The usual sources were ground seepages and springs. The product was sold for medicinal purposes in small bottles. Kerosene, the first major oil product, changed this situation almost overnight.

Drake's ingenuity and determination paid off. Oil had been struck and a new industry brought into being.

With this discovery of a means for producing large quantities of oil, the world was to be catapulted into a period of unparalleled scientific and economic development.

Almost immediately the rush was on. Titusville became the "Queen City" of the oil region. There, most of the industry's basic techniques were developed.

From the small production of Drake's well on Oil Creek, the industry has spread to lands and waters around the world. Venezuela

is the leading oil producer of South America today and it stands second to the United States among the oil producing countries of the world. Oil is also produced in other South American countries like Colombia, Argentina, Peru and Ecuador. South America has about eight per cent of the world's oil reserves and its production is over 16 per cent of the world total. Canada and Mexico are also rich in petroleum resources.

Asia, with about 60 per cent of the total, has the greatest proved oil reserves in the world. That vast continent produces about 20 per cent of the world's oil. About 95 per cent of Asia's oil reserves and nearly 90 per cent of its production are concentrated in a group of small states in or near Arabia, including Behrein, Iran, Iraq, Kuwait, Qatar and Saudi Arabia.

Europe has only about 7 per cent of the world's oil reserves.

Lately big new oil discoveries have been made in North Africa. The rest of the world

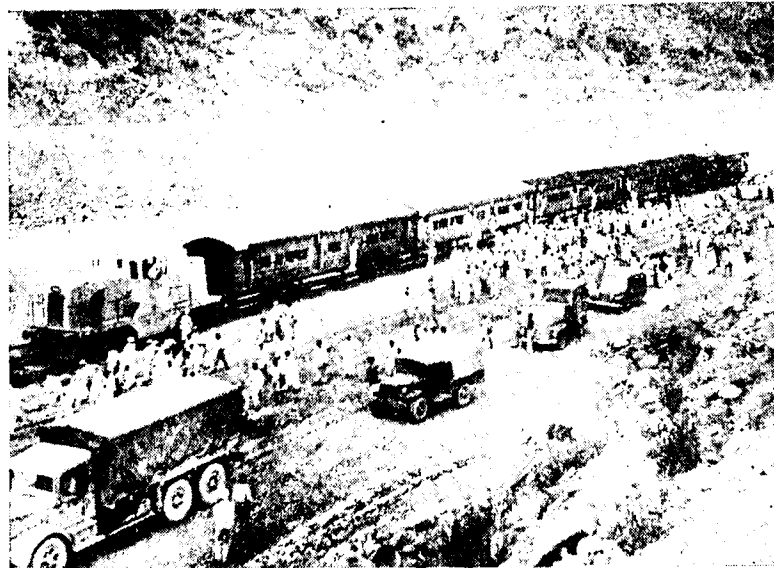
including Australia, New Zealand and islands of the Pacific have little known reserves, but explorers believe that some day petroleum deposits may be found in those places which now produce little or no oil.

Petroleum now provides chemicals from which thousands of important products are manufactured. Among these are synthetic rubber, plastics, fabrics, solvents, detergents, medicines, fertilizers, insecticides and weed killers.

To commemorate the 100th milestone in the march of progress of this industry, U.S. officials have planned a series of special activities which will reach their peak at Titusville during Centennial Week August 23-29, featuring such events as parades, dances, musical programmes and oil exhibits. The first-day issuance of a four-cent U.S. Oil Industry Commemorative Stamp will be a highlight of the observance.

—USIS

DIESEL-ELECTRICS HELP BUILD WORLD'S HIGHEST DAM



Officers and other workers arriving at the Bhakra Dam site, conveyed by a workmen's special hauled by a 44-ton industrial haulage diesel-electric locomotive made by G. E. C.

Three 44-ton General Electric industrial haulage type diesel-electric locomotives at Bhakra Dam have probably hauled more cement than any other trio of modern locomotives in the world.

Arriving in Bombay from the U.S. in the latter half of 1953, these sturdy diesel-electric locomotives, after reaching the site of India's largest multi-purpose irrigation and power project, have been carrying on an essential dual role for about five years.

During this time, the diesel-electrics have been busy transporting millions of tons of cement and other materials, besides conveying thousands of workmen to and from the dam site on an eight-mile strip of railway between the two Punjab villages of Bhakra and Nangal.

Round-the-Clock Operation

There has been a round-the-clock operation of pouring concrete that will total at least 135 million cu.ft. of concrete when the project is completed. In order to keep the mixing bins continually fed, 45 cars, drawn by the diesel-electric locomotives, have been carrying daily 9,000 tons of cement eight miles over mountainous terrain on the railway. In covering this stretch of track they have to negotiate gradients of 1 in 125, in addition to many narrow curves.

The concrete, in huge buckets each containing eight tons, is carried in rail-cars to big silvery cranes that lower the buckets—one every other minute twenty-four hours a day—to a narrow gorge between high hills on the swirling Sutlej river.

Concreting started November 17, 1955, and the Bhakra Dam recently reached a height of more than 400 feet. It is hoped that the remaining portion would be finished by the target date of March, 1960.

World's Highest

Work is steadily progressing in India's "Desert Bowl" on what will be the world's highest straight gravity dam when it reaches its full height of about 760 feet.

Incidentally, the railway line and the highway that run between Bhakra and Nangal are but two of the numerous other subsidiary constructions that were required for the tre-

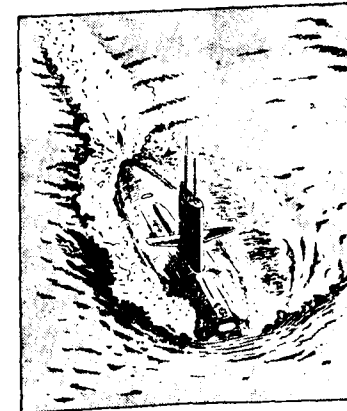
mendous project. Large rocky areas had to be blasted and levelled off so that offices, field, workshops and other constructional equipment and machinery could be set up or installed. This operation alone entailed excavation of more than 2,100,000 cubic yards of rock at various elevations.

It has been estimated that the concrete required would keep four railway trains running in a constant cycle carrying 800 tons of cement every day to supply the 7,00,000 tons needed. The cost of the concrete alone has been placed at Rs. 18 crores.

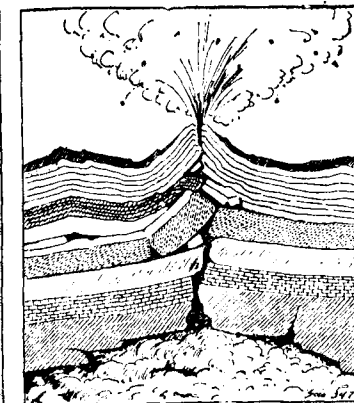
—Globe Press Service

DID YOU KNOW?

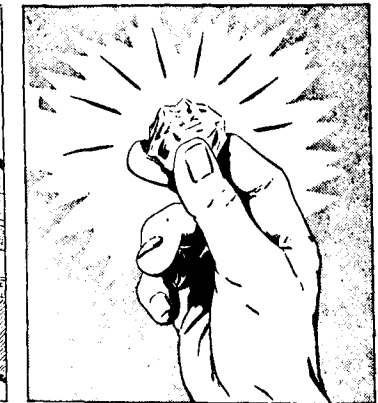
By SCIO



On her first sea trials in March, 1959, at speeds better than 46 m.p.h., the U.S. Navy's newest atomic submarine, the Skipjack shattered all known speed records for submarines. Two other U.S. atomic submarines, the Nautilus and the Skate, are the only vessels to have voyaged under the Arctic icepack across the North Pole.



Scientists say that beneath the earth's thin crust are temperatures hot enough to vaporize iron. And there are pressures so great that rock, heated far beyond its melting point, remains in a state of glassy solidity. Occasionally these elemental forces breach a fracture in the earth's shell, causing a volcano.



Abundant quartz is the source of semiprecious stones such as amethyst, agate and onyx. Quartz can be used to make imitations of precious jewels. One recipe for diamonds prescribes: four parts quartz, five parts red lead, one part potassium carbonate. Melt and cool slowly. For rubies or sapphires: add coloring matter.

—USIS

VISITORS TO THE FACTORY:

On the 6th July 1959 Shri N. R. Malkani, M.P. accompanied by Shri R. K. Bose, President, Pradesh Congress Committee, Orissa, visited the factory. Shri Malkani recorded his impressions in the Visitors' Book as follows :

"I am happy to note that the production of coaches is going up and, with the introduction of the Second Shift in full, the factory is going to produce 700 coaches per year. The quality of the coach and the working conditions of the workers are good." Shri Bose while recording his impression said : "This is really an institution which every Indian should be proud of."

On the 14th July Mr. R. M. London, French Consul at Madras, visited the factory. After going round the factory, he recorded his impressions in the Visitors' Book as follows :

"I wish to record my sincere admiration for the machines, workmanship and guiding spirit, which it was, this morning, my privilege to witness for the first time."

On the 28th July 1959 Shri L. R. S. Singh, Chief Commissioner of Pondicherry, visited the factory. At the conclusion of the visit Shri Singh recorded his impressions in the Visitors' Book as follows :

"I was very much impressed by all that I saw. The progress has been truly remarkable."

WEDDING BELLS



Our hearty felicitations to Shri S. Alwaraswamy, Head Typist of the Personnel Branch and Sow. Jayalakshmi who were married on 10-6-59 at Tiruchirappalli

A TRIP TO ENNORE

BY

MIR FASIHUDDIN

(Hon. Secretary, DEPSTO)

A trip to Ennore, a place about fifteen miles north of Madras, was arranged by the "Depsto" (Depot Stores) Committee, on the 17th July, 1959. Headed by Shri T. S. Jayaraman, the able Depot Officer, about forty members of us from the Depot Stores of the Integral Coach Factory did this trip and spent the day very usefully and pleasantly.

In a specially arranged bus, we left the precincts of the I.C.F. Institute at 8-30 a.m. and on reaching the Beach at Ennore, we dispersed in groups, some to wander about on the beach, some to sit and talk shop in the shade of country boats berthed ashore. A few of us were attracted by the village nearby, inhabited solely by the fisherfolk. The cluster of huts were enclosed by a fence of casuarina saplings. A gap in the fence served as the main entrance to the village. As we walked towards it, we came upon the temple of the presiding deity of the village—though weather-beaten still commanding veneration—facing the sea to our right and, on the left, the community well.

For a casual on-looker the village looked a sleepy corner of the earth. But for the noise raised by a few children playing about, there was little evidence of any activity. On entering the village, the first remarkable thing that struck us was its clean lay-out. The huts were all palm-thatched with low mud walls and clay mud-flooring looking very tidy. Each house was fenced off from its neighbour, exhibiting an individuality even in group living. The eaves of the roof reached down to three feet above the ground so that entry could be effected only by bending low the head and body. The houses were all erected in a fashion that

left a fairly big space in the centre of the village—the "common green" probably! Only, there was not much of the green but clean fine sand. There were a few trees here and there but of the same species—the "Thespesia Populnia" or "Poovarasu" as is commonly known in Tamil. Clean lanes of sand led to other huts and to the village green. A water tap, provided in the square, supplied fresh water and consequently the community well was sparingly used.

Our intrusion into this peaceful domain did not at all evoke any curiosity on the part of the inhabitants much less any aversion. A few women, who saw us, just went on with what they were doing without twinkling the eye-lids. Even the one or two pie-dogs that were visible were just too drowsy in the warmth of the sun to even make a growl of protest at us intruders. The thing that struck us as out of the ordinary was the domestic animals such as cows, buffaloes, sheep, etc. and poultry of any form, which were conspicuous by their absence. There were just none.

By talking to an elderly woman—the granny of the village—it was learnt that most of the male members were out at sea-fishing. Their children went to the Primary School near the main road to learn the three Rs.—that is, those that felt like learning. Those that felt otherwise helped their fathers to make or mend a net, or rig out a catamaran before putting out to sea, or just go about the beach collecting all odds and ends and offering these to sophisticated visitors from outside for money; or, they themselves went fishing. A couple of males, who were presumably having an off that

day, were met by us and they gave some more interesting information. All of them belonging to the fishing community were living in isolated groups along the fringe of the sea, right down to Cape Comorin. The community comprised of both Christians and Hindus but they lived in amity; marriages were contracted within the community only and seldom outside. The fishing nets were very costly, going as high as Rs. 350 (beyond the reach of a single family). Ten or twelve of them jointly owned a net and shared the daily catch which usually brought them Rs. 3 to 4 per head under favourable conditions. On other days, when the wind was unfavourable, they just kept themselves off the sea. There might also be days on which they wouldn't make a good catch. It was all just luck and all in the day's run.

There were fishermen's Co-operatives which helped them with the wherewithal to make nets, but they did not absolutely rely on such societies. Some fishermen augmented their incomes by selling a kind of fine black dust deposited by the high winds blowing over the beach. This fine dust is sold at about Rs. 100 a ton and is used by the Goldsmiths for polishing jewellery. The inhabitants of the village were in the main poor; but theirs was a poverty dignified by a calm resignation to their lot in life. A happy lot of people they were, wealthier in living a contented life, full of good cheer, in a secluded domain of their own, far from the maddening crowd.

After spending the forenoon this way, we first dropped in at Messrs. Ashok Leyland Ltd., on the first stage of visits to industrial institutions programmed for the day. We had a tasty lunch in their excellent canteen. We were then taken round their works where Shri R. K. Tandan, our Dy. C.O.S. and Shri A. V. Sugavaneswaran, our Purchase Officer, joined us. We went round the Tool Room, Foundry, Engine-Assembly Section and Chassis-rolling Shop. The Engine-Assembly Section, in parti-

cular, was very interesting. A complete six wheeler Leyland chassis costs about Rs. 36,000 delivered on the road and it was of interest to learn that Messrs. Ashok Leyland Ltd., are exporting chassis to Burma, Ceylon and some other Eastern countries. Another feature was that, once the workers entered the Workshop buildings, there was no need for them to come out of it either for obtaining stores or for contacting other sections in the Factory. The factory looks compact, clean and well-laid out. It was noteworthy and very pleasing to see the workers, about 1500 in all, absorbed in their work and contributing their mite in the building up of 'Industrial India.' Our thanks are due to Shri K. N. Gopalan, the Secretary of the Factory, for the facilities afforded to our party.

Next we moved on to Tiruvottiyur and called at Messrs. Enfield India Ltd. Their Administrative Officer, Shri S. Viswanathan, welcomed us and took us round the factory. Royal Enfield Motor Cycles and three-wheelers are being manufactured there with 60% of indigenously produced material. The cost price of an 'Ensign' (1.5 H.P.) and a 'Bullet' (3.5 H.P.) motor cycle, it was learnt, is about Rs. 1,900 and Rs. 3,900 respectively. As we came out, the weather which until then had been agreeably pleasant turned to be a bit unkind; clouds had gathered in the sky and it threatened to rain at any moment. After light refreshments, we were conducted to Messrs. Hackbridge-Hewitt & Easun Private Ltd., where electrical transformers are being built. Shri Khambatta, their Electrical Engineer, explained in detail and lucidly the various stages in the manufacture of transformers.

