



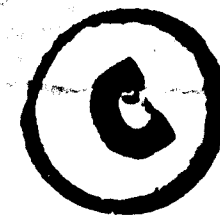
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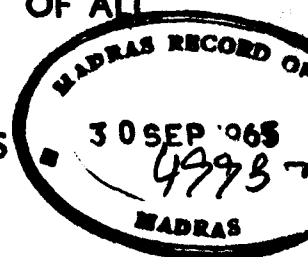
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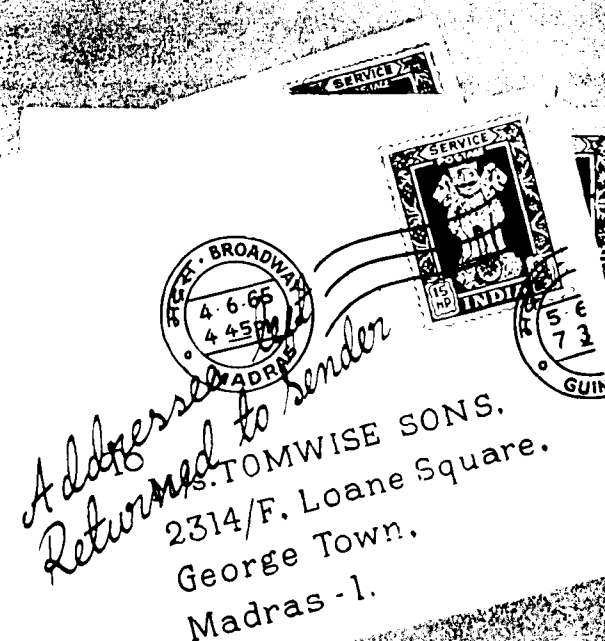
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“A B C OF COSTING”

E. S. NATARAJAN & S. K. SUBRAMANIAN
 (National Chemical Laboratory, Poona)

Before undertaking any business venture, the entrepreneur has to decide on a number of issues, such as, the market potential, availability of the raw materials, possible competition, etc. One of the most important tools in this decision making is the profits and return on capital.

To compute the return on capital one has to know the capital to be employed in the venture and the possible cost of production. The underlying principle in this is the science of costing or cost engineering. We intend covering the basic principles of this science in a series of articles.

Cost estimating is the art, based upon empirical and factual relationships, of predicting the economic future of a proposed operation. It is composed of three basic phases: investment, which is the money necessary for establishing facilities for productive operations; cost which is the expense of the effort to manufacture and sell the product; and profit which is the excess return over cost resulting from the sale of the product. This article specially intended for the small scale entrepreneurs covers the following seven subjects: 1. Capital; 2. Material; 3. Utilisation; 4. Labour; 5. Over heads; 6. Depreciation and; 7. General;

1. CAPITAL

CAPITAL INVESTMENT

The total capital investment required to finance the erection and operation of production unit is made up of fixed capital representing the investment in plant and auxiliaries and working capital representing the money required for normal business operations.

Working capital is not included in calculating capital investment since it is held as cash, raw materials, finished product, inventories etc., which presumably can be sold and converted to cash when the project is discontinued.

Capital of a company shall be the aggregate of the amounts, as on the first day of the previous year relevant to the assessment year of (i) its paid-up share capital; (ii) its reserves, if any; (iii) its debentures, if any; (iv) any money borrowed by it from Government, or the IFC or ICICI or any banking institution or any person in a country outside India.

Depreciation is generally assumed to be uniform for the life of the project in preliminary evaluations.

Capital is the sum total of all the money invested in business in the form of fixed and current assets. The money required for capital in business is raised from public by its Directors by floating shares and loans. Loans are also secured from foreign countries.

Capital comprises of (i) current assets, and (ii) fixed assets.

- (i) *Current assets*: This includes the value of raw materials in hand, sums due from outside parties, on account of goods sold etc., bills receivable, cash in hand/bank, /fixed deposits, investments in Government securities, current stock of manufactured goods.
- (ii) *Fixed assets*: Fixed assets may be definitely expressed as the sum of the evaluation of equipment, buildings, land and auxiliary facilities or a proportionate share thereof if such services are used for more than one process. Generally speaking, this will form 85 to 90% of total capital.

CAPITAL EXPENDITURE

An expenditure which results in the acquisition of permanent assets, which are intended to be continually used in the business for the purpose of earning revenue is capital expenditure. Further, any amount expended which tends to extend or improve the existing assets so as to enhance their revenue earning capacity by increasing production or reducing cost of production may rightly be treated as capital expenditure, e.g. land, building, plant, tools and equipment, fixtures, etc.

WORKING CAPITAL

This includes raw materials, in-process material, product inventory and credit.

In evaluating some of these charges in multi-product plants, some logical proportioning must be employed.

For an easy and ready compilation of the working capital from the available financial statements, the concept should be confined only to the excess of current assets over current liabilities.

RETURN ON CAPITAL EMPLOYED

Criterion upon which selection of a process for manufacture should be made is the return on the investment that the plant will realize. If such a decision is made upon the basis of manufacturing costs alone it is quite possible that false results will be obtained. In other words, an expensive installation may have a lower manufacturing cost than a higher operational expense plant with a lower investment with the result the actual monetary return on the investment may be lower when expressed as percentage of the investment outlay.

Working capital plus fixed capital is the capital employed in a business.

EARNING CAPACITY

The undermentioned ratios will indicate how far the business can earn its surplus and how far the surplus earned meets the adequacy or otherwise of the business.

Profit on turnover	Profit / volume of sales
Operating efficiency	Profit / capital paid up
Capital turnover	Volume of sales/capital paid up.

Profit turnover determines the margin available for the business on the turnover. This will indicate the capacity of earning such a high margin which may be the result of a lower cost of production.

The investing public will be interested to know the operating efficiency of the firm, as this will determine the wages earned on capital. The more the business can earn on its paid up capital, the more can be declared as 'dividend' barring any statutory limitations on the declaration of dividends. Coupled with the profit on turnover, the more this ratio is, the more will be the operating efficiency.

METHODS OF EXPRESSING PROFITS

Venture profitability: Venture profitability may be defined as the difference between the actual calculated profit on an investment and the minimum acceptable profit for an enterprise of the particular type and risk. The acceptable profit may be defined from practice.

This method takes into account the entrance of risk of failure into an economic evaluation. We may consider 10% return as being satisfactory for a process based upon firmly established technology or for a product with an assured market and a stable selling price; on the other hand, however, 20% may be regarded as the minimum acceptable return on an operation which has never been established commercially or for a product of dubious value. Obviously risk has always entered into the final discussion on proposed plants.

EVALUATION OF PROFITS

- (i) *Percentage of sales*: This is a simple and commonly recognized method; its main drawback is that it does not indicate the relationship between the rate of earning profits and the capital required to make the profit.
- (ii) *Return on investment*: This is the ratio of the profits per annum to capital required expressed as percentage. Where acceptable minimum return on investment is known, this method can be employed to work back the profit margin required to make the project worthwhile as a paying investment.
- (iii) *Venture profitability*: Where a minimum acceptable rate of return on investment

is set to make the project attractive to capital investment, possibilities of obtaining higher than minimum returns are considered. This difference or excess over the minimum yield is called the venture profitability.

- (iv) *Pay-out periods*: This measure of profitability is engineers' method of measuring profits. Basically this is the number of years in which capital investment will be repaid by the profits before charging depreciation. For a layman, it is the number of years that would lapse before an asset becomes self-supporting. If 'N' is the payout period in years, the 'P' profit per annum before depreciation, 'C' the capital invested, then $N = \frac{C}{P}$.
 - (v) *Profit variability*: It is also necessary to consider the variability of profits depending upon the changes in the activity levels of the proposed industry. This will help in establishing the Margin of Safety in performance levels which would firmly establish the successful workability of the project. The three factors profit, selling price and production are closely interrelated and if two are known, then the third can be arrived at.
- Mainly there are four important stages in the evaluation and execution of project:
- (i) Idea formulation stage
 - (ii) Laboratory or bench stage
 - (iii) Pilot plant stage
 - (iv) Commercial plant or production stage.

II. MATERIAL

Stores are broadly classified as Engineering, Chemical, Electrical etc., they are stocked in different godowns each one kept away from the other for safety, security and easy handling.