When we left the place, the sky darkened and rain set in. Messrs. Carborundum Universal Limited was the next and last factory to be visited. There we had a cordial welcome extended to us by the Works Director, Mr. Ivor Mann, the Personnel Officer Mr. D. Moses, and the Sales Officer, Shri Mohan Rao. We

'SUNDAR RAJ CHALLENGE TROPHY' HOCKEY TOURNAMENT

BY

(A. D. PARTHASARATHY, S.L.W.I./Sports)

The Inter-Departmental Hockey Tournament conducted this year by the I.C.F. Sports Council was a phenomenal success. This kind of tournament develops a healthy spirit of rivalry, fellowship and sportsmanship and enables a large number of staff to participate, besides evoking keen interest among the spectators, who are mostly from among the workshop staff.

It is for the first time in the annals of the I.C.F. Sports Council that an Inter-Departmental Tournament for Hockey was conducted for the Sundar Raj Challenge Trophy.

It should be placed on record that we of the I.C.F. family owe a deep sense of gratitude to Shri M. Sundar Raj, our revered Dy. F.A. & CAO, for his noble gesture in donating a trophy for conducting this tournament.

Fifteen teams participated in the tournament. The I.C.F. Sports Council trained twelve coaches and ten umpires from among members of the I.C.F. Hockey Team and also the veterans of the game employed on this Administration. The umpires that were trained controlled the matches in the competition very efficiently. The coaches and umpires should be congratulated on the interest and enthusiasm shown by them in training the players soundly.

The finals of the I.C.F. Inter-Departmental Hockey Tournament, 1959 for the Sundar Raj Challenge Trophy was played on Monday the 27th July 1959 on the I.C.F. Colony Grounds, between the Civil Engineering Department and the 'F' Shed.

Almost all the Officers and Staff turned up to see the game of the two outstanding teams.

were led first to the Coated Section and then to the Bonded Section, and Mr. Mann personally accompanied us and explained the working of these branches. Their factory is nicely situated in the midst of a beautiful garden. Emery papers, grinding wheels and stones are manufactured there. It was learnt that the biggest wheel made there is of the size 42" and the smallest $\frac{1}{4}$ ". It will be of interest for readers to know that the emery paper which enters the oven takes $5\frac{1}{2}$ days to reach the other end. The temperature increases from one end uniformly and then decreases at the far end, the maximum

temperature reached being 1280°. At one place, we entered into the oven and felt the heat ourselves.

After having had tea in their nice canteen, we boarded the bus and wended our way back to the I.C.F. It was still raining, but the weather failed to dampen our jovial spirits. We reached Ayanavaram at 7-00 p.m. and parted, bidding 'Au revoir' for the day. We returned home with the satisfaction of having spent the day in a very enjoyable and useful manner.

RAILCOACH
R-3-b

Wit and Whistle

1. Two friends, one thin and the other robust, were talking. All of a sudden they began to quarrel. Friends separated them but the two were struggling to get themselves free and continue fighting. After seeing the frantic efforts to relieve himself put forth by the robust person, the thin man shouted,

"More of you chaps hold him : two are enough to hold me."

2. The two ex-convicts met. One asked the other,

"Hey you ! Your period is not yet over. How on earth you were released so soon?"

"My skill."

"After all you were a sweeper."

"Yes, you see ; I took a broomstick, swept busily past the guards, past the verandah, all over the compound and down to freedom."

3. The country Branch Manager had been to the Headquarters office for attending a party given in honour of the new Managing Director. As the party was going on, he told the lady by his side,

"Look at that dud," referring to the Managing Director "Whoever could call him a Managing Director?"

"Don't talk so loose about him. You know who I am. I am his wife."

"You know who I am?" asked the Branch Manager.

"No, Why?"

"Then I am saved "; so saying he quickly slipped away.

4. The policeman approached the Car Driver.

"May I know if you have a licence please?"

"Yes," said the driver, "You'd like to see it?"

"Not now" replied the cop "I would like to see it when you do not have it."

5. "Now come along. I have defended you in the case" said the lawyer to his client.

"You and I only were in this room yesterday. How much have you switched from this wallet?"

"Not much, Sir," said the client. "Just enough to pay your fees."

6. The tailor got really bored of the customer. He said,

"Why do you unnecessarily bargain, Sir? After all, you are not going to pay as you have done in the past."

"Of course, that is true" said the customer, "but still I don't want you to lose much, you see."

7. They were trying to pull Jones through the welding department. Unfortunately he went on failing in all the tests given to him, however simple they were.

The disgusted instructors at last called him for an interview and one of them asked him,

"Can you at least answer this? What is Tack-welding?"

"Oh, it is a very skilful art, Sir."

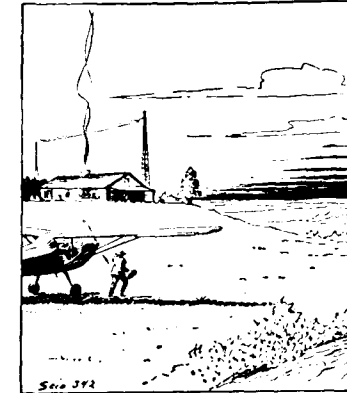
The instructor at last sighed a sigh of relief.

"Yes ; why, does it require skill?"

"It requires skill because it needs the welder to do two things simultaneously, talking as well as welding."

DID YOU KNOW?

By SCIO



Ranching families in Australia often live a hundred miles or so from the nearest neighbour. Children "go to school" by radio and correspondence courses. In case of serious illness, the doctor comes by airplane. Minor illnesses are diagnosed by radio and the remote families fill their own prescriptions from numbered drugs and remedies kept in the home medicine chests.



Scientists say that not only is improved weather-forecasting probable within the next few years through the use of earth satellite devices such as the U. S. Vanguard now orbiting the world, but also that modification of the weather someday might be possible. Experts say world commerce and agriculture would be aided tremendously if weather forecasting could be improved as little as 10 percent.



Scientists say insects are the most experienced flyers in the animal world. They have been air-borne for some 200 million years and during half that time had the air to themselves. In flight they surpass birds and bats, and in some ways are superior to any flying machine. An airplane can fly farther and faster, but a common housefly can outmaneuver a jet.

—USIS

THE CAPITOL BUILDING



THE CAPITOL BUILDING of the United States stands in 131 acres of landscaped park on the crest of a hill overlooking Washington, D. C. Built to house the Legislative Branch of the U. S. Government, Congress moved into the original sandstone structure in 1800, when 15 States comprised the Union. The Capitol grew as the country grew, with marble wings and other architectural features being added over the years. The huge cast iron dome, which is surmounted by a bronze Statue of Freedom, was completed in 1865.

—USIS.

VOL. III No. 12



SEPTEMBER 1959

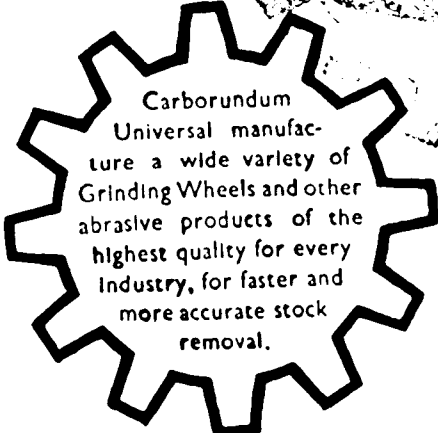
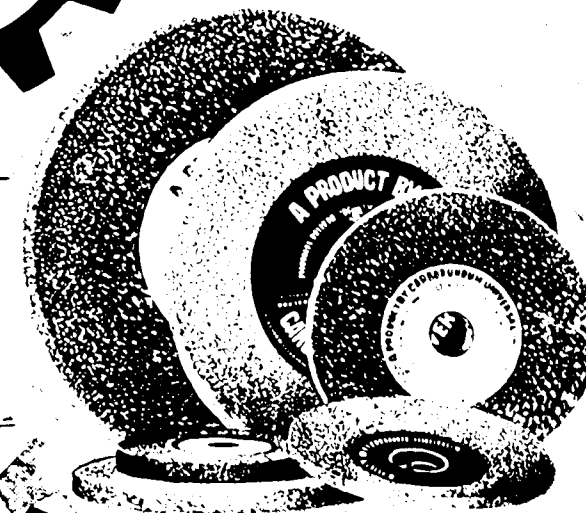


A scene from the drama "Vazha Vaithavan" in Tamil, staged at the I.C.F. Open Air Theatre on Independence Day, August 15, 1959. A large gathering witnessed the drama in rapt attention.

**THERE'S A
CARBORUNDUM UNIVERSAL
GRINDING WHEEL
FOR EVERY INDUSTRY**



Carborundum
Universal Ltd. are
on Rate Contract with
the Government of India
for the supply of their
Grinding Wheels
and Segments.



Carborundum
Universal manufacture a wide variety of
Grinding Wheels and other
abrasive products of the
highest quality for every
Industry, for faster and
more accurate stock
removal.

CARBORUNDUM UNIVERSAL LTD..
52/53, Jehangir Street, Madras-1,
Telephone: 2941 (4 lines)
Works: Tiruvottiyur

Distributors:
M/s. William Jacks & Co., Ltd.,
Calcutta-1, Bombay-1, Madras-1, New Delhi,
Bangalore-1, Kanpur.

CHANDA PAINTS

FOR QUALITY & ECONOMY
FOR BETTER COVERAGE

IN WIDE AND VARIED USE THROUGHOUT OUR COUNTRY
BOTH FOR INTERIOR AND EXTERIOR PURPOSES

RENOWNED FOR DURABILITY AND FINISH

"INERTOL" PAINTS

For Iron, Concrete, & Steel — the best aseptic water proofing compound — for use on Piers, Quay Walls, Foundations, Granaries, Locks, Lock Gates, Cranes and etc.

INERTOL PAINTS ARE USED ON EVERY COACH THAT LEAVES THE
INTEGRAL COACH FACTORY

MANUFACTURED BY:

Messrs. P. C. Chanda & Co. Ltd.
CALCUTTA

Represented in the South including

Madras, Mysore, Kerala & Andhra Pradesh

By

The South Indian Export Co. Ltd.

20 General Patters Road, Madras 2

Telegramms : Dieselage Madras

Telephone : 84127

RAILCOACH

(INTEGRAL COACH FACTORY MAGAZINE)

EDITORIAL NOTICE

All contributions must be clearly typed and doublespaced on one side of the paper only, and signed, not necessarily for publication, but as a guarantee of good faith.

Manuscripts and photographs, not accepted for publication, will not be returned unless the sender so requires. Intending contributors from outside our Factory, if they intend to get back unaccepted articles and photos, should send a suitably stamped and self-addressed envelope along with the material sent by them.

Contributions should be addressed to the Editor, not by name, and reach him not later than the 25th of every month for consideration for publication in the next month's issue.

The Editor does not assume any responsibility for the accuracy of the news supplied by correspondents or for opinions expressed by contributors. Opinions expressed in the "RAILCOACH" whether editorially or by contributors should be regarded as having no official authority.

	Rs. nP.
Annual Subscription ...	3 00

CONTENTS

SEPTMBER 1959

	PAGE
Editorial	4
What is News and Why	5
C. R. B. Inspects I.C.E.L.	8
Time and Motion Study	12
News from Switzerland	21
Independence Day Celebrations	22
I.C.E.L. Colony School Annual Day Celebrations	24
Report of the 17th International Scout Conference	26
Soil Mechanics for Railway Engineers	28
Cleaning of Diesel-Electric Locomotives	29
March of Science	32
Visitors to the Factory	34
Time for an Oil Change?	35
Flower Arrangement	36
Herb for eye diseases	38
Cooperation	39
I.C.E.L. Catholic Employees' Thanksgiving Service	40
A Trip to Mettur Dam	41
The Rainy Season	42
Our Family	43
Brain Teasers	44
Obituary	45
Wit and Whistle	46

editorial

OPEN AIR THEATRE

Efforts are continuously being made by our administration to provide better and more amenities to the staff and also to make the benefits available to as many as possible of the I.C.F. family. The I.C.F. Institute hitherto had an improvised open air theatre. As the stage itself was only an improvised one and the accommodation available in the compound limited, Shri K. Sadagopan, our former Chief Administrative Officer, with his usual forethought conceived the idea of building a well-equipped open air theatre and through his personal efforts obtained a special grant of Rs. 40,000 from the Railway Board. We saw the culmination of his efforts on the 13th August 1959 when the open air theatre was declared open by Shri E. Krishna Iyer, Secretary of the State Sangeeth Natak Sangh. When we enjoyed the first drama staged in the theatre on the 15th August under pleasant and ideal conditions, it was quite natural that our thoughts turned to Shri K. Sadagopan for the excellent amenity arranged for by him. Our thanks are due to the administration for selecting an ideal site and to our engineers for the scientifically laid-out theatre and the thoughtfully laid-out sloping lawn in front of the stage. The Electrical Department has of course lived up to its reputation in providing good lighting and loudspeaker arrangements. We trust that the Institute authorities will take full advantage of the excellent amenity provided and arrange for the much needed relaxation for the members of the I.C.F. family by arranging to stage a number of plays in the open air theatre. We also trust that this amenity which will be availed of by the staff and their families in large numbers will help them to identify themselves with the Coach Factory.

WHAT IS NEWS AND WHY

World Bank loan for Indian Railways

An agreement has been signed with the World Bank whereby a loan of 50 million dollars has been made available to India for the development of Indian railways. The loan is repayable in 20 years in 34 half-yearly instalments commencing from January 15, 1963. The rate of interest is 6 per cent. The amount of loan is to be used for meeting the cost of purchases abroad of electric locomotives, overhead equipment for electrification, plant and machinery for workshops, and such other railway materials and equipment as are essential for executing the Railways' second Five-Year Plan and are not indigenously available.

Central Board of Railway Research

A high-powered Central Board of Railway Research is to be set up shortly. The functions of the Board will be to direct and co-ordinate research on railways and secure co-operation of other institutions such as national laboratories.

Indo-Iraqi collaboration in railway field

His Excellency Mr. Hasan Talbani, Minister for Communications, Government of Iraq, called on the Railway Minister Shri Jagjivan Ram on the 19th August, 1959.

They discussed matters of common interest pertaining to the railways of the two countries. Shri Jagjivan Ram is understood to have mentioned during the conversation that the Indian railways had made considerable progress in the field of self-sufficiency in railway equipment, and were now in a position to assist the railway systems of the neighbouring countries with technical know-how and equipment which could be manufactured to the requirements of the railways concerned.

The Iraqi Minister for Communications, had an hour's meeting with the Railway Board in New Delhi on August 22, 1959.

The discussion centred round the extent to which the Indian railways could extend technical and other co-operation to the Iraqi State Railways, where conditions of railway working are identical to those in India.

His Excellency was informed that the Indian railways had now achieved almost complete self-sufficiency in regard to railway equipment and had at their disposal a large technical organisation engaged in railway research, design and standardisation work. His Excellency was assured that the Indian railways would gladly provide any assistance which the Iraqi railways may from time to time require, whether in the field of technical collaboration or supply of manufactured equipment.

Silver medal awarded to railwayman for act of courage and self-sacrifice

The Government of West Bengal has awarded the 'Dr. Harendra Coomar Mukerjee Silver Medal' for 1958 posthumously to the late Kunja Das, a gateman of the Eastern Railway, for an outstanding act of courage and self-sacrifice.

The 'Dr. Harendra Coomar Mukerjee Silver Medal' is awarded annually to deserving persons who have done any outstanding acts of courage and self-sacrifice at a great personal risk in saving the lives of their fellowmen from death due to accidents in any part of West Bengal.

The citation accompanying the award says :

"On October 16, 1958 at about 5 p.m. a child aged about three years named Swapan Kumar Bhattacharjee, son of Shri Saktipada Bhattacharjee of Bongaon in the district of 24-Parganas strayed out of the house which is situated near the railway line and came upon the railway track on the Ranaghat-Bongaon section of the Eastern Railway near Gate No. 22 while the 8-Down Ranaghat-Bongaon local

was coming at full speed. Gateman Kunja Das ran after the child and caught hold of him just a few seconds before the train reached the spot. He saved the life of the child by throwing him off the railway track but was himself knocked down by the running train. The train was stopped soon after and he was picked up in a precarious condition. He was immediately removed to the railway hospital where he succumbed to his injuries on the following day. Late Kunja Das showed outstanding courage and self-sacrifice in saving the life of the child Swapan."

Kunja Das is survived by two sons aged 22 and 12 years. The former has been given employment by the railway administration while a monthly educational scholarship has been sanctioned for the younger son. For the present this will continue for four years.

One crore rupee scheme for remodelling Madras Central Station

The Madras Central Station is to be remodelled at a cost of over Rs. 1,00,00,000 in order to equip the station for dealing with the increasing Second Plan traffic pressure.

The Madras Central Station was constructed in the latter part of the 19th century, and has since then undergone very little remodelling apart from minor additions and alterations carried out from time to time. The yard accommodation is extremely cramped and facilities for handling passenger and parcel traffic are most inadequate.

The scheme provides for more and longer platforms, increased washing facilities in a new coaching yard to be constructed at Basin Bridge, and better facilities for inspection, maintenance, stabling, train examination and repairs.

The present scheme is part of a master plan for the remodelling of the Madras Central Station, and the balance of the work will be taken up during the Third Plan period.

New Additional Member, Finance, Railway Board

Shri C. T. Venugopal, Director/Finance, Railway Board, has been appointed Additional Member, Finance, in the same office, in place of Shri Apjit Singh, who has proceeded on leave.

Shri Venugopal has been succeeded by Shri D. P. Mathur, until recently Senior Deputy General Manager, Central Railway.

Manufacture of electric Locos at Chittaranjan

Orders for manufacture of ten 1500 volts D.C. locomotives have been placed on the Chittaranjan Loco Works recently. Global tenders have been invited for progressive manufacture of 42 A.C. freight type locomotives at Chittaranjan Locomotive Works. The last date for submission of the quotations is November 9, 1959.

Coach building project in Kerala

The project regarding the location of the proposed metre gauge coach building factory in Kerala is to be held in abeyance for the time being. In view of subsequent improvements in the output of existing coach building units, the position has been reviewed.

New Primary Schools for Railwaymen's Children

Five hundred and ten new single teacher austerity type primary schools are intended to be opened at different places on the Railways during the current year. A large number out of these have already been opened and are functioning.

Holiday home for railwaymen in Kashmir

Two holiday homes open to non-gazetted railwaymen and their families from all parts of the country are to be set up in Jammu and Kashmir State, one at Srinagar and the other at Pahalgam. During the current season, however, only the home at Pahalgam will function, and this will not be open to the families of railwaymen.

The Jammu and Kashmir State Government has transferred to the railways at actual cost the youth hostel building at Pahalgam for setting up the home.

Railway employees taking advantage of this offer will travel to Pathankot on their own passes. The transport charges for excursions and their stay *en route* between Pathankot and Kashmir will be met from the Staff Benefit Fund, to which Government makes a generous contribution each year. Arrangements for food will be made at nominal charges ranging from Rs. 20 to 45 according to salary groups.

Railway employees will be conducted to Pahalgam in convenient groups from different parts of the country. Altogether, it is estimated that approximately 700 persons would be able to take advantage of the scheme in the current season. The scheme provides for a fortnight's stay for each person.

'Crack' goods trains

The scheme of running 'crack' goods trains has been introduced on five Zonal Railways. On the other railways, fast goods services existed, though not under the nomenclature "crack goods trains."

The main features of the scheme are :

- (i) Crack goods trains are fast trains run to scheduled paths like passenger trains to fixed timings ;
- (ii) They are worked by selected engines, crews and guards ;
- (iii) A special watch is kept by divisional officers on the running of these trains.

Plantation of trees alongside rail track

Instructions have been issued to railway administrations for planting trees alongside the railway track. The railway administrations, on their part, have issued necessary instructions to their subordinate offices to undertake immediately planting of trees along the railway line. For this purpose, the railways are also raising their own nurseries at suitable places. In the meantime arrangements are being made by them to obtain necessary seeds and seedlings from local nurseries as well as forest officials. Apart from planting of trees by the railways themselves, forest departments of the State Governments have also been or are being addressed to take over spare railway land for purposes of afforestation.

Rail line from Rourkela to Barsua

The railway line from Rourkela to Barsua iron mines is expected to be completed by the end of December this year. An overall progress of 80 per cent in the construction of the line has been made up to the end of July, 1959.

Railway lines in backward areas

While selecting new lines for construction, areas which are backward and which abound in mineral wealth get due consideration. However, selection of new lines is conditioned by the financial ceiling, availability of materials and the overall traffic needs of the country.

Women in railway service

The number of women serving on railways in India as on June 30, 1959, is 10,324. Of these two are Gazetted, 4,426 non-Gazetted class III and 5,896, class IV servants.

C. R. B. INSPECTS I. C. F.

Shri K. B. Mathur, Chairman, Railway Board took an opportunity while he was at Madras to inspect the Integral Coach Factory on the 24th August, 1959. He was received on arrival by the Chief Mechanical Engineer, Shri K. Swarup, and taken round the workshops of the Shell factory, the Technical Training School and the site of the Furnishing Annexe. Shri K. B. Mathur who was inspecting the Factory after three years was very much impressed with the progress made. In his address to the officers of the factory at the conclusion of the visit, he exhorted the workers to keep up the tempo of production. At the same time Shri Mathur struck a note of caution that it was not enough for workmen and officers of the I.C.F. to think only in terms of achieving higher targets in the factory but that it was

essential for them to develop a broader outlook and think in terms of a sound development of the country. Finally he made a fervent appeal for the development of a sense of oneness and comradeship which would enable us to undertake more onerous responsibilities and stressed on the need for a broader outlook in the context of developments being forged in other countries.

After an introductory speech by Shri K. Swarup, Chief Mechanical Engineer, the Chairman addressed the officers of the factory. He said :

“It has been a great pleasure to me to have got this opportunity to visit the Integral Coach Factory about which I had been hearing and reading quite a lot from time to time, because it is now something like 3 years when I came

Shri K. B. Mathur in the lobby of the Administrative Office.
L. to R.—Shri K. Swarup, Chief Mechanical Engineer, Shri K. B. Mathur, C.R.B., Shri A. C. Mukerji, G.M., Southern Railway, Shri R. M. Sambamoorthi, Superintendent of Works.



C. R. B. addressing the officers of the factory in the Meeting Room.

to this place and since then undoubtedly considerable improvement and considerable change has come about in the Integral Coach Factory. The output is exceeding all expectations, which indeed is extremely creditable and in fact I was rather shocked to hear from Mr. K. Swarup that he will have to apply a brake to the increasing tempo of work that is going on in this particular place, because we seem to have reached a stage when it looks as though our capacity which we will be able to develop in this place, will be in excess of our requirements. That is all very good and very creditable.

“Well, gentlemen, recently I have had an opportunity of visiting a number of workshops in other countries and quite apart from the fact that the coach that you are producing is 20% cheaper, for which the reasons may be somewhat different from the type of reasons that we are looking for in our own country, viz., that it may be due to the fact that probably our wages are lower than the wages paid elsewhere, what we are definitely making a serious endeavour to do is to ensure that as man to man our output is not very much below, at any rate, if not on a par, with the level attained by anyone else in any country and it looks to me that we seem to be reaching a stage when we will be able to claim that our output as a man is not inferior to that of anybody else. That is the direction in which we have got

to think and, therefore, apart from comparing the output in terms of money, of course it is quite important, it is equally necessary for us to compare the output in terms of man-hours and I should very much like to see sometime that our man-hours are also shown in relation to the man-hours required elsewhere. Now, there again, comparison may at times be not absolutely real because everything laid out in any one workshop is not strictly comparable with what has been laid out elsewhere. If so, we should be able to form some appreciation of our own capacity in relation to what others have already been able to achieve now.

“I was rather impressed at the neatness of the entire workshop which is certainly very creditable, because, when we go round some other workshops in our country, we do not see that sort of neatness and cleanliness. My reactions when I went round, were rather the reactions of a layman, entirely not the reactions of somebody who knows some of the techniques. Now my reaction when I went round and I asked a few questions from Mr. Swarup was that there are still a number of machines we are using in this factory which we are incapable of producing in the country. I am not talking of complicated or specialised types of machines, but of simple equipment. For example, I was told that we cannot even make this spray paint equipment, because we cannot get the jet nozzles made in our country.

“So it is the duty of each and every young man of our country to consider, think, examine and take whatever steps he can to initiate others, contact others, tell others, guide others and do so many things, to see that everything practically to the best of our ability is done to produce things in our own country. Now that does not mean any narrow parochialism or isolationism. But it signifies our important, urgent, economic need which prompts us to think in terms of producing things in our own country. It is not as though we want to remain absolutely isolated from the rest of the world. That is not the idea behind this thinking. The only idea behind this thinking is that our country requires that we must move fast. There is no question of moving slow. If we want to move, we must have other equipment that is needed to be moved fast. And if we are to keep on borrowing money from outside and keep on getting things from outside, how can we provide that impetus, that dynamism in our economy, so urgently, so violently needed in our country, in order that we may be able to reach a better standard of living.

“This workshop of yours is a model one. We are having quite a number of developments. If we could reach a stage when we can claim that in the I.C.F. we are using precision machinery which is a product of our country—or at any rate we have now the capacity to produce it in our country—it would be a great improvement on conditions obtaining at present. It will go to the credit of the I.C.F. if it made any real contribution in that direction.

“You should improve the output and the efficiency of this workshop, but you should also develop between the men working here a sort of a relationship, a sort of link, a sort of comradeship, a sort of thinking, which might develop that sense of oneness in the task that you are engaged in and at the same time a feeling of patriotism that we are citizens of one nation employed for the common good of the country directed by a common purpose and objective. So that is another

task which is equally important. In other words, you have got to develop a sort of a human relationship in your various contacts with the men below and above. That sort of link, affinity, a sort of real friendship, real oneness should develop. That should be the frame of mind with which you should approach human problems in this workshop. That is again a most important thing, quite apart from the efficiency of mechanical output.

“Lastly I should like to impress upon you, quite apart from what I said about the problems of indigenous production of machines etc., that while you are engaged in a fairly important national work, please don’t think that your task has ended there and what I would urge upon every young man of our country, if I have anything to do with him, is that it is extremely important for us outside our normal vocations during which we are busy with our own work, to think for a moment intensively, carefully, analytically and thoughtfully how our country is moving, what it needs. I mean in every individual there is real patriotism. It is not enough for us merely to know that we are producing 350 coaches, 380 coaches or 400 coaches in I.C.F., the cost has gone down, the finish is very good, very much appreciated by everybody and a number of commendations come from big people.

“Your task does not end there. Your task extends very much beyond those narrow limits of the I.C.F. Your thinking should extend from the north to the south and from the east to the west and move to every corner of the country to see as to what is happening in the country, in which direction it is moving, what sort of developments are taking place, what are the plans of developments, where is the money coming from, how best that money can be brought in and how best that money can be spent in the most economic way, are we doing it, are we not doing it, do we feel that there are other ways of doing it and so on. The young mind would cease to be really dynamic, would become completely static, if our thoughts are merely confined to our own limited

task that we do. Therefore it is necessary for you to educate yourself, as much as you possibly can, with the entire working of the country in its economic phase, in its human phase, in its international phase and so on. Once you possess that sort of knowledge, even though you may be working in a limited sphere, it gives you great happiness. It gives you self-satisfaction. Knowledge has its own satisfaction and that is most important. That will naturally please your mental horizon. Those are matters which every young man should apply himself to and think for himself, study and understand. Therefore, beyond your own work, in the technical field and in the economic field, in the human field, your knowledge must extend.

“We have got amongst us our Swiss Friends and the amount of assistance, the guidance, that we have received from them who have

helped us in laying the foundations of this vast organisation that we have built up here is really great. They have also given us the fundamentals of the thing. We are extremely grateful to them for all the assistance and guidance they have given us and I am sure they will not mind it if our young fellows have the ambition to excel them. That is as it should be.

“Today human contacts are much wider, much closer, much quicker, than they were before and still it is all to the good that the impact of mind on mind is apt to produce much better output as when the hammer blows on the steel. The same thing happens in the case of the human mind, on striking another mind it produces results. The more contact there is between men and men, it is to the good of the world in general. It is not a good confined to any one country.”

Monthly Outturn		
	Target	Actuals
	Indigenous coaches	Indigenous coaches
August 1959	30	38
Cumulative total for the first five months of the year 1959-1960 (Financial)	150	(of these 5 were T.L.R.S.) 184

TIME & MOTION STUDY

(The first in a series of lectures on "Time and Motion Study" by Shri L. D. Eubank Scott, A.M.E./Time Study, is reproduced below.)

Few words have achieved greater significance in this country in the post-Independence era than the word "productivity." You hear it every time there is a speech made in connection with industrial advancement, you can see it every day in your newspapers. It is to my mind the "Keyword" to advancement, economic security and stability, and to real freedom—freedom from want and poverty of which we have seen so much in this country. It is a word which must become the guiding principle of all of us who have the privileged task of nation building, if we are to see the end of that poverty and want in our lifetime. Providence has placed a grave responsibility on our shoulders. Independence has been achieved in our time. And, as a house is as strong as its foundation, so the future of this country will depend on how strongly we build that foundation now, and stretching the simile, the mortar we use must be Productivity.

Very rightly, precedence was given in the First Five-Year Plan, to achieving self-sufficiency in agriculture so that the problem of feeding the millions of this country might, to some extent, be solved. The building of great Dams and the River Valley Projects was primarily to bring under cultivation wider and wider tracts of waste land. The generation of power was secondary; and the second, third and subsequent Plans, whether of five years or more, must lay progressively greater emphasis on the industrial development of the country for the better utilisation of this power.

Factories like this magnificent coach factory, the Steel Mills that are growing up at Rourkela, Bhilai and Durgapur—have been made possible by the additional power available. But these factories in themselves are only a means. In the end it is not magnificent factories by them-

selves which can spell the difference between prosperity and poverty. It is productivity, the productivity of the worker alone that can change the face of things.