DEMANDS

Divisions order their requirements on demand slips which are presented to Stores Section. After verifying from the stock and if found non-available, they are passed on to the Purchase Section for effecting the purchases. The Purchase Section in turn calls for quotations. The quotations when received are screened by the Stores Section and sent to Purchase Section to call for samples. After proper screening (viz. lowest tender, quality, local standing of the contractor, ability or otherwise of the contractor from past experience to execute orders placed, etc.), orders are placed on the firm to supply the stores within a stipulated time. Railway receipts received (in respect of stores sent by rail) on the basis of order issued, are posted in a daily receipt register by the Stores clerk. When the packages are cleared from the Railways/other parties, the contents are usually checked and discrepancies, if any, pointed out to the supplier.

The packed stores on arrival at the Stores godown are unpacked for inspection by the division concerned, etc. After receipt of the inspection report and finding that the goods are according to specifications and in good condition, the stores are taken on ledger charge on the basis of inspection notes and issued to the Division/party which demanded the same. The daily receipt register will indicate the bill number, date, quantities received, ledger folio,

expenses incurred for clearing, freight charged etc. for each item of store.

STOCK TAKING

Periodical stock-taking should be done throughout the year by stores staff. Internal audit staff should see that regular stock-taking is carried out and discrepancies pointed out and rectified on the spot. Audit should be vested with powers to carry surprise physical verification of costly items of stores worth Rs. 500, and above. This method of check has achieved good results.

VALUATION OF STOCK

The closing stock is valued at the average receipt rate provided of course the consumption during the accounting period is less than the opening stock, first in first out principle is adopted for valuation.

INVENTORY CONTROL

There should be a proper inventory control in order to (i) conserve storage space, (ii) effect economy by restricting purchases to bare requirements avoiding blocking of capital, (iii) to have a proper turn-over thereby avoiding deterioration in stock, (iv) avoid obsolescence, (v) adopt a regular annual review in order to cater for the stores generally required for the laboratory thereby avoiding regular local purchases which are not economical for more reasons than one, (vi) effect a proper control over the stock held with the results losses due to pilferage, breakages can be reduced to the barest minimum.

INVENTORY CONTROL

Stock report for the week/month/quarter ended:

Ceiling fixed:

	Raw material	Consumable goods	Finished goods
Inventory as per last week/month/quarter statement	...	...	...
Add purchases during the period	...	...	...
Less consumption during the period	...	...	...
Inventory as at close of period	...	...	...
Increase/decrease on ceiling	...	...	...
Period for which stock likely to last based on past consumption	...	...	...
Agreed rate of turnover	...	...	...
Remarks	...	...	...

STORES OVERHEAD

A proper method of fixing stores overhead should be adopted.

The following procedure should be adopted:

- (i) Value of opening stock of stores on first April. Add value of purchases during the year say 1964-65.
- (ii) Less Value of closing stock on 31st March, 1965. Difference between (i) and (ii) will indicate the turnover during the year 1964-65 (to be obtained from Accounts Section.)
- (b) The pay and allowances of staff including Stores Officer, Stores Supervisor, etc.
- (c) Expenditure on account of maintenance of lorry, pay of driver, cleaner, plus its depreciation.

(d) Depreciation charges on account of premises occupied by Stores (to be obtained from Civil Engineer). Power, etc. consumed by godown, office, etc. occupied by Stores should be obtained.

(e) Administrative overhead on the pay and allowances of staff at 10% to be added. This percentage is to be reviewed every year based on the percentage of salary of administrative staff to the total salary paid.

(f) Add the total of values obtained from (b) to (e) and find out the percentage on the value of (a) obtained. This percentage is to be added as Stores overhead

(a) (i) Value of opening stock on		
1st April say	...	2,00,000
Add value of purchases, say	...	13,00,000
		15,00,000
Less value of closing stock, say...		1,00,000
Stores turnover	Total	14,00,000
(b) Pay and allowances of staff, including labour	...	30,000
(c) Maintenance of lorry, pay of driver, cleaner, petrol & oil charges maintenance, etc. Plus depreciation	...	7,000
(d) Administration overhead @ 10% on (b)	...	3,000
(e) Depreciation for office, building, godown, water, electricity charges, etc.	...	2,000
		42,000

$$\frac{42,000 \times 100}{14,00,000} = 3\%$$

Stores overhead to be charged 3%

STOCK LEDGERS

The loose leaf system has to be adopted. The number of leaves in the ledger should be kept as concise as possible (say 500) in order to keep the ledgers in tact since they will be involved in lot of day to day handling. There should be a typed index.

Separate ledgers should be maintained for regular stores and stores ear-marked for pilot plant and if possible kept segregated (due to the nature of accounting involved in these two cases).

Stores should adopt the Bin Card System since this will indicate (i) actual stock in hand (ii) maximum and minimum limits which will facilitate further indenting, stocking, etc. Stock verification can be conducted easily and quickly, quick location of stores for issue or otherwise can be achieved.

ISSUES

Issue of stores from stock is to be done on the basis of issue slips received from the various divisions. Distribution of issue slips is as follows:

Original-duly receipted held by Stores for strike off from ledger.

Duplicate-duly receipted sent to Accounts for audit.

Triplicate-duly receipted returned to division for record.

Control numbers should be inserted serially by the Store Keeper issuing the stores (separate number should be adopted for chemical, engineering and other stores), and this number should be inserted in the stock ledgers against the items issued. It should, however, be made clear (by the Stores) that the indenting officer himself endorses the items numbers demanded and draws a horizontal, diagonal and then horizontal line to avoid any malpractices either by stores staff or in collusion with stores staff.

ACCOUNTING OF ISSUES BY CONSIGNEE

The following system should be adopted:

Stores issued from the store holder should be susceptible of verification whether (i) in fact the same have been received, and if so actual quantities received, (ii) balance held in stock by division which will help in ordering further quantities, (iii) avoid excessive/short stocking (iv) avoid misuse/wastage/spoilage/pilferage, etc.

It does not always mean that stores are consumed as soon as they are supplied. An issue entry should be supported by a corresponding receipt entry in order to observe the basic principles of accounting and to avoid (i) malpractices, (ii) over stocking, (iii) shortages, (iv) deterioration due to stock, (v) adjustment of storage space etc.

LOCAL PURCHASES

As far as possible the idea of resorting to local purchases should be discouraged, due to many reasons. Such purchases should be effected when absolutely necessary and in respect of urgent cases and not as a matter of *daily routine*. All concerned should be requested to approach the Stores well in advance so that the necessary stores can be procured and supplied in the most economical manner possible. Stores/Purchase should periodically review the local purchases effected and include items regularly required for placing annual indents in order to replenish/replace existing stocks.

INVENTORY CONTROL

There should be a proper inventory control. Stores should be procured in time by taking the lead time into consideration. Stores which are required at a future date (say after 3 months should not be indented unless they have to be imported) should not be stocked. Stores not required for a long time also should

not be held in stock. Stores when once issued to the divisions should not be held in the stores under any circumstances for the following reasons: (i) storage space, (ii) accounting/stock-taking, (iii) deterioration, (iv) breakages/spoilage, etc. There should be regular and periodical stock-taking by the stores staff. The Bin Card System should be adopted. It should be seen that proper security and fire precaution measures are installed in the stores.

PRICING OF STORES

The Stores Division should adopt an uniform method in pricing when issues are effected whether it be for workshop or for divisions. When the stores are received, the rates, etc., together with other incidental charges like sales tax (Central and General), railway freight, handling/loading charges, etc., as billed for by the suppliers, should be noted. All these expenses have to be included in the purchase price and then price per unit/kg. arrived at for adoption. The last in first out method or first in first out method can be adopted according to the nature of market conditions prevailing during the time of issue. (The former method is to be adopted when there is large scale fluctuation of rates and the latter when there is practically a steady market). In the case of issues to workshop, the rates to be adopted are to be inserted on the issue demands in order to facilitate easy and quick procuring of materials used by the workshop.

CLASSIFICATION OF STORES

Classify all the items by the nature of their procurement source and establish the time lag it takes to receive in the Stores from the time of placing the purchase requisition.

Material code	Depreciation
100/0001	XYZ
Min. Ordinary	Max.
100 nos. 200 nos.	300 nos.

PACKING MATERIAL

Packing material issued together with direct labour etc., are booked straightaway in respect of goods sent to outside parties.

In respect of packing material received, credit should be afforded to cost of materials on account of their sales realization; since it is not possible to give credit to each and every item, the amount realized on account of sale of packing material should be related as a percentage to the total value of stores purchased during the year. The percentage thus arrived at should be adopted for the following year to be deducted from the cost of stores purchased. This percentage should be reviewed at the beginning of each financial year.

NOTE

In respect of imported materials which are constantly required, action should be taken to obtain actual users' licence for obtaining direct imports which will result in a substantial reduction in raw material cost.

STORES CONTROL

Present day high prices, relative scarcity of materials, delay in procurement, etc., require a close watch upon materials and stores control techniques demand attention. Objects of stores recording and accounting are:

- Control of the amount invested by the undertaking in stores.
- Control of amounts charged to cost or expense accounts in respect of stores consumed.
- Control, custody and safe-keeping of physical stores.

To obtain the above objects, the records should have provision for the following:

- to be able to ascertain the quantity and value of items in hand at any given time;
- to have the stores so laid out and planned that physical stock can be easily checked with records;

(c) decide the price basis on which the goods consumed to be charged to cost;

(d) decide maximum holding and ordering levels of all items;

(e) provide a control on variation in consumption quantities.

PERPETUAL INVENTORY SYSTEM

A method by which records for the stores are maintained to reveal quantities and values thereof in hand after each transaction.

Development in storage facilities and handling equipment is not made use of as is expected. Bad lay-outs and methods of stocking have led towards an examination of physical quantities as a costly and time wasting process.

(a) Materials should be stored in the bins in the same order in which items in quantity registers are maintained; the quantity registers should also record the location of items in bins/racks which are numbered.

(b) Stock of materials in the bins are uniform and issues effected from one end of the bin without disturbing other stocks.

(c) Use of material code number reduces working time and helps in quick location of materials.

(d) Physical quantities are checked with reference to records in the stores. Reconciliation with priced ledger item by item is carried out with balances at the end of a specific period.

Weighted average rate of pricing of material issued is generally adopted. The real popular method is first in first out method. Industries facing a highly competitive market adopt the latest purchase rate.

The determination of levels of stock holdings and ordering is a baffling problem. The minimum and maximum levels of stock are policy matters depending upon the storage space available as also on finance.

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POWER

Under this head we have got power for industry and power for electrification. Both should be separately treated (measured by meters) since they are governed by different rates. In the absence of meters, data indicating the time taken and H. P. of motors used and (1 H.P. per 1 hr.=746 watts) assessment can be made of the electricity / power consumed. It is presumed that power is purchased by electric supply undertakings and own power is not generated. If own power is generated, the cost of obtaining power should be separately calculated by finding out the cost of production, taking into account capital cost, cost of raw material, direct labour and supervision charges, overhead charges, fixed and variable, and interest on working capital @1%.

WATER

The supply of water is usually effected by the Municipality who will install meters for the purpose. The actual consumption will be billed for according to the rates in force. In

case there are different units in the same factory using water from the same source, it should be roughly gauged by experience the quantity likely to be consumed by each unit so that utility cost can be evaluated proportionately. Installation of separate sub-meters is suggested to obtain the exact quantity of water consumed for each item manufactured.

STEAM/GAS

If steam/gas is purchased, then the quantity consumed and value thereof can be obtained after payment of monthly bills. In case own steam/gas is generated cost of generation should be worked out taking into account the capital cost, material and labour cost, interest on working capital, other overheads like depreciation, insurance, supervision and the rate arrived at should be adopted.

ENGINEERING MAINTENANCE

This will usually be taken at 5% on the capital cost of plant and machinery. (Depreciated value).

BUILDING MAINTENANCE

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IV. LABOUR

EMPLOYMENT AND METHODS OF REMUNERATION

The labour department is responsible for recruiting suitable labour under the rules governing their employment in force in the factory concerned. Each factory has generally certain fixed rules for specified class of personnel.

The labour in the factory consist of two main classes, the supervisory staff and the labour force actually employed in manufacture of their physical labour. All the labour in India are governed by the Factories Act, 1948 as amended from time to time. Factories Act lays down the principles governing their employment viz. age, hours of work, remuneration for overtime etc.

Each worker when he is recruited is registered in the Factory's records as an employee. Details of previous service, age, name, father's name, address, etc. are indicated. He is also allotted a number which identifies him for all purposes connected with the factory.

Wages of labour employed in a factory may be regulated under any of the following methods: (a) time rates (b) piece rates (c) Premium bonus method.

(a) *Time rates*: A certain rate is fixed for each man per unit of time he works (generally) per hour. The actual period he has worked during a wage period is calculated from records maintained and the total amount due for the period is worked out at the rate applicable to him. The system is suited for general labour where much care and skill is necessary e.g. tool room, pattern shop, etc.

(b) *Piece rates*: (i) *Straight piece rate*—Method of remunerating labour on the basis of actual results obtained. The employee is paid at a fixed rate for each unit of work he completes. There is an incentive to the workman to earn as much as he can by turning out more units (approved ones only) within the shortest time. Thus, production is quickened and the cost of overhead expenses per unit of production is correspondingly reduced with resultant reduction in cost. In addition, the workmen will always find ways and means to simplify the method of production and reduce wastages to the minimum in order to achieve higher output.

There are some disadvantages as well in this method. There is a tendency on the part of the employer to 'rate cutting'. When the employer notices that his men are earning much more than their time wages, he is inclined to think that the piece rates have been pitched high and therefore cuts down the rates. This leads to discontentment amongst labour which may result in labour strikes, etc. In order to avoid such a situation, piece rates should be fixed after careful time studies. Once a rate is fixed, it should not be changed unless there is a change in the mode of manufacture or a change in the machinery used therefor.

In India (generally) there are only two systems of remuneration: (a) time wages and (b) piece work.

Piece work can be divided into (i) individual piece work and (ii) gang piece work. The

individual piece worker is paid what he earns for the work he completes. The gang workers are a number of men forming one company employed on a particular type of work or on the completion of specified jobs. The total of the amounts payable for the jobs completed by the gang are called their earnings for the period. The total time wages for the gang are calculated and the difference between the 'time wage' and the 'earnings' is distributed amongst the members of the gang in proportion to the time wage of each. This difference might be a profit or loss.

The payment of wages to the men working in factories is regulated by the Government in accordance with the rules contained in the Payment of Wages Act.

LABOUR—TIME KEEPING FOR WAGES

It can be noticed that the period of employment of workmen in the factory is most important and has to be properly recorded. This is done in various ways.

The most modern method is to use time recording clocks. This has to a great extent minimised manual work with all its connected inaccuracies. The records maintained under the mechanical clocking system are more exact and give complete satisfaction both to the employer and employee.

Time recorders—in which cases are used: Each workman is given a card at the beginning of each wage period which shows his name, number, wage period and the rate. The time recording clock is placed either at the entrance of the factory or at the entrance to the department in which men are working. On both sides of the clock are placed two pigeon-holed racks, one on each side, marked 'In' and 'Out' respectively. When the employee gets into his department at the opening time, he will find his card in the 'out' rack. He will take it and insert it in the clock which will print the time of his entrance into the factory

under the 'in' column. Then he will place the card in the 'in' rack and commence work. When he leaves the factory he will again insert his card in the clock which will print in it under the 'out' column the time he is leaving the factory. Now he will place his card in the 'out' rack. This process of clocking 'in' and clocking 'out' will be carried out every time a worker enters in and goes out of the factory respectively.

The clocks contain two coloured ribbons—one black and the other red. Regular time is printed in black and irregular time in red, thus making it easy to calculate the irregular times e.g. late attendance, overtime, etc. The change over from black to red ribbon is automatic and no manual adjustment is necessary.

Generally, the machines print the day of the week, hour and minute showing whether A.M. or P.M. In certain machines arrangements have been made to print the month and date also.

At the end of each wage period, these cards are sent to the cost accounting department where the attendance for each day is extracted—normal and overtime separately. The total of the normal time for the wage period and the overtime after conversion to normal time at the rate applicable ($1\frac{1}{2}$ or double) is multiplied by the rate for the man which gives the total wages due to him. Deduction on account of Provident Fund, Insurance, Rent, Income Tax, refund of loans, etc., are effected and the net amount due is arrived at. To safeguard against a workman clocking 'in' or 'out' for more than one person, this act is supervised by some person employed in the factory. This fraud can also be detected while accounting is done since the time so booked will not be debited to any job.