"Productivity", let me hasten to explain, should not be confused with "Production". These two words are very often, erroneously, associated. They have, however, two very separate and distinct meanings. We can obtain more "Production" by using more men, more machines and materials to obtain larger volumes of output. "Productivity" on the other hand means the most efficient utilisation of these resources. It is a ratio of output to input. Production by itself cannot raise real wealth. Indeed, production without "buying power" can lead to recession. It is "Productivity" which alone can raise the real income and consequent on it, the standard of living of the whole nation. By producing more, more cheaply, we bring more within the buying power of more people. This is real wealth. If salaries were to continue indefinitely chasing prices it could only lead us to bankruptcy, because the more we earned in hard cash, we would still have to spend on soaring prices.

We have an excellent example of what productivity can do for a nation in the Swiss, with whom we have had a very successful technical collaboration in this factory. As anyone of you, who has been there will know, Switzerland has little or no natural resources. Yet she is one of the foremost industrial countries in the world today—the reason?—because of her high productivity—per capita output is so high that it enables her to import raw materials and export them at competitive prices on a highly competitive world market in spite of high wage levels and a high standard

of living. This is no mean achievement, and as I have said, though it bears repetition—Productivity is the key to her success.

You might be wondering why all this emphasis on Productivity at a lecture which is to be devoted to Time and Motion Study. It is because Time and Motion Study or Work Study is one of the most penetrating and practical tools for obtaining higher productivity. It is, in fact, the "why" of Work Study. Work Study is the only factual basis on which such branches of Production Engineering as Planning, Rate-Fixing, Estimating, Cost Control, Material Control, Machine Control and Scheduling can be rationally built up. These are all tools for higher productivity.

Work Study is nothing new. It is in fact as old as the oldest professions. Even the old craftsman, who produced an article in his shop single-handed, had to estimate the cost of materials and evaluate the time he spent on the job when asked for a price. Modern high-power competitive salesmanship however, precludes the use of such sporadic and irregular estimations, or as one eminent Industrial Engineer prefers to call it, "Guesstimation." To be competitive, estimates have to be more accurately and scientifically worked out.

The use of systematic Work Study was first introduced—some eighty years ago—by that great American Engineer of the Bethlehem Steel Works—F. W. Taylor. It was he who gave the impetus to the application of a scientific means of work and time evaluation, and modern Work Study and Work Measurement have been built up on the fundamentals developed by him.

When systematic Work Study was first introduced into industrial concerns, many people believed, and indeed the notion still exists, that it was solely for the benefit and remuneration of the employer, who made his people work faster and harder, and pocketed the major share of the profits. While this might have been true in the case of a few un-

scrupulous employers, it must be remembered that the modern concept of Time Study is entirely different. Most of the workers considered that as a result of this new-fangled idea a large number of them would be thrown out of their jobs. This resulted in opposition, which sometimes even amounted to violence. Indeed, all the antagonism to scientific work study, can be traced to this underlying fear. Even the Supervisor looks with suspicion at the Time Study Man when he walks into the shop. He thinks—"Here's one of those chaps who has come here to show up my weaknesses; to usurp, or to encroach upon my responsibilities and lower my prestige"—in other words his "SENSE OF EFFECTIVENESS" is lowered. Nobody likes to feel that he has failed in his job, he loses his own confidence and develops as a result a feeling of insecurity. However, supervisors and workers, generally speaking are for the most part honest, hardworking people who do their jobs as well as they can. They are certainly not less clever than the Time Study specialist and indeed have years of good experience and great practical knowledge which they have used to great advantage. If they have failed to obtain the utmost from the resources at their disposal, it is generally because they have not been trained in, nor have they the time to devote to the systematic approach which Works Study requires to be brought to problems of Organization and Performance of work.

The primary reason for Work Study is to search for ways and means of saving time. Important as the saving of material is, it is only secondary to the saving of time, if we will but realise that this is the one commodity, which, if lost, is irrecoverable. Nothing can be done to retrieve it. It is irrevocably lost. It becomes obligatory therefore, on every person engaged in an industrial undertaking to become "time conscious!" You have often heard it expressed as "Cost Consciousness"—if we agree that to an industrial concern time is money, then the two are synonymous, and time lost is a bad debt, and must be written off.

The concept of modern methods of Work Study is not, as is popularly imagined, to save time by the intensification of the worker's burden by greater pace and greater speed. It is rather, to study, critically, the job, or operation, with a view to eliminating wasteful work and to improve the working conditions for the operator, thereby eliminating inordinate fatigue and drudgery.

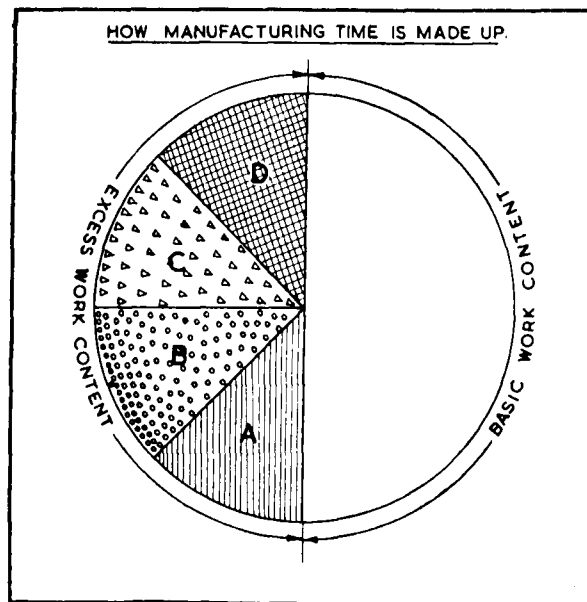


Chart 1

To be able to understand this, let us take a brief look at what constitutes the time to do a job. From this chart No. 1 you will see that the time to do a job can be classified under two groups or heads. Assuming that this circle represents a job which takes one man hour, or machine hour.

(1) The white portion of the circle indicates the Basic Work Content of the job. That is, the irreducible basic time, including rest, which it would take to do the job IF everything connected with the job, viz., the machine, the material, the design, processing, method of manufacturing and operator performance were perfect. This is however obviously a state of perfection never attainable in practice.

In fact, actual operation times are far in excess of it on account of the amount of

(2) Excess Work Content introduced into the job shown by the etched portion by

A. Defective Design or Specification of the Product

Here we have work content added to the Basic work content due to (i) Bad Design which prevents use of most economic processes, (ii) lack of standardisation, which prevents the use of high production processes; (iii) incorrect quality standards, calling for a higher class of finish than is actually necessary, or too close tolerances, or (iv) the design requires removal of excessive material. Next we have:

B. Work content added by inefficient methods of manufacture or operation

Such as when a job is manufactured on a machine entirely unsuited for the job, or when alternative material has to be used which involves more, or more difficult operations. Wrong tools, and bad layout, causing wasted movement, or incorrect methods of working.

C. Ineffective time due to shortcomings of management

Here we have time added to the basic work content due to management shortcomings resulting in man, or machine, or both, being idle because management has failed to plan, direct, co-ordinate or control efficiently because of

- (1) Excessive variety of the product.
- (2) Lack of standardisation.
- (3) Design changes.
- (4) Bad planning.
- (5) Lack of raw materials.
- (6) Plant breakdown or in bad condition.
- (7) Bad working conditions, poor supervision and lack of a proper worker training programme.
- (8) Accidents due to the lack of, or insufficiency of, proper safety training and precautions.

D. Ineffective time within the control of the worker

Finally there is the work content added by the worker himself due to—

- (1) Absence, lateness or idleness, deliberate slowing down, late starting and early stoppage.
- (2) Careless workmanship resulting in scrap or rectification, or in accidents to himself or those near him.

It will be evident, therefore, if all the factors enumerated under these four heads, could be eliminated, or minimised, we would achieve the *minimum* time for production, and the *maximum* productivity is achieved.

The Time Study Engineer's job is to *observe*, *record*, and *examine* what is happening, and then to *develop* the best method, *define* it and *install* the method. If the entire responsibility for all this were left on the Supervisor, it would be quite impossible for him to carry it out with the care and exactitude, and freedom from domestic bias so necessary to a successful and factual study of what constitutes a Fair Day's Work. All too often the Supervisor selects the output of some exceptional worker in the shop, and stipulates that as a representative day's output, which he expects other operators to emulate.

The Supervisor of today has so much to do in applying himself to all the technical problems and administrative detail of the everyday running of his shop, that he has no time to go into the details of tearing down each and every job to see how he can improve it and where time is being lost. Too often the Supervisor knows far more about other "Tools" than about Work Study, which is really one of the most important "Tools" in his supervisory tool-chest.

The Work Study Department is a service department, just as certainly as the Maintenance or Tool Grinding Sections are. It is there,

not to usurp or encroach or detract from the responsibility and prestige of the Supervisor, but to assist him in every way possible in his work of achieving the targets laid down for him by top-management. The ideal condition for a higher level of productivity is a combination of the specialist knowledge of the Time Study Engineer, and the Supervisor's knowledge of the job.

Work Study arrives at a representative day's work by processes and application of a series of questioning sequences. It is a systematic method of evaluating a fair day's work.

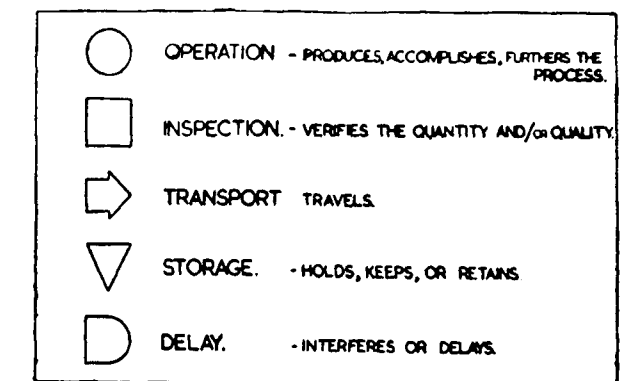


Chart 2

Let us see how Work Study operates. It comprises two main aspects for study as will be seen from the Chart (No. 2) viz.,

(1) Method study, which is defined as—

The systematic recording, analysis and critical examination of existing and proposed ways of doing work, and the development and application of easier and more effective methods.

(2) Time study, which is defined as—

The scientific application of techniques designed to establish the work content of a specified task by determining the time required to carry it out at a defined standard of performance by a qualified worker.

The first aspect is to improve methods of production to achieve improved factory and workplace layout ; improved design of equipment ; better working conditions and reduction of fatigue ; improved use of materials, plant and equipment.

The second aspect is to provide a yardstick for human effort to achieve improved planning and control. More efficient manning of plant and reliable standards of labour performance as a basis for reliable labour cost control and as a basis for direct financial incentives.

While there are two separate aspects to the subject of Work Study it is quite impossible to divorce entirely either aspect from the other. Method Study is concerned with the reduction of work content, while Time Study is concerned with the investigation and reduction of ineffective time.

The eight basic steps for performing a complete Work Study are—

- (1) *Select* the job or process to be studied.
- (2) *Record* from direct observation everything that happens using the most suitable technique of recording.
- (3) *Examine* the recorded facts critically and challenge everything that has been done by the application of a questioning sequence considering in turn the purpose of the activity, the place where it is performed, the sequence in which it is done, the person who is doing it, and the means by which it is done.
- (4) *Develop* the most economic method taking into account all the circumstances.
- (5) *Measure* the quantity of work in the method selected and calculate a standard time for its performance.
- (6) *Define* the new method and the related time so that it can always be identified.

(7) *Install* the new method as agreed standard practice with the allowed time.

(8) *Maintain* the new standard by proper control procedure.

These steps will be discussed fully at a later stage when we deal with Method Study and Time Study separately. Suffice it to say that the Supervisor forms an integral part of the Work Study application ; without his active co-operation all the efforts of the Time Study Engineer are nullified. The Time Study Engineer gives the Supervisor the tools of efficiency through the medium of production standards, and the Supervisor alone can finish the job by introducing the standards to his shop and making every effort to prove the Time Study Engineer right, instead of using his influence to obtain the reverse effect. Both bodies are closely allied, and a combined effort to understand each other's position and problems will result in greater productivity, and, a factor which is equally, if not more, important a team spirit to approach differences without prejudice.

One often hears the word "Scientific" methods of Work Study spoken about—let us examine what is really implied by the word "Scientific" in respect to Work Study. The dictionary defines science as "systematic knowledge, or any branch of study concerned with observed material facts." Because Work Study is concerned with the measurement of human endeavour there is a tendency to regard certain details of this work as unrealistic and unscientific. No laws can govern the complexities of human inconstancy. Nothing is easier than to criticise the inexactness of the technique of Work Study, or to point to the extent to which judgment operates in the assessment of work values as proof of the unscientific nature of the subject. It is necessary, therefore, to sound a note of warning in subjecting Work Study to tests which have no real significance in practice. Time Study does not pose as a pure statistical science. It has its shortcomings, which are freely acknowledged, but it is a practical tool

for use in the day-to-day operations for which it is used. It is scientific in the sense that it brings the spirit of systematic enquiry to bear on problems which others think can be solved by commonsense alone. It has stood the test of almost universal application, and emerged as one of the most successful methods of expressing human work in quantitative terms.

METHOD STUDY

Till now, I have dealt briefly with the subject of Work Study as a whole, so as to give you an overall picture of its usefulness to the Supervisor. I would like to give you a brief idea of the first aspect of the subject, namely Method Study.

In Method Study the same sequence of Select-Record-Examine-Develop-Instal-Maintain is followed. It is essential for the purpose of obtaining a complete and successful result that the procedure adopted should follow very carefully, this sequence. None can be excluded. It is an analytical approach and to ensure that the content and extent of the analysis is complete it is essential to follow these six basic steps. Do not be deceived into believing that Method Study is as simple as these six steps make it sound. They have been classified thus only to simplify the explanation.

It is here, in the Method Study aspect of the job, that the Time Study specialist looks to the Supervisor for his help and support most. It is here that the Supervisor's years of experience on the job and the practical knowledge of it, and the conditions surrounding it help the Time Study Man to carry out a complete investigation of the job ; the more successfully they work as a team, the more successful is likely to be the investigation, and the results likely to accrue from it. I would like to explain to you therefore some of the techniques used in Method Study, so that your co-operation with the Time Study man can be based on a knowledge of the job and you have an idea of what the Time Study man is after.

In the selection of the job for Method Study, the selection is dictated by need. It may be that a job is not going through satisfactorily because of bad layout or operation planning. Or, that poor use of material, labour, or machine capacity is resulting in high scrap and re-processing. Or there may be bottlenecks due to inconsistencies in work, or highly fatiguing work. Thus any problem with regard to output is the problem to select for the joint assault of the Supervisor and the Time Study Man.

Next comes the process of recording—by observation—what is actually happening. When I say by observation, I mean just that. There is no point in sitting down at a desk and picturing the operation, no matter how familiar one may be with it. It is necessary to observe, and record exactly what is happening. The reason for this is twofold. First to have a *true record* of the job as it is *being done* for later comparison with any proposed method that may be developed. Secondly, it is quite necessary to have all the facts before us when we embark upon an investigation—these facts therefore must be *exactly what is happening*, and not what we *think* is, or should be, happening.

This recording of the facts is carried out in one or more of several ways, depending on the detail of information required. We employ Process Charts, Flow Diagrams, String Diagrams, and even models for Plant layout investigations. Multiple activity charts, and two-handed Process Charts being among those used for the investigation of operations at the work place. The construction and interpretation of Process Charting is made simpler by the use of symbols (Chart No. 2).

In case we wish to obtain an overall picture of the principal operations and inspections on a job, we might employ an outline Process Chart (No. 3) in which we employ only the symbols for operation and inspection. This gives us a picture of each and every operation as related to the other, and, from it we can

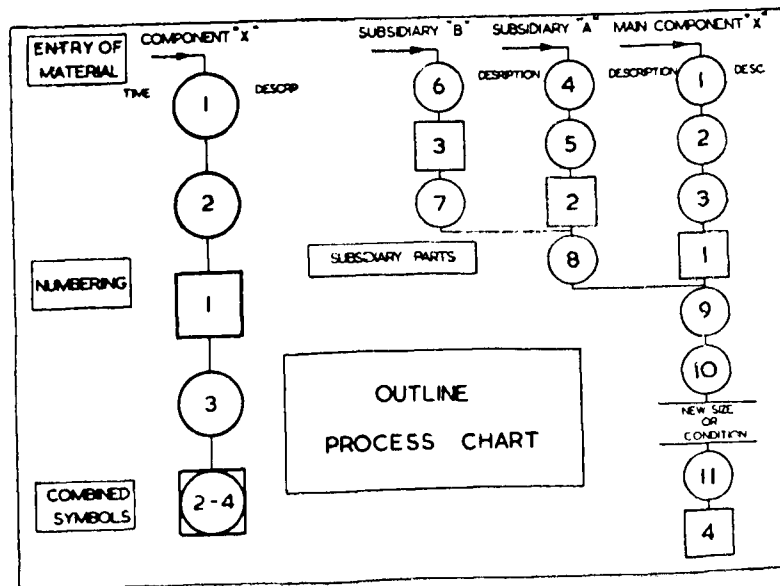


Chart 3

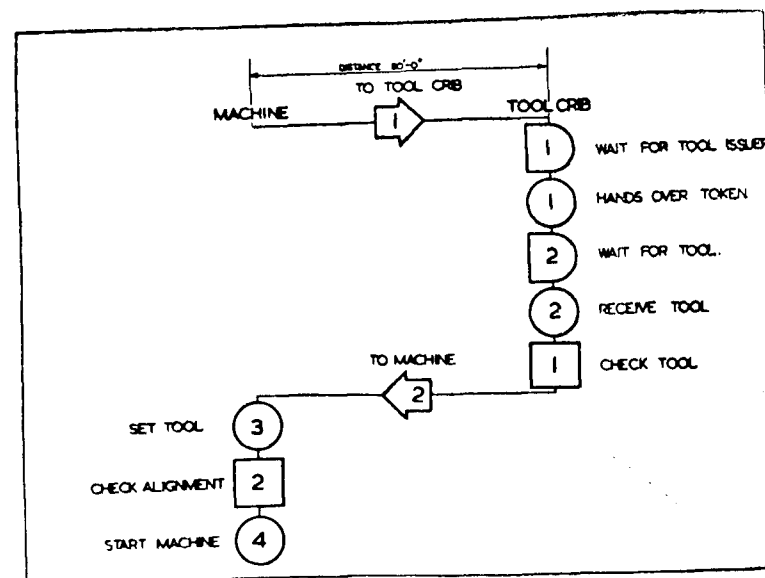


Chart 4

easily see whether or not further detail study is necessary, and where. If it is, then we can go on to making a Flow Process Chart (No. 4) which employs the symbols for Transport Delay and Storage besides those for Operation and Inspection. When further detail is necessary, you can easily see how these same symbols can be used to construct Process Charts showing either the Man or the Material activity, and even the relative activities of the man and the machine. It can even be projected to give Two-handed Charts for detailed motion study, which however would be going into too much detail of the subject for a lecture of this kind.

The next important step in the study is the critical examination of the problem, and is to my mind the crux of the whole procedure. It is, therefore, sometimes more effective if two people are working on it together—preferably the Supervisor and the Time Study Man. The entire process is put through a questioning procedure as to

- (1) *Purpose* : “What is being achieved?”
“Is it necessary?”
- (2) *Place* : “Where is it done? Why there?”
- (3) *Sequence* : “When is it done? Why then?”
- (4) *Person* : “Who does it? Why that person?”
- (5) *Means* : “How is it done? Why that way?”

At first sight this might appear to be rather a silly little game of asking what appears to be questions, to which the answers are obvious. I would however warn you that many of the results obtained through Work Study appear to be so obvious *after* it has been achieved as to make one wonder, “why didn’t I think of that before.” There is an old saying that to ask the right questions is half way to getting the right answers. This little set of questions, while apparently simple, ensures that everything to do with the job is challenged. The correct

answers furnish us with the background of events and establish whether existing procedures are based on sound reasoning.

The next step is to find the possible alternatives of doing the job by asking the further questions :

- (1) What else could be done?
- (2) Where else could it be done?
- (3) When else could it be done?
- (4) Who else could do it?
- (5) How else could it be done?

This brings us to the final sequence in the questioning process which presents us with the finally selected alternatives based on all the advantages and disadvantages namely :

- (1) What *should* be done?
- (2) Where *should* it be done?
- (3) When *should* it be done?
- (4) Who *should* do it?
- (5) How *should* it be done?

This questioning pattern ensures that every aspect of the activity is examined and all alternatives fully considered. From this point, logical deduction indicates the most effective means of improvement, as a basis for developing a new method.

Once the method has been developed it remains to **INSTALL** the method by proper instruction and operator training, and to **MAINTAIN** the method by proper follow-up procedure to ensure that the new method is **MAINTAINED**, and the operator does not slip back into old habits.

With this I shall bring to a close this brief outline of Work Study. I have not as yet touched on the second aspect of the subject, namely Time Study, to which I hope to devote one complete lecture at a later date. I have tried to impress upon you this evening the

importance of developing the right attitude of mind to the subject. I have also tried not to confuse your minds with a lot of details about method study techniques, and have had, perforce, to present to you only the barest detail necessary to a comprehensive understanding of the subject. I trust I have succeeded in doing just that, and if by the way, I have been able to infuse in you an enthusiasm for this very fascinating subject—my time and yours has not been wasted. There are many good

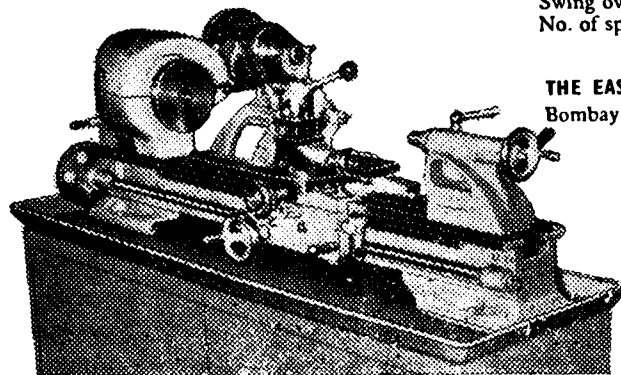
books on the subject for those who wish to pursue it further, and in the factory itself, you will find ample scope for putting your ideas and theories to work.

No one will deny that there have been unhappy experiences with Work Study, but these have been due, not to Work Study, but the misapplication of it, and, as more often as not, the complete lack of Work Study.

Thank you.

Amar 6⁰⁰

PRECISION BENCH LATHE



Centre Lathe: "Amar" Indian make, Precision Sliding, Surfacing and Screw Cutting Centre Lathe
Available in 3½' (35 series) and 4½' (45 series) Bed Lengths:
Model: 45AE with straight bed
Model: 45AEB with straight bed and change gear box
Model: 45AEG with gap bed
Model: 45AEGB with gap bed and change gear box

Technical Data:
Height of centre 6"
Distance between centres 18" (35 Series)
Distance between centres 30" (45 Series)
Swing over bed 12"
No. of spindle speeds 16

Sole Selling Agents:

THE EAST ASIATIC CO. (INDIA) PRIVATE LTD.
Bombay - Calcutta - Bangalore - Delhi - Madras
Secunderabad

Manufactured by:
Amar Electrical &
Mechanical Engi-
neering Works,
Ludhiana.

NEWS FROM SWITZERLAND

(Published through the courtesy of the Consulate-General for Switzerland)

Assembly of the Swiss machine and metallurgical industries

A General Assembly was held recently, at Lausanne, by the Swiss Society of machine manufacturers and the Swiss Association of machine manufacturers and industrialists belonging to the metallurgical branch, which group 550 firms, occupying some 200,000 persons. After twelve years of fruitful activity, Dr. Ernest Speiser, Senator, handed over the presidency of the Swiss Society of machine manufacturers to Mr. Buhler, Member of Parliament.

The Swiss Federal Railways during the first half of 1959

From the 1st January to the 30th June, 1959, the Swiss Federal Railways carried 113 million passengers, i.e., 2.6 million more than during the first half of last year. The transport of goods remained practically unchanged (11.25 as against 11.2 million tons). A decline of 12 million francs occurred, however, in respect of the profits derived from the operation of railways, this being due mainly to an increase in cost.

Cars and railway tunnels

Considerable reductions on the fees for the shipment of cars through Swiss Alpine Railway tunnels have recently been announced by the Swiss Federal Railways. As the system of these shipments has been improved lately, passengers will no longer have to get out of their cars during the tunnel trips. Fees now also include the tickets for the passengers. The new reductions may amount to 40% in certain cases.

Swiss drive

Every seventh Swiss was in possession of a motor vehicle by the end of 1958, the Swiss Federation for Road Traffic started recently with some 726,000 registered vehicles serving a population of 5,210,000. Switzerland is now one of the most heavily "motorized" countries in Europe. This figure does not include an additional 125,000 army cars, tractors and other agricultural vehicles. Furthermore, an estimated thirteen to fourteen million foreign cars and motorcycles entered Switzerland temporarily last year.

INDEPENDENCE DAY CELEBRATIONS

The 12th anniversary of Indian Independence was celebrated in the factory with the usual eclat on August 15, 1959.

Exhorting the workers to rise up to the increasing demands on them Shri K. Swarup, Chief Mechanical Engineer, reviewed the performance of the factory in his talk to the gathering of officers and men and their families, and said :

"The dawn of today marks the 12th anniversary of Indian Independence and we have assembled here to celebrate the event. Today is a day of National rejoicing,—rejoicing over the hard-won freedom—rejoicing over what we have achieved in this span of a decade. We have of course on this happy occasion also to pledge ourselves for forging ahead in the path of prosperity by hard work and sincerity of purpose.

"To me, associated intimately with you for the past 6 years, this day gives an opportunity to express my gratefulness to all of you for the unstinted co-operation and assistance that you have given me. In the days ahead, when we have to toil and struggle hard to maintain our standards and achieve still higher standards in the I.C.F., I am sure you will extend to me the same amount of friendship and co-operation.

"Since attainment of political Independence in August, 1947, considerable progress has been made in the upliftment of millions of our countrymen who were economically backward. The whole national energy has been marshalled under the leadership and directions of the First and Second Five-Year Plans to improve the lot of the common man. The progress

Mrs. K. Swarup, wife of our Chief Mechanical Engineer, distributing the prizes on Independence Day



made, though impressive, has still to be accelerated, if we are to compare ourselves favourably with the advanced countries. Let everyone of us ponder over our past and present situation objectively and assess national requirements and also our own responsibilities for meeting them. If we proceed with this spirit in our national construction work, there can be no doubt that we will be achieving our objectives in a short time. On this solemn day, a day of both rejoicing and dedication, let us resolve that, undeterred by difficulties, we shall continue to march forward towards the many-sided development of our country so that our dream of a welfare state be realised as soon as possible.

"This is also a day of stock-taking and let us review our past performances and gear ourselves to deal with the tasks ahead. I would say that we have done excellent work in the past year. We are much ahead of our schedule in production and the Second Shift which is since being gradually introduced is also gaining strength faster than expected.

"The first TLR in light-weight construction was launched recently and it is a proud achievement, considering the fact that I.C.F. was originally scheduled to produce only III class integral coaches. A regular production of TLRs has already started and another matter of pride is that I.C.F. will soon be producing first class coaches.

"The sanction for the construction of workshop structures of the Permanent Furnishing Annexe has been received and the construction of the Rs. 3.75 crores project will soon be

getting into full swing. In the meanwhile, I am glad to say, the temporary Furnishing Annexe has been forging ahead with a good production record.

"On the I.C.F. are now placed more and more demands, but I have no doubt that we as a family will rise equal to any demands and acquit ourselves creditably.

"So, on this great day, let us renew our bonds of love and affection for one another and take a resolve, solemnly dedicating ourselves to the assigned task, which is our duty and our rare privilege to perform.

"JAI HIND."

Earlier in the day, as the Chief Mechanical Engineer arrived in the Parade Ground east of the Integral Coach Factory Staff Colony, he was given a general salute. After invocation, the National Flag was hoisted by the Chief Mechanical Engineer and then the National salute was given. Shri Swarup then inspected the parade and witnessed a March Past.

Children of employees of the factory were recipients of sweet packets to mark the occasion

Later in the evening a Tamil drama entitled "Vazha Vaithavan" was put on boards at the I.C.F. Open Air Theatre by the members of the Amateur Artiste's Association, Ayana-varam, Madras. The drama was directed by Shri R. Somasundaram, Head Clerk of the Stores department. The story was gripping and kept the gathering in rapt attention throughout.

I. C. F. COLONY SCHOOL ANNUAL DAY CELEBRATIONS

The Fifth Annual Day Celebrations of the I.C.F. Colony Aided Elementary School was celebrated in a befitting manner on the 10th August, 1959 at the premises of the I.C.F. Institute. The function was presided over by Shri K. Diraviyam, I.A.S., Collector of Chingleput.

The Manager and Correspondent of the school, Shri S.G. Iyer, our XEN, after welcoming the guests, read the Annual Report of the school. In his report he said :

"On behalf of the Managing Committee of the I.C.F. Colony School, I have great pleasure in presenting before you the School report for the fifth academic year 1958-59. The strength of the school remained at 211 during the year. In the annual examination 165 students, i.e., 78% of the total strength got promoted to higher classes. 27 children who left the top class of the Elementary School had secured admission into higher classes in the neighbouring High Schools. During the inspection of the school in December, 1958, the educational authorities were pleased to remark as follows :

"The accommodation of the school is adequate and suitable and is kept very clean. The records are upto date and the standard of tuition is satisfactory. The Headmaster, with the co-operation of his team of assistants, is constantly striving his best to improve the efficiency of the school."

As usual the children participated in the functions connected with Independence Day, Universal Children's Day and Republic Day, celebrated by the I.C.F. Among the important personages who visited the I.C.F. during the year under review and whom the children had the occasion to welcome in the Colony,

may be mentioned, His Royal Highness The Duke of Edinburgh on 31st March, 1959 and Shri V. K. Krishna Menon, Defence Minister, Government of India on 14th February, 1959.

"The current year has been one of great changes for this small institution. The State Government had ordered that the private management schools in the State should elect either to levy school fees from students and forego the Government grant or to declare the schools as 'non-fee levying institutions' when they would be eligible for aid from the State Government. With the sanction of the I.C.F. administration, this school has been declared as a non-fee levying institution from this year onwards.