In some factories there is a further check in that the attendance marked by the time keeper is subjected to a cross check from the attendance report furnished to the Cost Accounting Department.

When the wage period is completed, the wage rolls are prepared separately for each department. These again can be prepared either manually or mechanically depending upon the size of the factory and its employees. (Different kinds of machines are available for this purpose). The cashier obtains the necessary cash and arranges for the payment. In big factories employing a large number of men, mechanical cash counters can be used to fill in the pay envelopes quickly.

In order to safeguard against fraud of any kind while making payment, the following safeguards are adopted :

- (i) The personnel who prepare the wage rolls are not permitted to make the pay envelopes or vice-versa. If the Cost Accounting department is entrusted with the preparation of wage rolls this condition is automatically fulfilled.
- (ii) Different persons should be made responsible for payment in different departments so that payment can be made in the shortest time. Frequent change of personnel should be made as well for making payments.
- (iii) A responsible representative of the department should be present at the time of making payment for identifying and watching the personnel to whom payments are made.
- (iv) After payment, the pay roll must be signed both by the pay clerk and the

representative of the department endorsing thereon the fact of payment with full details.

- (v) Payments made to workmen for less than Rs. 20/- are exempted from stamp duty.

LABOUR ALLOCATION TO WORK ORDERS

The allocation of labour to work orders is not so simple as in the case of materials. Just as each workman books his attendance 'in' and 'out' on a card in a clock, the time spent by each man on each job is booked separately on the clocks, in cards known as job cards. The card may be either one card for each man for each cost period or one card for each man for each job. In the former case, the card will show the various jobs on which the worker was employed during the whole cost period and the time for which he was so employed on each. The total of the time so booked on his card should agree with the time booked on the time card for the worker for the corresponding period. If the time booked on the time card is more than the period of the total time shown on the job card, the difference should be treated as 'idle time' when the worker remained idle. If on the other hand, the total time booked on the job card was more than the total in the corresponding time card, either of them is incorrect.

In case one card is used for booking the time on one job, all the job cards for the same man for the cost period will have to be collected and total time booked to jobs agreed with the total time booked on the corresponding time card. Reconciliation of these time elements is an important factor in modern Cost Accounting.

V. OVERHEADS

This includes : (i) depreciation (see separate chapter on this subject Page 15) (ii) insurance; (iii) rates/taxes; (iv) administrative overhead; (v) E.S.I.; (vi) provident fund, pension, gratuity; (vii) welfare and amenities; (viii) leave reserve/save salary; (ix) bonus.

Other items of expenditure like electricity consumed for office, water charges, taxes, office rent, postal expenses, stationery, salaries of office staff including managers, security staff, etc. rent of premises, if hired (depreciation if owned).

- (ii) In the case of insurance, no insurance is allowed in respect of Government buildings/projects. Otherwise normally 1 to 2% is allowed as insurance over the capital cost of plant and machinery and buildings.
- (iii) Rates/taxes as levied by Local/Municipal/State authorities.
- (iv) All miscellaneous expenditure which cannot be booked under any direct element of cost is included under this head. The total of this item of expense is related as a percentage to the direct labour cost including supervision. Usually this will vary between 10 to 15% of the direct labour; over and above this percentage should be checked in detail and proper adjustment be made if any, to other direct elements of cost.
- (v) Employees State Insurance: This is leviable at 1½% on direct labour when Employees State Insurance scheme is in force in the locality; if not it is taken as ½% on direct labour in order

to recover the expenses incurred by the employer on account of medical facilities provided. This is applicable to employees drawing a salary upto Rs. 400 per month. (Employees State Insurance Act 1948).

- (vi) Provident Fund: It is the liability of the manufacturer to provide an equal contribution to the Provident Fund amount subscribed by the employee. The employee contributes 8½% of his pay and this works out to 1 months pay for one year. The employer contributes an equal amount and interest at 4% per annum is allowed on the total amount. This is termed Contributory Provident Fund. In the case of General Provident Fund, interest at 4% is allowed on the sum contributed by the employee; generally the sum contributed amounts to a months pay per annum. In the case of employees subscribing to General Provident Fund other benefits like pension and gratuity are granted. Gratuity is paid at the rate of ½ a month's pay to one year of permanent service subject to a maximum of 15 months pay on the basis of last substantive pay drawn. Pension is granted to individuals who have put in more than 10 years permanent service. This forms ⅓ of the substantive pay last drawn subject to a maximum of Rs. 500 p.m. In the case of very senior officers, a sum of Rs. 675/- is granted p.m. as special pension.
- (vii) Welfare and amenities: This works out to about 10% of the direct labour charges (including supervision) incurred.

(viii) Leave reserve: This will be taken at the rate of 12½% of the effective strength in order to provide for persons granted annual leave/providing for leave reserve etc.

(ix) Bonus etc., depend upon the nature of production. These can be broadly grouped under Incentive, Production, Group Incentive, Holiday, Attendance etc., taking into account these factors into consideration.

ROYALTY

This is usually paid to the foreign collaborators in a manufacturing industry for the supply of technical know-how and for initial training of personnel (in India) for a stipulated period say 5 years. This generally varies from 2½% to 5% on the sales realisation price of the finished product. This item of expenditure is generally shown as a separate item of cost.

In case outright purchase is made of the know-how, it is better to amortize the expenditure incurred over the life of the patent or some predetermined period.

WORKS OVERHEAD

Works expenditure which cannot be directly booked to the manufacturing cost is included

under this head. This includes supervision, welfare and amenities to workers, workman's compensation, leave pay, holiday pay fringe benefits, etc. The sum of this expenditure should not normally exceed 15% of the direct labour cost.

MATERIAL OVERHEAD

This is usually 1 to 2% on the total raw material cost to provide for storing, handling, maintenance of ledgers, maintenance of godowns, periodical stock verification, etc.

LABOUR OVERHEAD

This includes expenditure incurred on account of casual labour, idle time, break down of machinery, waiting time for receipt of material, indirect supervision etc.

For estimating purposes it is suggested that 40 to 60% of the operating labour, supervision and maintenance be utilized (or 15 to 30% of direct production cost). In addition a share in the general office salaries and overhead such as a accountings purchasing, pay rolls, traffic, office service and managerial staff for services rendered to the operating unit may be evaluated by utilizing a figure of 10% of the wages of the operating labour, supervision and maintenance.

VI. DEPRECIATION

Definition: Diminution in the intrinsic value of an asset due to use and/or lapse of time.

(ii) A reasonable allowance for the exhaustion, wear and tear on property used in the trade or business including a reasonable allowance for obsolescence.

(iii) Depreciation in larger terms can be defined as the diminution in value which takes place during the life of an asset for the following reasons;

(i) Wear and tear while in use;

(ii) Deterioration while not in use;

(iii) Deterioration through atmospheric, chemical, water or other external agencies.

It makes it legally necessary for a limited company to provide for depreciation before the accounts can be said to exhibit the true and correct state of affairs and before dividends can be declared on the shares held by the share-holders. Section 32 of the Income-tax Act 1961, and Section 350 of the Companies Act, 1956 as amended.

This is an item of fixed cost since it represents expenditure incurred in the shape of deterioration in the life of fixed assets of a company. This does not cater for obsolescence.

OBSOLESCENCE

The loss arising out of the need to replace a piece of equipment before its original cost has been recovered through depreciation charges, is termed obsolescence.

The causes for obsolescence can be (i) waste and losses including repair costs would have reached such a point that interest, depreciation and maintenance costs on a new price of equipment will result in an annual saving. (ii) discovery and introduction of a new machine having the same or greater capacity of production with lower unit labour cost. (iii) Discovery of a new piece of equipment, the introduction of which materially reduces the hazards either to the equipment or to the health of the employees. Improved models may come into the market before the expiry of the original assets since continuous researches are carried out in the laboratories attached to industrial units. In the above circumstances, management will have to cater for obsolescence sometime or other if not at the outset.