"The strength of the school has increased to 272 as on date and there are now 8 sections of classes instead of 7 as in the last year. Another significant change was the retirement of the Headmaster of the school, who had piloted it from its inception till he had to retire on superannuation. The place has been filled up by his First Assistant, Shri John Victor, who has qualified himself to the post by passing both the Matriculation and the T.S.L.C. Examinations on his own initiative as a private candidate. In this connection, I would like to place on record the appreciation by the management of the good services rendered to this institution by the previous Headmaster Shri K. V. Subramania Iyer and I hope the new incumbent will try to follow in his footsteps and prove worthy of shouldering the additional responsibilities that have fallen on him due to the increased strength and other significant changes in the conduct of the school.

"With the increase in strength reported above, the present school building is inadequate to house all the classes comfortably, but here

again, I am glad to state that the I.C.F. Administration has taken up timely action for getting a new building constructed for which the Ministry of Railways have been approached for approval. I hope that the next academic year will see the school housed in its own premises.

"I shall be failing in my duty if I do not publicly acknowledge the keen interest evinced by some of the senior officials of the I.C.F. in the affairs of the school. Shri Swarup, our Chief Mechanical Engineer, has been the main source of inspiration to the Committee of Management in facing the various problems connected with the running of the school and we owe him a deep debt of gratitude. Shri A. V. Subramanian, our Personnel Officer, with his inherent academical leanings, has been striving to raise the status of the school to that of a Higher Secondary School by the gradual introduction of the higher standards year after year. With his personal effort and drive, I do hope that the next year would herald the upgrading of this institution into a Higher Secondary School. Shri Sundar Raj, our Deputy Financial Adviser, has taken keen interest in the financial stability of the school and has been giving us valuable advice as how to further strengthen the position."

Shri K. Swarup, our Chief Mechanical Engineer, in a short speech, congratulated the

Management and the teaching staff on the excellent results obtained by the school during the year and wished the school all success in the years to come.

Shri Diraviyam then spoke in a very humorous vein and told the children that, while other children played with toy-trains, the I.C.F. children could well afford to boast that their parents produced the real trains. He appealed to both the parents and the children to give their education a distinct bias towards practical work, so that in the long run the children would be able to take up their places befittingly in the I.C.F. itself.

Mrs. Diraviyam, who also attended the function, distributed the merit prizes to the children of the school.

The evening's programme was high-lighted by a number of interesting and original items of variety entertainment put on boards by the school children themselves, ranging from toddlers of 5 to top class children of the age group 10-12. The hall was packed to capacity and the large gathering enjoyed every bit of the programme with rapt attention.

With the singing of Jana Gana Mana, the function came to a close.

REPORT OF THE 17th INTERNATIONAL SCOUT CONFERENCE 1959

BY

MAHENDRA LAL,

District Commissioner, Scouts, I.C.F.

Introduction

The Boy Scout movement, which was started in a small way in 1907 by Lord Baden-Powell, has now become a world-wide movement with over 8 million Boy Scouts and Rovers. The success of this movement has been in a large measure due to its appeal to young boys and girls. The Governments of various countries, recognising the educational value of this movement, have also given generous help in the organisation and spread of this movement. In 1920 the International Bureau was formed with the object of co-ordinating Scouting activities in the world and for spreading the message of Scouting. The First International Conference was held in London in 1920. Since then the International Committee and the International Bureau have done much to promote Scouting in the world. Conferences on a World and Regional basis are held periodically to review the work being done in different countries. Travelling Commissioners and Field Commissioners appointed by the International Bureau travel from country to country organising training courses and checking on the progress made. The International Scout Conference is held once every 2 years to review the work done and to plan for the future. The 16th International Conference was held at Cambridge in England in August, 1957.

The 17th conference

The 17th conference held in New Delhi was attended by delegates from 34 countries and observers from 8 countries and also the representatives of various European Scouts in exile. Also among those present were Lord

Rowallan, Chief Scout, Sir Charles MacLean, Deputy Chief Scout and Chief Scout-designate and Justice Vivian Bose, the National Commissioner for Scouts and Guides, India, Major General Spry, the Director of the International Bureau and the Executive Commissioners and members of the International Committee.

The delegates were housed in the Asoka Hotel in New Delhi and the proceedings of the conference were conducted in Vigyan Bhavan.

Inauguration

The conference was inaugurated by Prime Minister, Shri Jawaharlal Nehru, at 17-00 hours on 29th July, 1959. The colourful ceremony was held in the Main Hall of Vigyan Bhavan, where Scouts and Guides bearing the flags of different participating countries marched inside the hall while the 10th World Jamboree song was sung over the loud-speakers. Pandit Nehru, in an inspiring speech, stated that for the first time in history, due to the world having been made smaller by advances in communication and technology, it was within the hands of men to build up the world, where the necessities of life and even something more can be given to every human being. He referred to the message of Emperor Asoka, which formed the basis of Indian Foreign Policy and expressed the hope that the Scout Organisation, as in the past, will continue to play a definite part in moulding people's character and will help people all over the world to move forward towards the goal of one world, which is obviously laid down to-day by scientific technology and other advances.

The Prime Minister's speech was followed by a Film Show in which films were screened on "The Youth of India at work" "Khajuraho," "Bharathanatyam," "Khedda Operations," "Periyar Lake Sanctuary" and "Yoga."

Conference proceedings

The theme of the conference was "Building Tomorrow, Today." The discussions opened daily by a keynote address by an eminent scouter. Keynote addresses were given by Justice Vivian Bose, by Dr. Arthur A. Schuck on "The Boy," by Lord Rowallan on "The Leader" and by De Rham of Switzerland on "The Scout Ideal." The daily pattern of the conference was that in the mornings a few papers used to be read by eminent scouters from different parts of the world on various subjects of interest, to be followed in the afternoons by Group Discussions on these and allied subjects. Interesting reports were made about the development of scouting in different parts of the world and in particular must be mentioned "The Development of Rural Scouting in Malaya," "Breaking new ground in Papua and New Guinea" by Roy Nichols, "The Cub Programme" by Rev. Bryan, "The Explorer Programme of the U.S.A." by Alfred Augustus, "The Scout Alpine Club" by De Rham, "The Explorer Belt" by Mr. Calquhoun of Great Britain, "The Philia in Greece" by Mr. Yuralanos, "The Afro-European Caravans" by Mr. Pouissier and "Scouting for the Handicapped Boys" by De Sennanaik of Ceylon.

A report was also made by the Director of the International Bureau on the progress of scouting in the world and on the work of the Far-Eastern Regional Conferences by the Chairman of the Far-Eastern Regional Committee. Interesting speeches were also delivered by Robert Bloom, President of the Agar Foundation and Mr. Ellis of UNESCO. A review of the Plans for the future and the Jamborees and other International functions to be held was also made.

Group Discussions

A series of group discussions were organised in the afternoons under the chairmanship of



Lord Rowallan, Chief Scout, with the author

experienced and eminent scouters. These discussions provided an opportunity for free exchange of views and informal discussions between scouters from different parts of the world. Some of the important subjects discussed during these group discussions were "Man-power," "Promotion," "Organisation," "Cubs," "Scouts," "Scouting for handicapped boys," "Rural scouting," "Service projects" and "Finance." The excellent committee rooms of the Vigyan Bhavan provided an ideal setting for informal and exhaustive group discussions from which all delegates and observers undoubtedly gained a great deal in knowledge and experience.

Social and other functions

Outside the working hours, when the conference was in session, a programme of entertainment including parties, camp fires, etc. was drawn up, which kept all the delegates busy and also helped them to meet people. On the 28th July, a party was given by the President of the reception committee, Shri Jagjivan Ram, Minister for Railways, at his residence. This party was attended by all the delegates and observers and representatives of the local scout associations. On the 30th July, the Bronze Wolf Awards, the highest award in scouting, were awarded by Lord Rowallan to Messrs. William D. Campbell of America, Richard Thurman of Gilwell and Hon'ble George De Vargas of Philippines.

On the 31st July, a Camp Fire was held at the Humayun Tomb camp site. This camp fire was organized by the Delhi State and the Boy Scouts and Girl Guides of the schools in Delhi participated in the programme. The highlights of the programme were various folk dances performed by the school children, the Malayan Fire Cracker Yell organised by Malayan Camp Chief and the singing of the

B.P.'s spirit song by all those present led by John Thurman.

On the 1st August, there was a rally of Cubs and Bul Bulls in Rashtrapathi Bhavan followed by the presentation of Silver Elephant for distinguished service to Mrs. Lakshmi Mazumdar. In the evening there was also a reception by the President, Dr. Rajendra Prasad, in the State Room of Rashtrapathi Bhavan, when many of the delegates and observers present were introduced to the President.

On the 2nd August, the foreign delegates were taken on a visit to Agra to see the Taj and other historical monuments. A special air-conditioned train was run to Agra for this purpose.

On the 3rd August evening, the last day of the conference, there was an entertainment by the Children's Little Theatre. The closing dinner was held in Asoka Hotel in the Banquet Hall. The sumptuous dinner was followed by a Shadow Play by Mr. Prasanna Rao. The dinner and the leave-taking went on till past midnight, and the spirit of the International Brotherhood of scouting was very much in evidence.

SOIL MECHANICS FOR RAILWAY ENGINEERS

BY

U. G. K. RAO,
(206 pages, illustrated)

The Railway Testing and Research Centre, Lucknow, of the Research, Designs and Standards Organization has recently published a book entitled "Soil Mechanics for Railway Engineers" by U. G. K. Rao.

As the name of the book indicates, it is primarily intended for railway engineers and

should be valuable to all the civil engineers working on the Indian Railways.

The book is excellently printed and copies can be had from the Manager of Publications, Civil Lines, Delhi-8 and his authorized agents at Rs. 7-50 per copy.

CLEANING OF DIESEL-ELECTRIC LOCOMOTIVES

BY

B. L. JUDY,

(General Electric (U.S.A.) Locomotive & Car Equipment Department, Erie, Penna.)

AND

D. H. Noble,

(Electrical Research Engineer, Chicago, Rock Island and Pacific Railroad Co., Chicago, Ill.)

While many railway maintenance men may not regard the cleaning of diesel-electric locomotives as essential to maintenance, the fact remains that the intelligently directed cleaning job can be sound *preventive maintenance*.

For instance, it is obviously a waste of time to assign a highly paid mechanic the task of cleaning carbon dust from the exterior of a traction motor. But an hour spent removing dust from the motor's string band may prevent a flashover that could result in a very expensive armature rewind job.

A little dirt under a connecting rod bearing could mean the cost of a new crankshaft. Cleaning the outside of the engine would be an obvious folly.

The important thing is to perform only necessary cleaning, at the proper locations and at the right times.

The point is to obtain a direct return on the financial investment in locomotive cleaning. Too little or poorly directed cleaning will ultimately mean an increase in equipment failure. Too much cleaning will rapidly devour an equally large share of the maintenance budget with little or no return on the investment.

The solution is to take a realistic view of the subject of cleaning and to adjust the cleaning schedule to the actual need.

Cleaning the engine room

While there is no doubt that engine wear is directly affected by dirt, it is difficult to correlate engine room dirt to engine wear. However, it stands to reason that engine room dirt will eventually reach either wear surfaces in the engine or the electrical equipment. Even such a simple task as refilling the governor invites failure when the engine room is so grimy that dirt is carried into delicate parts. The truth of this is clearly evident from the large number of cases of hunting governors found on dirty engines.

Engine room dirt is only and therefore particularly bad for electrical equipment. This is the result of oil vapor being in the air and it is aggravated by poor engine maintenance. For example, excessive blow-by in the engine will frequently result in an oil soaked generator. In some locomotives this necessitates a major maintenance project.

Careful attention should be paid to cleaning air, fuel and lubricating oil supply systems. These are the chief avenues by which dirt can enter the engine. If these are kept properly clean, very little trouble should be experienced from dirt in the engine.

Cleaning electrical Equipment

Probably the most immediate return from a suitable cleaning programme is found in the

electrical apparatus. Flashovers, grounds and similar failures are all directly related to dirt and particular attention to the cleaning of electrical equipment will be well repaid.

The dust found around railroads generally makes a good electrical conductor and therefore if it accumulates on insulation creepage surfaces it will eventually cause failure. Hence, periodic cleaning of insulation surfaces on motors and generators is a good preventive maintenance practice. The frequency with which insulation must be cleaned depends on service conditions.

When the dirt is oily, no amount of blowing will remove it. In such cases it must be washed away with a solvent. Care should be taken not to use more solvent than is necessary. When possible, it is preferable to wipe the equipment with a cloth dampened with solvent rather than to spray or wash it.

Probably the most difficult type of dirt to remove is the smoke-like deposit of fine carbon. It cannot be blown or washed off. The only way to get rid of it is by scrubbing. In inaccessible places this is best done by an abrasive blast.

Cleaning controls and cables

By far the largest part of the control equipment is located in the high-voltage cabinet and therefore it is fairly well protected. Occasional judicious cleaning may be required but misdirected or over-cleaning can do a great deal of harm.

A consideration of the kind of attention required by the various items of control equipment will indicate the proper cleaning procedure.

First, take the power contactors. The design of most contactors is such that they are little affected by dirt unless it is highly conductive. Interlocks are generally designed so that their contacts are vertical and either shielded or totally enclosed. Only clinging

dirt, such as oil soaked dust, will be able to lodge and cause trouble in open type interlocks.

Maintenance workers should be cautioned against using too much oil in and around contactors. For example, if an excessive amount of oil is added to contactor air cylinders, it will be blown out through the exhaust ports of the magnet valves as a fine spray that will settle on all nearby equipment. This oil film will act like flypaper and hold all dirt that comes its way. Cleaning contactors in this condition is impossible without removing them from the compartment. Lubrication schedules should, therefore, be adjusted to take this into account and only the correct amount of oil should be used.

Careless cleaning of contactors can cause trouble, too. For example, if they are washed with cleaning fluid, dirt will be carried into insulation crevices where it may cause a breakdown. The cleaning fluid may also get into the air cylinder where it will ruin the lubricant, attack the piston packing or corrode the metal surfaces.

Generally, it might be said that as far as contactors are concerned, no cleaning is better than incorrect cleaning. An occasional blow-down with low-pressure air should suffice. In areas where great quantities of sand may be present, more frequent blowdowns may be necessary. Under highly abnormal conditions, vacuum cleaning may even be necessary.

Reverser and braking switches, like contactors, need little cleaning. However, the main contacts should be carefully checked. Over-lubrication of air cylinders can cause real trouble by spreading a dirt collecting oil film over the contacts.

Another place that oily dirt can cause trouble is on the insulation surfaces of reverser and braking switches. If it collects excessively, it may cause a ground or creepage failure.

Occasional wiping with a solvent dampened cloth is suggested.

Relays, rectifiers, transformers and capacitors generally need only occasional attention. The danger here is that excessive dirt build-up may cause overheating of these parts. It is impor-

tant that proper care be paid to the cleaning of these parts when it is done. Washing with liquid cleaners can possibly do a great deal of harm. Low-pressure blowdowns should be used instead.

(Globe Press Service)

WEDDING BELLS



Our hearty felicitations to Shri K. Ramaswamy, Welder 21/1198 and Kumari V. Rajalakshmi, who were married on 9-2-59 at Theni in Madura district.