In some industries there are forms of obsolescence that have nothing to do with the machinery itself. A change of taste or fashion might completely destroy the demand for a particular commodity produced by a machine or rise in price of the raw material might have the same effect. Such possibility of obsolescence is entirely different to that of improved methods which could have the different effect of cheapening production.

DEPLETION

The cost of capital that is actually consumed in the manufacturing process—oil from oil wells, coal from coal mines, diamond from diamond mines, etc., is depletion. The total capital of the running concern is depleted as every ton of material is extracted and sold. Thus depletion is a capital loss whilst depreciation is an expense adjustment. Depletion ceases where production ceases; but depreciation continues even when the business of a company ceases to operate.

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AMORTIZATION

This factor together with depreciation is the end result of the operation to which most stress is usually laid on cost estimation. This cost enters into the final manufacturing cost as a yearly charge depending upon depreciation of plant and the interest charge on capital invested in plant.

For estimating purposes annual depreciation is generally taken at 10% of the fixed capital (the original plant cost is written off in 10 years). This allows for obsolescence as well as wear and tear. Amortization or interest on capital may be taken at 5%.

DEPRECIATION

The percentage rates of depreciation to be adopted by registered companies in India is shown in rule 8, part II of Indian Income Tax Rules (as amended from time to time).

METHODS ADOPTED FOR COMPUTATION OF DEPRECIATION

1. Straight line method
2. Reducing balance method
3. Sinking fund method
4. Annuity method
5. Production method.
6. Revaluation method.

1. Straight line

The life of an asset e.g. plant and machinery, building, etc. as well as its residual value is estimated. The original cost less the residual value divided by the estimated years of life determines the annual amount of depreciation to be charged. A separate calculation is to be made for each machine or asset providing due allowance for working of two or three shifts.

2. Reducing balance

A constant percentage rate of depreciation for an asset is determined. The value of the asset is depreciated at this percentage rate and written off every year from the books of accounts. At the end of the estimated life the residual value represents the value of scrap. Heavier depreciation charge is borne in the earlier years when repairs are lighter and repair cost in later years balanced by reduced annual charge of depreciation. This method is generally adopted by the Government of India.

3. Sinking fund

A fixed annual sum is charged against profits and a similar amount is invested in Government securities or insurance. Interest on securities is reinvested and added to this fund thereby reducing the rate of depreciation when compared to the straight line method.

4. Annuity

This method is used for lease hold building. A fixed annual sum is charged as depreciation (debited to profit and loss account and credited to lease account). This sum is calculated at a rate which allows interest on the diminishing balance to be debited to lease account every year.

The leasehold is considered as an investment earning interest which is credited to profit and loss account.

5. Production

This method is generally not used due to uncertainties of future output which necessitates calculation of varying rates of depreciation. The idea in this method is to distribute depreciation charge to the cost of the output. During periods of normal production the rate of depreciation is lower and the total sum charged is higher than when output is below normal. When output is low, the rate per unit is higher but the total depreciation charge is lower.

6. Revaluation

This method is used by builders and contractors. Machinery is charged to a contract at book value and at the end of the contract, is revalued and credited, the difference being met by the contract.

GENERAL

The expenditure on account of depreciation forms an item of great importance especially in chemical industries. This is due to the fact that the plant, machinery and building undergo a greater amount of deterioration during the manufacture of chemical products, even though proper precautions/ safe guards are taken at every stage in the process of manufacture, yet a fast rate of deterioration is inevitable.

From the financial accounting point of view, in any public or private limited undertaking in India, the rates of depreciation as promulgated in Part II of the Income Tax Manual (as amended from time to time) are adopted. These rates have been formulated after long years of experience and are considered fairly reasonable and accurate even in the present manufacturing conditions, and this rate is adopted by the various manufacturing organizations and the Government of India.

After adopting the income-tax rates of depreciation to the original cost of the plant/building, one can find the diminishing value of the fixed asset for the next financial year. This value will become the opening value of the fixed asset for the next financial year. In this method the accounts bear a heavier amount as depreciation during the initial years since a separate provision is always made for repair/renewals and maintenance, rather the lesser amount of depreciation in the later years is off-set by a higher amount of maintenance.

In the case of chemical engineering plants, a greater percentage rate of depreciation has

been allowed in the Income Tax Manual to provide for corrosion of boilers, water heaters, tubes, etc. Provision has also been made for obsolescence due to continuous progress in the field of research in chemical industry, a plant purchased today will become obsolete in the course of a few years with the result an industry has to go in for a new plant. (This means further expenditure on capital outlay). This can be met by issue of fresh shares or debenture loans payable after a specified number of years after which this amount will be capitalized.

(a) Company's (Amendment) Act 1960 has considerably amended the provision of section 350 regarding deduction of depreciation in determining the net profits for payment of Managerial remuneration. It is now required that the depreciation under section 350 should be calculated according to the rates prescribed under the Indian Income Tax Act 1922, (as amended from time to time), with reference to the written down values as mentioned in this section.

The written down value as shown by the books has to be taken into account in respect of the first financial year expiring at or immediately after the commencement of the Company's Act 1966, and that in respect of the first subsequent financial years the written down value for the purpose of section 350 will have to be calculated separately by applying the Income Tax Rules of depreciation on the written down value mentioned above.

(b) Requires companies to provide for minimum depreciation in their profit and loss accounts in accordance with the norms suggested in that section, before declaring dividend.

Section 205 (2) (b) provides use of an alternative method of providing depreciation viz. straight line method.

VII. GENERAL TERMS

USED IN ACCOUNTS (INCLUDING COST ACCOUNTS)

1. *Company* means a company formed and registered under the Companies Act, 1956 (as amended from time to time).

2. *Private Company* means a company which by its articles (a) restricts the right to transfer its shares; (b) limits the number, if any, of its members to fifty not including (i) persons who are in the employment of the company, (ii) prohibits any invitation to the public to subscribe for shares or debentures.

3. *Public Company* means a company which is not a private company.

4. *Working Capital*—The amount of capital available for trading purposes. (current assets minus liabilities)

5. (a) *Capital Employed*—Net fixed assets plus current assets minus liabilities.

(b) *Net worth*—Paid up capital and free reserves and surplus.

(c) *Capital Assets*—Charges that add to the value of the plant are regarded as capital assets.

6. *Balance Sheet*—is a statement at a given date showing on the one side the trader's property and possessions, and on the other the liabilities. The difference between the two sides, when the assets exceed the liabilities, represents the capital in the business.

Assets	Liabilities
The debtor balances remaining in the books of accounts are termed Assets, e.g. cash in bank and in hand, plant and tools, office furniture, stock of goods, debts due by customers.	The credit balances remaining are the sums due to creditors termed liabilities and the proprietors Capital Account.

7. *Gross Profits*—Profits before tax plus interest charges and managing agent's remuneration. The trading account shows the gross profit after charging the goods and material and other items of direct cost.

8. *Net profit*—(for a particular period) will indicate the profit carried forward to the next year's account; it is available for payment of dividend on shares, income tax, provision for reserves and for retention in the business. This is indicated in the Profit and Loss Account, e.g. Gross profit minus.

Rent, rates, taxes
Salaries
Commission
Advertisements
Discount
Bad debts
Depreciation

This is arrived at after deducting depreciation and taxation. It is in fact gross profits minus depreciation and taxation.

9. (a) *Debt*—Debt money is money which has been borrowed. It has to be paid back within a definite period with interest.

(b) *Equity*—Equity money is ownership money. Ownership in a corporation is represented by documentary evidence generally in the form of stock certificates.

(c) *Debenture Bond*—is a bond which is unsecured. Income bond is a bond the interest on which is contingent upon earnings.

(d) *Shares Stocks*—Shares are stocks. Shares which are fully paid may be converted into stock. The chief difference between shares and stock are that whilst shares are numbered and of a fixed amount, stock is not; shares cannot be transferred fractionally whereas stock can be transferred in any amount subject to such restrictions as the company imposes.

(e) *Preference Shares*—As the name implies, give the holder a preference with regard to dividend, and in addition, may give preference with regard to return of capital in the case of winding up.

(f) *Ordinary Shares*—are those which have no special rights but participate in the profits after the claims of any superior shares have been met.

10. *Patents & Royalties*—could be classified as a direct expense when payment is arranged on a production basis. In the case of outright purchase, it is better to amortize the expenditure over the life of the patent or some predetermined period and thus consider the same as Fixed Cost. Many know-how payments are between 2.5 to 5% of the sales price of the product. Royalty is the payment to a patentee

or owner of copyright for the use of his property, or to a land owner for right to mine beneath his land.

11. *Profitability*—Methods: (i) return on investment, (ii) pay out time, (iii) project value or worth. *Venture profitability* may be defined as the difference between the actual calculated profit on an investment and the maximum acceptable profit for an enterprise of the particular type.

12. *Pay out time*—is the number of years for the gross earnings to equal the investment. Cost reduction and cost control lead to the reduction in the cost of production. Costs reduction can be achieved by utilizing cheaper material, labour, etc. Cost control increases the efficiency of manufacture and utilises existing facilities to the fullest advantage.

13. *Break-even point*—Once the plant capacity has been selected the effect upon costs and profits by operation at less than full capacity potential should be ascertained. Such a chart is obtained by plotting on a graph paper the cost and rates for a specified plant size. The intersection of sales and cost lines is the break-even point, above which level of production the plant will be profitable.

14. *Work Study*—is a term used to embrace the two techniques of method study and work measurement, which are employed to ensure the best possible use of human and material resources.

15. *Turnover*—The total value of the sales of a business for a stated period.

16. *Development rebate*—A company will be entitled to development rebate under section 33 of the Indian Income-tax Act 1961 in respect of machinery or plant installed before 1st day of April, 1961 at the rate of 25%. (20% if installed after 31-3-61). This deduction will not be allowed unless an amount equal to 75% if the development rebate to be actually allowed is de-

bited to profit and loss account of the relevant previous year and credited to a reserve account to be utilized by the assessee during a period of 8 years next for the purpose of the business undertaking other than (i) for distribution by way of dividends or profits, (ii) for remittance outside India as profits or for the creation of any asset outside India. (Section 34 of the Indian Income-tax Act 1961).

17. **Manufacturing Account**—This contains the amount spent on materials, wages, salaries, services, etc., in order to produce the goods.

18. **Managing agent's commission**—This is calculated as a percentage on the net profits of a company. Generally it is 10% but a minimum is usually laid down in order to safeguard the financial interests of the managing agents. Appointment of managing agents to a registered company and their remuneration requires the prior approval of the Government of India. (Section 39 of the Income-Tax Act 1961).

19. **Budgets-Budgetary control**—Budgets are built up so that we can forecast what production we are expecting, what sales we are expecting, what expenditure we are expecting for the achievement of those sales and production targets.

By budgetary control people at top management level can set objectives for their subordinates of what they are expecting in the way of output, cost reduction and so on.

20. Measurements normally available in a well established factory :

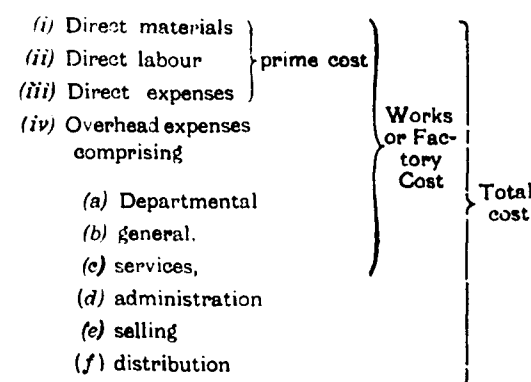
- (i) **Accounting** —Wage records, record of assets and liabilities, profit and loss accounts etc.
- (ii) **Costing** —Material and labour cost of jobs, overheads, sectional overheads, etc.
- (iii) **Costing control** —Cost of each section of business, operating cost of each section of business, cost of behaviour, cost standards.

(iv) **Budgetary control**—Forward plans, operations expenditure, liquidity, inventory, profit.

(v) **Work study** —Measured work, standards for production, operations, service, office etc.

(vi) **Quality control** —Measured standards, material usage, yield, rectification, rejection, tool wear etc.

21. Analysis of total cost



Works Cost or Factory Cost together with fair return on capital employed will form the fair ex-works price of a manufactured product.

22. Methods of cost accounting

(a) Unit Cost Accounting referred to as "out put" or "single" costing.

(b) Job Costing called also "Terminal Costing".

(c) Batch Costing—This is a form of Job Costing.

(d) Process Costing.

(e) Multiple costing referred to also as "Composite Costing"

(f) Operation Costing.

(g) Operating or "Working" Cost Methods.

Uniform Costing is a system common to different factories/producers in the same industry and may include any of the above methods. Standard costs may be used in conjunction with all the above methods, but not with job costing when the orders are practically all dissimilar and non-repeating.

Unit Costing may be defined as a method of costing by the unit of production where manufacture is continuous and the units are identical. It may be employed in conjunction with batch, operation or process costing and is suitable for such undertakings as collieries, quarries, mines, flour mills, steel works, brick and cement works, paper mills, breweries, municipalities etc.

Job Costing used to cost jobs or contracts that are kept separate during manufacture or construction. Applicable to job order in factories/workshops, builders, constructional engineers, ship builders, printers, etc.

Batch Costing used when orders or jobs are arranged in batches convenient for production, the batches being regarded as units for costing purposes.

Process Costing method of costing production by processes in which (a) product of the process becomes the material of a subsequent process (b) where different products and by-products are produced simultaneously (c) when the products are not separately distinguishable from one another during one or more processes of manufacture. Typical industries using this method are: chemicals, textiles, distilled products, explosives, pumps, etc.

Multiple Costing method of costing by combining the costs of component parts of an assembled or aggregate product, separate costs being compiled for each of a variety of product—used in the manufacture of cycles, motor-cars, engines, wireless sets, machine tools, aeroplanes and other complex products.

Operation Costing method of costing by operations in connection with mass production, repetition work and other forms of quantity production. Used in factories where production is in quantities of standardised lines with the object of working at a minimum cost.

Operating Costing method of costing the expenses incurred in the provision of services, such as those afforded by railways, tramways, motor coaches, carriers, gas, electricity and water undertakings.

Labour Turnover—Any changing of employees occasions loss to manufacture in several ways. In addition to the labour necessary for the engagement of a worker, there is loss of his time and that of his instructor during the period of learning the details of working routine. It has been shown that loss due to labour turnover is of significant importance. One of the principal purposes of incentive schemes is to reduce labour turnover.

Sales Turnover—The total cost of sales of the manufactured product/products effected during a stated period.

Conversion charges—Include expenditure incurred on account of (i) labour (direct and indirect), (ii) power and fuel, (iii) consumable stores, (iv) repairs and maintenance (v) establishment, (vi) depreciation. (Note: Expenditure on account packing is shown as a separate item of cost).

New Industrial Undertaking—Tax concessions will be eligible for exemption from Income Tax under section 84 and from Super Tax under section 101 of the Indian Income Tax Act 1961, on its profits upto 6% on the capital employed for the first 5 years of the company's operations.

COSTING

In short, the cost and work accountants act as a true friend, philosopher and guide to management—C. D. Deshmukh (ICWA Bulletin, April, 1956).

Cost Accounting is the science of collecting, recording, analyzing, interpreting and presenting transactions pertaining to the production of goods and services. In addition, it adds as a tool for measurement of efficiency and a means for control of expenditure as well as performance. It gives the total cost of production of a unit of product or service as also the cost of each element in production, e.g. material, labour and indirect expenses. The analysis and synthesis of costs also reveal expenditure incurred in each department, cost centre or operation.

Need of costing:

- (i) An invaluable aid in pricing a product or a service. It gives the minimum price for which the product or service may be sold.
- (ii) The financial accounts do not reveal the departments, units of product, lines of product, sales territories or functions. As a result, gain or loss may be determined but not the sources of gain or loss.
- (iii) The financial accounts do not distinguish the direct expenses from the indirect, nor do they emphasise the controllable items as against the non-controllable.
- (iv) The financial accounts fail to analyse losses due to idle plant and equipment.

Costing helps in locating all wastes and inefficiencies and in fixing responsibilities.

- (v) Cost records can correctly state the relative profitability of alternative method of manufacturing a product or rendering service.
- (vi) The Cost Accountant can render valuable service through scientific rate fixing and introduction of company-wide incentives.