MARCH OF SCIENCE

On Venus, Mercury and Jupiter

Man some day will land on and explore Venus, Mercury and Jupiter, but conditions on these planets may make it difficult to establish settlements. On the other hand, conditions on Mars, it is believed, make it possible for human beings and animals to live there.

These opinions were expressed in a recent interview by Dr. Lloyd Motz, astrophysicist of Columbia University, New York.

Venus, he believes, is surrounded by heavy clouds of water and he says some scientists are of the opinion its surface is covered with boiling water. However, he said, Venus could hold a good atmosphere.

Dr. Motz said that man sometime in the

future will explore Mercury. But since it is almost $2\frac{1}{2}$ times closer to the sun than the earth and since one side of Mercury remains turned towards the sun, the problem of extreme temperatures is a formidable one.

Jupiter, the largest planet, presents "substantial problems" for explorers. Dr. Motz explained that it is surrounded by poisonous atmosphere and that its gravitational pull is three times greater than that of the earth. Consequently, a 200-pound landing on Jupiter would weigh three times as much as he does on earth, or 600 pounds, he said.

Radar signals off Venus

Man has made his first contact with another planet by sending a radar signal to Venus and

back again to earth. The feat was accomplished by a team of Massachusetts Institute of Technology research scientists in the United States, who sent two sets of signals to Venus.

At the time the signals were sent, Venus was about 28,000,000 miles from the earth. The signals' round trips of about 56,000,000 miles were the longest radar contacts so far made. Each round-trip journey was made in about five minutes. Among other things, the experiment demonstrated that it will be possible to track future radio-equipped rockets to Venus all the way to their destination.

Food for space travellers

Food for space travellers poses one of the difficult problems facing future space flights. Scientists at the Massachusetts Institute of Technology are conducting research in the hope of finding the answer.

If three men were to take a "short" space journey lasting one year, they would need at least five tons of food, oxygen and water if these substances were used in their natural form. A trip to Mars would take three years and the three travellers would need 15 tons of food, oxygen and water.

Dr. Bernard E. Proctor, head of MIT's department of food technology, concludes that food for space travellers must be greatly reduced in size and weight and yet retain its high energy. How this can be done in the most effective manner is as yet unknown.

Versatile robot has "almost human" hands

The General Electric Company of Schenectady, New York, has built a robot that rivals a human being in the work it can do with its massive arms and hands.

General Electric engineers call the robot "Handyman."

"Handyman" was designed to serve as a master mechanic on experimental atomic airplane engines. It works in radio-active areas, controlled by a human operator some distance away.

The characteristic that distinguishes "Handyman" from other comparable robots is its ability to clutch objects in its steel hands. It duplicates very closely the clutching action of the human hand. To do this, it has a thumb and forefinger on each arm. Each arm and hand can perform a total of 10 types of motion.

The robot duplicates the movements of the hands of its human operator. Its arms and hands are controlled by an intricate electro-hydraulic system.

The operator can make the robot's fingers and thumbs bend and curl. The wrists and elbows can bend, the forearms and upper arms can twist, and there is a forward and sideward pivot in the shoulder joints.

Capable of such a variety of motions, the robot can hammer a nail into a board, unscrew a bolt, or twirl a hula hoop. The movements of its hands can be so delicately controlled that it can even pluck petals from a flower.

High power Rocket engine

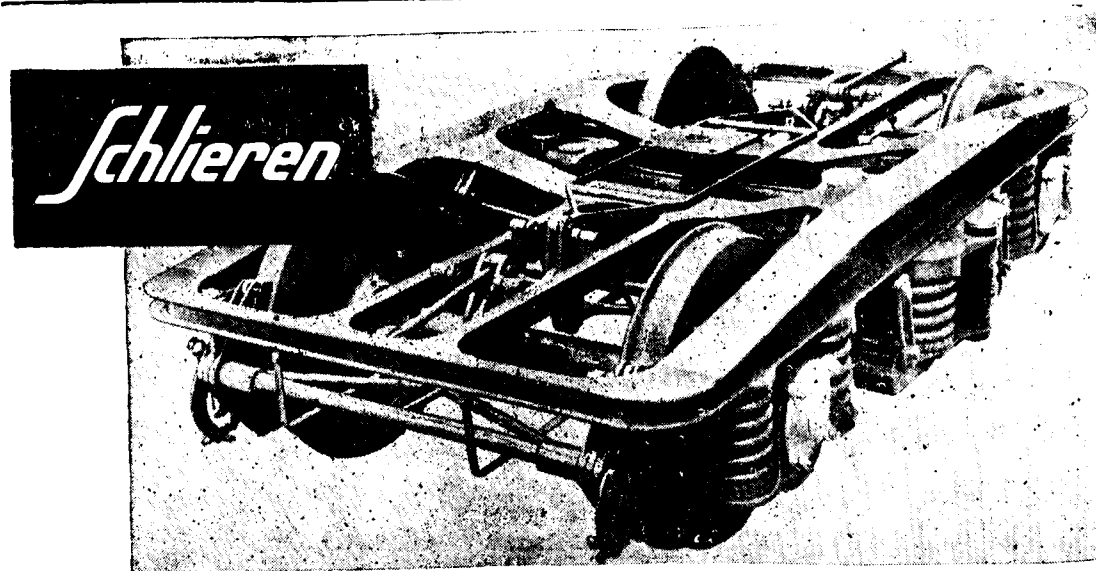
The 1,500,000-pound thrust rocket engine being developed in the United States promises many possibilities for future space projects, Krafft A. Ehricke, a leading U.S. space engineer reports.

Two such engines will provide a booster rocket of 3,000,000 pounds thrust, and this would make an excellent booster for a nuclear-propelled upper stage, Ehricke says. The Convair company official has worked closely with the U.S. space programmes from the beginning.

With two high-energy chemical-powered stages on a 3,000,000-pound booster it would be a comparatively simple matter to land people on the moon and bring them back, he believes. Such a rocket, it is thought, could land on the moon payloads weighing up to 10,000 pounds.

New material for space vehicles

A new material that may add to the safety of future space ships and increase the speed



**Bogie
Type SCHLIEREN
for sleeping
cars**

Bogies of this type developed by SCHLIEREN have been chosen by the Compagnie Internationale des Wagons-Lits for their latest sleeping cars because of their outstanding riding qualities, soft springing and smooth running under all conditions, even at high speeds (tested up to a speed of 100 m/h).

Tare weight: 5.7 tons
Wheel base: 2500 mm (8' - 2 1/2")
Helical springs

Swiss Car and Elevator Manufacturing Corp., Ltd., Schlieren-Zurich (Switzerland)

RAILCOACH

R-3

of missiles has been developed at the University of California in the United States.

The material combines the heat resistance of ceramics with the strength and flexibility of various metals. In making the material, molten metals and ceramics are sprayed in alternate thin layers on a rotating disk. This makes a "layer cake" structure consisting of many thin layers one above the other.

After cooling, the cake is crushed into tiny particles that are smaller than grains of salt. Each particle, however, retains its layercake structure. The grains are then pressed in a mould at temperatures up to 2,200 degrees Fahrenheit.

The resultant material is said to be superior to any previous mixture of metals and ceramics. Materials of this type are now usually made by mixing small particles of ceramics and metals as salt and pepper can be mixed. However, they become brittle at high heat and crack or break under stress.

Weightless man will move about space ships

Aviation research engineers in the United States are developing a device designed to

enable weightless space travellers to move around inside or outside of space ships.

The device, called a reactor gun, is still in the experimental stage, but is functioning successfully under conditions of weightlessness. These conditions are created by diving an airplane at a steep angle until it reaches a speed of 250 miles an hour. The plane then pulls out of its dive and coasts in an arc.

During the coasting period the plane and everything inside it becomes weightless for 10 to 15 seconds, and the plane's passengers experiment with the reactor gun.

The reactor gun consists of a group of bottles containing air under high pressure and a short length of hose fitted with a nozzle and valves by which the flow of air from the bottles can be controlled. The bottles are strapped to the space travellers' back. To move in one direction, he points the nozzle in the opposite direction and opens the valve to release high-pressure air. The reaction of the air rushing out of the nozzle provides enough force to propel the man from one point to another. The experimental work is being done at Wright Air Development Centre in Dayton, Ohio.

VISITORS TO THE FACTORY

On the 1st August 1959 Shri Shriman Narayan, Member, Planning Commission, visited the Factory. Shri Narayan recorded his impressions in the Visitors' Books as follows: "It is so gratifying to see that our young men can undertake highly technical work as efficiently as in any other country in the world."

Shri P. C. Padhi, Additional Deputy Comptroller and Auditor-General and Director of Railway Audit, visited the factory on the 5th August 1959. After going round the factory

he recorded his impressions in the Visitors' Book as follows: "It is a pleasure to visit the factory which has been progressing from success to success. I am greatly impressed by the efficiency of the workshop and the management."

On the 19th August, 1959 Mr. Sherwood, Representative of the Export and Import Bank, American Embassy, New Delhi, visited the factory. After going round the workshops, he observed that the factory was "an inspiring accomplishment."

TIME FOR AN OIL CHANGE?



The oil under test in the viscosimeter is contained in the dark coloured glass tubes and the small bulb-like objects at the top. This particular sample of oil comes from a G-E diesel-electric loco in use on the South African Railways.

The scientific testing of the engine lubricating oil from a massive diesel-electric locomotive by a General Electric (U.S.A.) chemist at the G-E. Locomotive and Car Equipment plant at Erie is a far cry from the average service station attendant's casual inspection of your automobile's lubricating oil.

The instrument into which the G-E. chemist peers is called a viscosimeter. It gives a measure of the flow rate or viscosity of the oil and permits analysis of engine operation with oils of different types as well as evaluating the oils themselves.

Viscosity is one of the more important physical properties of a lubricating oil. When an oil's viscosity is lowered through use, it loses some of its ability to maintain a protective

film on moving parts and its lubricating efficiency is lowered.

The sample of oil may come from a 1380 horsepower diesel-electric locomotive made by G-E. for the South African Railways. In addition to the monthly tests on samples of oil from G.E. diesel-electrics, operating on the South African Railways, similar tests have been made for railways in Asia, South America and Turkey.

Results of this and several other tests are sent back to the railroads along with comments and interpretations made by the G.E. experts. Information gained in these tests is used in evaluating lubricating oils and as an aid in forecasting the lubrication requirements of railroads in every part of the world.

—Globe Press Service

FLOWER ARRANGEMENT

BY

MISS MOHANAM VISWANATHAN

(Miss Mohanam Viswanathan, daughter of Shri C. S. Viswanathan, W.M./F., was in Japan for two years and she gives in this article a succinct sketch of what she learnt about the art of flower arrangement in that country—Ed.)

God has blessed the earth with rich nature which gives us the plant life and almost every plant has a flower to offer.

Flower arrangement is considered as a fine art in Japan and this reflects the outlook of a whole nation that takes advantage of nature. There may not be a sitting room or a meeting room in any building in the whole of Japan where flowers have not been arranged in an artistic way to create a natural atmosphere, however low and big the place may be. Mere collection of some flowers and plants and putting them in a container do not give the desired effect. The art of arranging flowers and exhibiting them in a matching background is inherited by this nation as an ancestral asset.

There are recognised schools and institutions all over Japan where this fine art is imparted to every woman and child. The nursery schools in Japan, where the children enter at the age

The author (4th from left) along with a teacher and students in a Japanese School for Flower Arrangement



of four, pay special attention in developing the children's minds with strong likes and dislikes so that they insist on what they really want when they grow up. The art of painting is also developed in the children's minds in the nursery schools, so that they get an artistic bent of mind in life.

I visited Japan in 1954 when I was 12 years old and stayed in that country for two years. The first thing that I noticed when I entered my new house in Japan was the flower vase put right at the entrance in a corner and an attractive flower arrangement in the drawing room. During my two years of stay in Japan, I took the opportunity of attending the classes for flower arrangement under the able guidance of learned teachers in the profession. The Japanese language is very soft and respectful and I did not find any difficulty in learning the language during a period of two months due to my close association with my learned teachers.

The main points to be remembered in flower arrangement are :

- (1) Selection of vases.
- (2) Selection of flowers with stems and leaves.
- (3) Deep colours for contrast of sprinkling nature.
- (4) Dried plants which will specially add to certain backgrounds.
- (5) Certain plants with thorns and irregular growths with no leaves.
- (6) Wild growths like 'Phumpus.'
- (7) Big leaves with broad and tapering shape.

- (8) Study of the background and surroundings of the hall or room where the flowers are to be arranged.

The selection of flowers is based on the colour, shape, abundance and life. It is not the perfume which counts for the selection of flowers for a vase.

There are different types of vases with shades and colours on them. The main types are as follows :

- (1) Open regular vases.
- (2) Open irregular vases.
- (3) High vases.
- (4) Corner type vases.
- (5) Pendulum type vases.
- (6) Wall type vases.
- (7) Multiple vases, etc. etc.

These vases are made of China clay porcelain finished and of bamboo and timber. The decorative vases are finished with colour background on the exterior and mat-finished. There are special bases ('Kensa') on which pins are fitted so that the flowers can be stuck to any desired position.

Normally, in big halls, open type vases are used. Usually, in the entrances, corner type vases are used. For verandahs and passages

The author learning flower arrangement in a Japanese School. The teacher is to the extreme left.



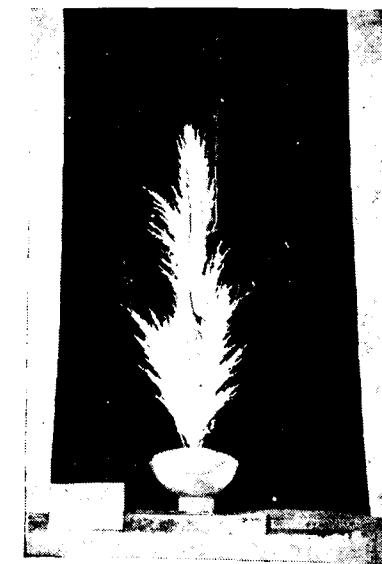
pendulum type vases are generally used. It is always difficult to make a correct choice of a vase to give the best effect for a particular surrounding. Decorative vases are used for corners and windows.

When flowers are arranged in vases, it should give a feeling that the vase is not overfilled and also, at the same time, the unnecessary portion of the vases should not be exposed.

The vases used for sticking the flowers must be cleaned thoroughly everyday, so that the perishing stems sticking to the pins are removed. The water in the flower vase must be changed every day. A pinch of salt may be added to the water to give longer life for stem and flowers. The edge of the stems should be cut in a slant wherever possible.

It is necessary that after every lesson is over, the student should make a sketch of the flower arrangement she has done to appreciate the defects and effects for future guidance. She must also note down the main features she has taken into account for the background and the main features she has exhibited in the flower arrangement to suit the background with special contrast, if any, she has taken into account.

A prize-winning entry by the author at a Japanese Flower Show.



HERB FOR EYE DISEASES

The Secretary of the Ayurvedic Research Council, Delhi, has sent the following report :

Punarnava, a herb, found commonly all over India, has ushered in a new era in the treatment of eye diseases.

The herb has proved efficacious in visual troubles that were regarded incurable so long. Yet, the herb is so cheap that four seers of it would not normally cost more than an anna.

In many cases, it has made the use of glasses, whether having plus or minus power, unnecessary.