TYPICAL COST SHEETS

- (i) A typical cost sheet indicating the elements of costs together with other overhead costs which go to form the works cost of production is enclosed.
- (ii) On a study of the balance sheet and profit and loss accounts of a selected group of chemical manufacturers, it has been noticed that the following percentages of expenses constitute the manufacturing cost. (enclosed).
- (iii) The return on capital employed (which is a policy matter), can be generally taken as 20% on the total manufacturing cost; out of this 10% will be utilized for taxation provision and 10% for dividend to be paid to shareholders.
- (iv) To the manufacturing cost thus obtained, 10% has to be added to provide for selling and distribution expenses and commissions etc. paid to dealers.
- (v) In view of the above, the selling price would be 130% of the manufacturing cost (inclusive of profit).

Cost estimating is the art based upon empirical and factual relationships of predicting the economic future of a proposed operation. It is composed of three basic phases: investment, which is the money necessary for establishing facilities for productive operations; cost which is the expense of the effort to manufacture and sell the product; and profit which is the excess return over cost resulting from the sale of the product. (Chemical Engineering Cost Estimation by Aries and Newton).

PROJECT COST ESTIMATION

(ICWA Bulletin, April 1962, p. 305-311)

Specialized and detailed information is necessary for evaluating the technical and economic feasibility of any project. New proposals have to be substantiated by cost data

furnishing information on the important points such as investments, yields, pay-out periods, savings and/or earnings in foreign exchange to justify starting of a new project.

BASIC FACTORS

Cost estimation is designed to determine the following:

(i) capital investment, (ii) cost of manufacture, (iii) selling price, profits, return on investments and pay-out periods, (iv) foreign exchange requirements and savings.

CAPITAL INVESTMENT

Companies of fixed capital and working capital:

a) *Fixed capital*—Expenditure on manufacturing assets—land, buildings, plant, installation, instrumentation, utilities, etc. Non-manufacturing assets—land for employees' residences, residential quarters, welfare activities, etc.

a) (i) *Equipment cost estimation*—The main or the bulk item comprising of fixed capital is the cost of plant and machinery. Usually a sound basis is adopted for estimating this and then others are taken as a percentage on a plant cost. The best method is to itemise in detail all machinery required and estimate their purchase costs.

The cost of equipment of a certain capacity may not be readily available. In such cases, if the cost of a similar plant of a different capacity is known, use is made of the statistical relationship known as the 0.6 rule.

where Y = purchase of cost of equipment Y

X = purchase of cost of equipment Y

$$Y = X \left(\frac{ZY}{ZX} \right)^{0.6}$$

ZX = capacity of equipment X

ZY = capacity of equipment Y

Like the 0.6 factor rule, a ratio of 0.7 power of the production capacities ratio is used for estimating total fixed capital requirement where the same figure is available for a plant of different capacity. The 0.6 rule gives a basis for estimating the purchased cost of equipment while the 0.7 rule gives an estimate of total fixed capital expenditure on purchased and installed equipment. Expressed arithmetically the 0.7 rule is:

$$FY = FX \left(\frac{ZY}{ZX} \right)^{0.7}$$

where FY = fixed capital investment of plant Y

FX = fixed capital investment of plant X

ZY = capacity of plant Y

ZX = capacity of plant X

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By statistical survey and analysis, relationship between the fixed capital and rate of production is established and this ratio is applied for approximating fixed capital investment for any required production capacity.

Unit investment cost = $\frac{\text{fixed capital invested}}{\text{products capacity}}$

Turnover ratio or capital ratio is also used for projecting fixed capital requirements:

Turnover ratio = $\frac{\text{Sales value of products}}{\text{Fixed capital invested}}$

Capital ratio = $\frac{\text{Fixed capital invested}}{\text{Sales value of products}}$

By multiplying the unit S.P. by the annual capacity of the plant and dividing by the turnover ratio or multiplying by the capital ratio, the fixed capital requirements can be obtained.

Building Cost Estimation

This is usually done on an approximate rate per square foot of floor area of covered and uncovered buildings required.

Project Report

(i) Technical data about the method of production in the form of an operation process schedule or chart.

(ii) Justification for the anticipated needs of the country of the product.

(iii) How requirements are being met and scope for expansion of the market.

(iv) Cost data indicating:

- (a) Capital requirement-fixed and working
- (b) Production costs
- (c) Prices
- (d) Profits and measurements of profitability
- (e) Foreign exchange factor.

Statement No. 1

ESTIMATED COST DATA FOR THE MANUFACTURE OF

Name of product :

Working days per year : 300

Production per year : Per day :
(three shifts)

Capital	Rs.
1. Land.	
2. Plant and Machinery.	
3. Buildings.	
4. Laboratory equipment.	
5. Installation and erection.	
6. Railway siding.	
7. Transport.	
8. Furniture & office equipment.	
A. Investment on Block.	
B. Working capital to cover cost of raw materials, stores, fuel, labour, supervision. etc., based on (say) 3 months working costs less depreciation.	
Capital employed (A+B).	
C. Interest on working capital @ 6%	
D. Interest on working capital per unit.	

A Y S H A

ELEGANCE

STANDS FOR

IN UTILITY WEAR

SWIM-SUITS, SAILOR AND SPORT SHIRTS, TEE SHIRTS FOR LADIES AND GENTS, JERKINS AND ZIP SWEATERS AS WELL AS A CHOICE SELECTION IN PRETTY LINGERIE AND SLUMBER-WEAR FOR ALL AGES

Manufactured by :

AYSHA HOSIERY FACTORY PRIVATE LTD.,

P. O. PALAPARAMBA, N. MALABAR

(KERALA STATE, INDIA)

RAILWAY STATION & SEAPORT, TELLICHERRY.

Telephone :

26 TELLICHERRY

Telegram :

"SUPERTEX" KUTTAPARAMBA

Cost of production of _____

Production per year :

Production per day :

(three shifts)

S. No.	Particulars	Rate	Per	Quantity	Amount	Cost per unit
		Rs.			Rs.	Rs.
A	Raw Materials					
1.			Kg.			
2.			Kg.			
3.			Kg.			
4.			Kg.			
5.			Kg.			
	Total					
B	Utilities					
1.	Power		K. Wh			
2.	Steam		Kg.			
3.	Water		Litre			
4.	Coal		Kg.			
5. i	Engineering at 5% on plant					
ii	Services at 3% on building					
	Total					
C	Labour					
1.	Direct	—	—	—		
2.	Supervision	—	—	—		
	Total					
D	Packing					
1.	Material	—	—	—		
2.	Labour	—	—	—		
	Total	—	—	—		
	Prime cost					

S. No.	Particulars	Rate	Per	Quantity	Amount	Cost per unit
E	Factory overheads (Variable)					
1.	Indirect labour and Supervision at 25% of Direct labour and supervision	—	—	—		
2.	Administration, rent, rates & taxes, welfare and amenities, postage and stationery, insurance etc.	—	—	—		
3.	Leave reserve at the rate of 12½% of D.L. & Supervision	—	—	—		
4.	Welfare & amenities at the rate of 10% of D.L. & Supervision	—	—	—		
5.	Provident Fund at the rate of 8½% of D.L. & Supervision	—	—	—		
6.	E. S. I. at the rate of 1½% of D.L. & Supervision	—	—	—		
7.	Administration at the rate of 15% of D.L. & Supervision	—	—	—		
8.	Gratuity at the rate of 5% of D.L. & Supervision	—	—	—		
9.	Postage, Stationery etc. at the rate of 3% of D.L. & Supervision	—	—	—		
10.	Insurance at the rate of 2% of fixed capital	—	—	—		
11.	Rates & taxes at the rate of 1% of fixed capital	—	—	—		
F	Factory overheads (fixed)					
1.	Depreciation on plant and equipment at 10%	—	—	—		
2.	Depreciation on building at 5%	—	—	—		
3.	Interest on capital vide item D. in statement No. 1.	—	—	—		
	* Cost per cost	—	—	—		

* Does not include selling and distribution overhead and profit.