The application of the herb has disproved the existing belief that glasses, especially of the convex variety, once adopted, can never be eliminated. In a large number of such cases, normal vision has been restored by the use of the herb.

The Ayurvedic Research Council, with headquarters in Delhi, experimented with a large number of preparations for treating eye troubles during 1958 but Punarnava proved the best of the lot. Its juice is to be applied to eyes after soaking it in the powder of another herb known as Vimal Joti.

According to the former Adviser in Indigenous Medicines to the Government of India, the greatest authority on Ayurveda, the secret of his normal vision at the age of 60 is the use of Punarnava. The President of the Council, Kaviraj Khetal, also tried it personally. The specific reduced the power of his glasses from + 5 to + 2.50. He has been wearing glasses for the past eight years.

The A.R.C. is planning to open centres in the big cities where the specific will be distributed free.

Many important ophthalmic hospitals of the country are re-examining the therapeutic value of the herbs. Such institutions include Pendra Road Sanitorium, Jalan Free Eye Hospital, and Sant Parmanand Blind Relief Mission.

The U.P. Government is planning to use the herbs in State Ayurvedic Hospital, Lucknow and the Bharat Sewak Samaj, Muzaffarnagar, is arranging to distribute it in their various centres.

On this success Kaviraj Khetal and other office-bearers have received thousands of congratulatory letters from every nook and corner of the country as also from abroad.

CO-OPERATION

BY

C. KANDHASWAMI, B. COM.

(Depot Stores)

The word co-operation is defined by the father of the Irish co-operative movement, Mr. Horace Plunkett, as "Self-help made effective through organisation." In recent times every one is talking about co-operation: for, practically in every walk of life—not only in urban areas but also in rural areas—co-operation plays an important part. We have the consumers' co-operative societies, co-operative credit societies, co-operative house construction societies, co-operative milk supply union etc. The recent Nagpur Resolution on co-operative farming has caused great stir in the country. Whatever may be the merits and demerits of the plan, one thing is clearly noticed; that is the Government of India have understood the significance of co-operation in the attainment of the economic security of the country.

Although everyone talks about co-operative societies, yet it is observed that a large number of the educated masses are not fully aware of the characteristics of co-operation. It may be broadly classified as :

- (1) It is an organised activity.
- (2) It is purely voluntary.

- (3) The rights and interests of the members are equal.
- (4) It promotes primary economic interests.
- (5) Its activities are restricted to members.

Co-operation is generally said to be an alternative to capitalism in which the motive of profit is the chief feature.

The beginning of the co-operative movement dates back to the nineteenth century. At that time it was purely the individuals who joined together to form an organisation for mutual benefit. The first co-operative store formed in England in 1844 by the famous "Equitable Pioneers of Rochdale" is a concrete example. But now, in the State of Madras, we see that the Government are directly interested in promoting the spirit of co-operation. There is a big set-up to co-ordinate the functions of the various co-operative societies with the Government.

It will not be out of place to summarise the difference between the co-operative farming as outlined by the Nagpur Congress Resolution and the collective farming which is in vogue in Russia and Red China.

Collective Farming

The entire village community is employed in agricultural work as the only occupation. Individual farmer has no right to the land and the work is carried on as per the plan drawn by the State.

Co-operative Farming

The individuals continue to own their lands and cultivation is according to the decisions of the society. All other agricultural services like the supply of credit, sale of the produce etc., are undertaken by the society. It is open to some members to stay out of the co-operative farm.

The collective farm concentrates only on production and there is no need to indulge in other activities because the State supplies credit and purchases the produce at a fixed price.

In a collective farm the peasant must be admitted as a member and must be a subordinate to the plan and regulations of the State .

It is a part of the general plan for production, exchange and distribution and therefore, every detail such as the quantity to be produced, the hours of work, the share of the state and the price of the produce are decided under the plan.

The produce is divided according to the area of the land owned by each member and the sale of the produce is left to the choice of the member.

Here, there is no such subordination of the peasant.

The freedom of the peasant is safeguarded and the right to remain a member or not is not taken away.

I. C. F. CATHOLIC EMPLOYEES THANKSGIVING SERVICE

The third Annual Celebration of the I.C.F. Catholic Employees was celebrated on Sunday, 16th August, 1959, at Our Lady of Lourdes Shrine, Perambur, Madras.

The object of the Association in the Integral Coach Factory is similar to those associations organised by the Southern Railway, Telegraphs and Mercantiles etc. and is purely a religious group, which enables every Catholic to meet others of his fold once a year and offer thanksgiving to Almighty God for the benefits bestowed on them.

The celebration commenced with a car procession of Our Lady around the Shrine followed by a solemn High Mass sung by Rev.

Fr. Papas, S.D.B. General Communion and singing of the Te Deum with Benediction of the Most Blessed Sacrament concluded the church service.

The members then adjourned to the Southern Railway Institute (East), Perambur, for breakfast where about 150 I.C.F. employees with their families were present.

The second Annual Report of the Association was presented by Mr. I. S. Storey, Secretary, after which Rev. Father Joseph Sandanam, S.D.B., addressed the gathering.

The function came to a close with a vote of thanks by Mr. D. Selvan, Chairman of the Association.

A TRIP TO METTUR DAM

As a part of the scheme to develop better human relationship amongst the staff, a picnic, third in the series, was organised by Shop 25.

About 90 men formed the group and they all left Madras in a reserved bogie attached to the Nilgiri Express on the 14th August 1959 for Salem enroute to Mettur. Fittingly enough, the coach allotted to them was a newly furnished I.C.F. coach No. GTY 5173 (Shell No. 547) having its maiden run. As soon as the rake was backed on to the platform, our boys got busy in decorating it with flowers and flags. The staff were then issued identification badges and a roll call was taken. Our Works Manager, Sri S. Arunajatai came to the station to see them off and he specially warned them to be very careful in bathing in the Stanley Reservoir.

On arrival at Salem, the coach was detached from the Nilgiri Express and attached to the Salem-Mettur local. At about 5-30 a.m. the men went to a restaurant outside the station, where the morning tiffin had been arranged. The train left for Mettur at about 7-30 a.m. arriving at Mettur Dam R.S. at about 9-15 a.m. Immediately they set out to visit the Mettur Chemicals Co. and saw the process of manufacture of Vanaspati and Bleaching powder. The visit took them nearly 90 minutes and afterwards they proceeded to the Power Station and had a look at the huge turbines driving the generators. The next item was lunch for we had to foot a distance of more than a mile. Lunch over, all of them trooped to the park below the dam and, after strolling in the green shady lawns for some time, went to the right flank of the dam. There many of the boys

slipped into bare bathing costumes, got into cool water for a refreshing bath, keeping in mind the Works Manager's instructions not to go beyond safe limits.

Dark threatening clouds accompanied by thunder put in their appearance on the western sky and it hastened the return back of the boys, the route taking them over the dam proper over its entire length. After spending some time in the pavilion commemorating the completion of the work, from where they had a glorious view of the panorama all around, they walked back straight to the coach stabled in the yard. By about 6-00 p.m. the various groups were on their own again. The Mettur-Salem local steamed into Salem Junction at about 8-00 p.m. and the boys went to the Hotel for their dinner in two batches. After a leisurely dinner and a stroll, the group came back to the coach and orchestra started again offering free entertainment to the people waiting on the platform.

The coach was attached to the Mettupalayam-Madras Express at about 10-00 p.m.

The train steamed into Central punctually and we all detrained and dispersed, being a bit tired but richer in experience.

The interest taken by the Welfare Officer in arranging for a special coach, the help rendered by SS/MAS in providing one of our shells for the journey, and the facilities offered by the Station Masters, Salem and Mettur Dam, during our stay there are to be mentioned in this connection.

THE RAINY SEASON

BY

Mrs. MYTHILI GOPALAKRISHNAN

1. The sun is screened by dark clouds,
Like a maid in a black veil ;
Thunder is heard like her cries aloud,
And rain pours like the tears of her wail.
2. The air is cold and very chill,
Indicating the rain to come ;
People shiver as if at the sight of a bill,
And take stimulants ; sometimes rum.
3. Pittar, pattar, falls the rain,
Like the clattering of horses' feet ;
Impartially on a villa and a window-pane,
And runs along the sides of the streets.
4. Pedestrians are seen with an umbrella each,
Walking quickly to avoid getting wet ;
Worried they are, their destinations to
punctually reach,
And almost fly with their faces set.
5. The tar-roads glisten with water,
Like a stretch of fine black marble ;
Though the streets are slippery—no matter,
The animals run fast to their stables.
6. Children delight in sailing paper boats,
In the pools of stagnant water, up to the
hip ;
They pride in the majesty of the fleet afloat ;
Thrilled, as if they were real Navy Ships.
7. Raincoats and mackintoshes sell quick,
The shopman has no time to breathe ;
8. Cafes are raided for hot drinks,
The dull weather necessitates stimulation ;
People wear Jerseys blue, red, green and
pink,
To keep themselves warm in the situation.
9. The ponds are filled with noisy frogs,
Inviting their mates to join their company ;
All open corridors are inhabited by
street-dogs,
Their abodes of shelter—which are many.
10. In the home, rain is hated by mothers,
It hinders the progress of their work ;
The children catch cold, one after another,
Which is great worry, and they sing not
like larks.
11. Fathers in offices try hard in vain,
To conquer drowsiness, a nuisance to
work done efficiently.
Road transport is delayed by the down-
pour of rain,
And the staff sometimes attend offices late
consequently.
12. Night falls quickly ending the day,
With darkness, like a black curtain
Which falls after a scene in a picture gay ;
Sleep and rest are hurried for certain.

OUR FAMILY



Born of a family of farmers in the Ramnad District of Madras State, Shri V. Samuel Pillai, Peon of the Office of the Chief Mechanical Engineer/Administration, hails from Rajapalayam. He joined the I.C.F. on 28th December, 1954 and prior to that he was working as peon in the American Consulate.

Wiry of build, Shri Samuel Pillai is by nature a very active and conscientious worker, temperamentally attuned to putting in his best, both of body and mind, to any work he is entrusted with. Having passed more than half the Psalmist's span of three score years and ten, Shri Pillai is energetic and hard working.



Son of Shri N. Nagiah Naidu, retired Telegraph Sub-Inspector, 35 year old Shri N. Ramachandran, Motor Driver/Mechanic hails from Ranipet. He joined the I.C.F. at the very inception of the project, after serving with the Mysore State Government as Motor driver for more than a decade.

Shri Ramachandran holds a driving licence and has done about 300 thousand miles without a single accident. He is an expert driver and does his work with ease and grace.

Brain teasers

1. A suit of thirteen cards consisting of ace, king, queen, jack, 10 till 2 of the same colour has to be arranged in certain order such that the first card to be taken off the pack and put at the bottom, second also to be taken off and put at the bottom while the third is to be thrown open on the table. This process has to be repeated then without the cards exposed on the table continuously till the last card is thrown and the order of the cards thrown open has to be in the order of ace, king, queen, jack, 10 to 2.

What should be the order at the commencement?

2. On a table a number of parallel lines at equally spaced distances of 2" between them are drawn and a needle of $1\frac{1}{2}$ " length is thrown at random on the table. What is the probability that the needle will fall on one of these lines?

3. Lakshmi is twice the age that Shanti was when Lakshmi was Shanti's age. When Shanti gets to Lakshmi's age their ages will total 63 years.

What are their ages?

4. If you have a five gallon, a three gallon and an eight gallon measure and the last one

being full of oil, how can you measure out with these exactly 4 gallons of oil?

5. The terms given below in list A pertain to one or the other studies given in list B (not necessarily in order).

Identify the right pairs—

- | | | |
|----------|------------------|----------------|
| A | (1) Unstratified | (2) Cirriform |
| | (3) Macaroony | (4) Promissory |
| | (5) Chaldron | (6) Spleen |
| | (7) Woodbine | |
| B | (1) Meteorology | (2) Cookery |
| | (3) Geology | (4) Botany |
| | (5) Physiology | (6) Commercial |
| | (7) Measurements | |

6. When a group of visitors took up their stay in a village, local residents enquired into the habits of the visitors and came to know that two-thirds of them do not smoke, half of them do not indulge in alcohols, one-sixth of them smoke and show weakness to drinks and ten of them do neither.

How many were there in the group of visitors?

OBITUARY



We wish to record with deep sorrow the untimely death of Shri S. Srinivasan, a Technical Progressman of the Deputy Chief Mechanical Engineer (Works) Office, at the very young age of 26. He was drowned under tragic circumstances in the Cauvery while on a holiday trip to Kodumudi.

During the short span of his service in this factory, he won the love of everyone who came in contact with him, by his sincerity and integrity. In the execution of any work entrusted to him, he always took an attitude of ungrudging acquiescence and thus earned the appreciation of his superiors.

His death on the river at Kodumudi was due to his effort in saving a child that was about to drown. In the death of Mr. Srinivasan, the I.C.F. family has lost a sincere and conscientious worker and it is a great loss to his fond parents, sisters and brothers, whom he leaves behind him. Our sympathies are due to his family who have to bear his loss with great fortitude.

May his soul rest in peace !

Wit and Whistle

1. The proud Race-goer was boasting about his ability before a set of boys.

"Do you know what happens to the horses I follow."

"Yes," came the reply from one of the group. "They follow other horses."

2. "If any one of you give me about a thousand rupees, I will be able to make some money."

"How much will you be able to make if I were to give you so much," asked an enthusiastic opportunist.

"Well, a thousand rupees," said the first.

3. "What are you doing, you, over there" asked the Professor, pointing to a man in the back rows, busy with some work.

"Driving a nail" was the unconcerned reply.

"How dare you say that ; I don't know how on earth you are going to pass the Exams." added the Professor.

"I need not have to, Mister," told the man. "I came here, only to repair the desks here."

4. The statesman was a smart guy. He was trying to palm off an old vehicle. During the course of his talk with a rather rich but eccentric customer, he said,

"This vehicle, Sir, with the minimum fuel (pointing to the petrol tank) will run at top speed 10 miles non-stop."

"Oh, my God. I live only 8 miles away from my office and how can you expect me to walk back 2 miles."

The salesman was no doubt puzzled, but recovered soon and said,

"Well Sir, I have a solution. You please go back one mile and return the same way to your office."

5. My friend, a quick thinker, had been to the village. He was asked by the farmer once, pointing to a flock of sheep,

"How many sheep do you guess to be there in that flock."

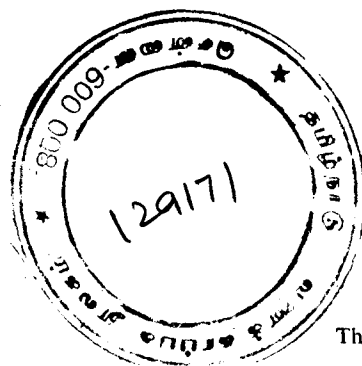
"Five hundred," said my friend and it was a perfect blind shot at dark.

"Absolutely correct" said the amazed farmer "and how did you arrive at it."

"Nothing very difficult" said my friend "I just counted the total number of legs and divided them by four."



The party of men from shop 25, who went on a trip to Mettur Dam recently, in the train compartment whiling away their time in music



The party in front of the Mettur Chemicals Building at Mettur