					Per cent
Raw material	...	...	...	...	50
Utilities					
Services	...	...	...	...	5
Maintenance	...	...	...	...	3
Rent, rates, taxes	...	...	...	...	2
Wages	...	...	...	...	12
Depreciation	...	...	...	...	8
Consumable stores,					
duty, etc.	...	...	...	...	10
Administrative	...	...	...	...	5
Packing	...	...	...	...	1
Consignment	...	...	...	...	2
Selling & distribution	...	...	...	...	—
Royalties/fees, etc.	...	...	...	...	2
					—
(i) Works Cost	...	...	...	...	100
(ii) Return on investment	...	...	...	...	20
(iii) Selling and distribution 10% on cost of production (100)	...	...	...	...	10
					—
					130

Works cost of production add 30% to cover (i) profits, (ii) selling and distribution expenses.

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To help the age-old Brassware Industry at Kumbakonam, the Government of Madras has started a Brassware Servicing Centre to give technical assistance to artisans with modern machinery.



It also manufactures House-hold Utensils in Brass and Stainless Steel, Dusters, Sprayers, Hospital equipments, Brass building fittings, Radio components, Loud-speaker frame assembly horn cup, Transformer end cover, Steel furniture, Almirahs, Racks, Non-ferrous casting for electric water heaters and all other sheet metal works in ferrous and non-ferrous metal.

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- * Ground Glass Wares
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- * High Vacuum Apparatus
- * And all types of Scientific and Laboratory Glassware

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to serve your specific purpose if standard
items are not suitable.



Please contact:

THE GOVERNMENT SCIENTIFIC
GLASS TRAINING CENTRE,
GUINDY — MADRAS-32.

A Division of the
Department of Industries
and Commerce, Madras

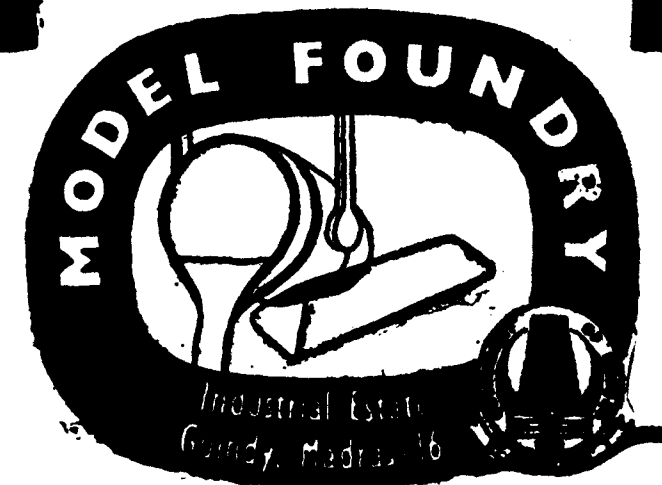
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X8m, N65
N65:20.1



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FORM D (I)

(Prescribed under rule 7 (2) of the Registration and
Licensing of Industrial Undertakings Rules, 1952)

APPLICATION FOR LICENCE OR PERMISSION

(To be submitted with 10 spare copies)

This form is to be used for application for a licence or permission for the establishment of a new industrial undertaking (Under section II of the Industries (Development and Regulation) Act, 1951) where foreign collaboration, import of capital equipment or issue of capital is involved.

1. Name of the Scheduled Industry or Industries to which the articles proposed to be manufactured relate ...
2. Name and address of the applicant ...
3. Name and address of the industrial undertaking ...
4. If possible at this stage, indicate—
 - (a) Whether it is proposed to be undertaken by proprietors, partners, private limited or public limited company ...
 - (b) Names of proprietors, partners or Board of Directors and their addresses ...
 - (c) Name and address of the Managing Agents, if any ...
 - (d) Obligations, rights and privileges of Managing Agents in the constitution and working of the company ...
 - (e) How is it proposed to finance the undertaking? ...

(f) Is any foreign collaboration (whether in the form of royalty or consultancy agreement) or investment envisaged? If so, the extent and nature of such collaboration. Is it proposed to find foreign exchange for import of capital equipment in any other way?

5. Proposed location of the factory ...
Tehsil
District
State

8. Lines of Manufacture proposed—

Name of product and bye-product.	• Proposed (annual) installed capacity
----------------------------------	--

7. Manufacturing Programme :

(a) Existing activities, if any :

Sl. No.	Items of Production	Existing capacity		Current annual production	
		Quantity/Tonnage	Value	Quantity/Tonnage	Value

1.

2.

3.

etc.

• Basis of estimating installed capacity should be clearly stated, viz., whether the operation will be continuous or by shifts and the number of shift days assessed for estimating the annual capacity.

(b) Final manufacturing programme for items in respect of which this application is made :

Sl. No.	Items of manufacture	Annual capacity		Estimated Annual production		CIF value of unit/product
		Quantity/Tonnage	Value	Quantity/Tonnage	Value	

1.

2.

3.

etc.

(c) Forecast of time required for implementation of the project. ...

8. Phased manufacturing programme for 7 (b) above, if any :

Year	Items of production	Annual turnover		Percentage by value of imported content (i.e. total of all imported raw materials and components)
		Quantity/Tonnage	Value	

1st year

(i)

(ii)

(iii)

(iv)

2nd year

(i)

(ii)

(iii)

(iv)

3rd year etc.

(Attach a sheet, if necessary)

9. Estimated requirements of main raw materials.

Name of raw material	Whether indigenous or imported; if the latter, the country of origin	Quantity required per year	Estimated value
----------------------	--	----------------------------	-----------------

10. Requirements of capital equipment.
Total value of equipment required ...

(i) Imported—

Please give name of the countries in the order of preference ...

(ii) Indigenous—

11. Indicate your requirements of rail transport for movement of raw materials and finished products in the proforma attached ...

12. Water supply—

(a) Will it be ample for requirements of—

(1) factory, and

(2) township or staff quarters?
(State approximate quantity) ...

(b) Will it be drawn from public supply?

(c) Effluent problems, if any ...

13. Power supply—

(a) Total requirements proposed to be drawn from ...

(1) Own generating station ...

(2) Public supply ...

(b) In case of own station give brief particulars of plant in operation ...

14. If possible indicate requirements of coal/ coke in the proforma attached ...

15. If possible indicate the estimated requirements of fixed assets, i.e. investment in land, buildings and machinery ...

Land ...

Building ...

Machinery ...

Note: Where the land and / or building is rented, the capitalised value of the same may be given ...

16. Give a brief description of the processes involved in the manufacture and factors favourable for their adoption. ...

Proposed to be employed on implementation of the project.

17. Staff and Labour—

(a) Managerial ...

(b) Supervisory ...

Technical ...

Non-technical ...

(c) Clerical ...

(d) Labour—

Skilled ...

Semi-skilled ...

Unskilled ...

(e) Other categories, if any ...

Place:

Signature of Applicant

Date:

(To be filled in by the Government of India)

Date of receipt of the application.

Signature of the Receiving Officer.

PROFORMA REFERRED TO IN ITEM 11 IN FORM D (1)

**STATEMENT SHOWING THE RAIL TRANSPORT REQUIREMENTS OF M/s.....
FOR THE MOVEMENT OF RAW MATERIALS AND FINISHED GOODS FOR THE MANUFACTURE OF.....**

Exact location of the undertaking and railway station which will serve it	Commodity required to be manufactured	Quantities of finished products in tons required to be moved by rail year by year during the next few years		The direction-wise breakdown of traffic as stated in col. 8 on a daily basis indicating important stations / areas to which the despatches are to take place	Name of each raw material
		Annual movement (tons)	Daily average (tons)		
(1)	(2)	(3)	(4)	(5)	(6)

Source of supply of each raw material indicating stations and areas etc	Quantity of each raw material		Brief indications of special facilities if any required at the despatching and receiving stations including special types of wagons	Any other information relevant to railway transport requirements
	Annual movement (tons)	Daily movement (tons)		
(7)	(8)	(9)	(10)	(11)

**PROFORMA REFERRED TO IN ITEM 14 IN FORM D (1)
STATEMENT SHOWING THE REQUIREMENTS OF COAL / COKE OF M/s.....**

Exact location of the Undertaking and the Railway Station which will serve it	Grade, Class, etc., of coal / coke required		Quantity of coal / coke required per month	
	Coal	Coke	Coal	Coke
(1)	(2)	(3)	(4)	(5)

Source of supply indicating stations and areas	Date of commencing of the works	Type of burning equipment used
(6)	(7)	(8)

APRIL - JUNE 1965

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AT
ECONOMICAL COSTS**

Consult
The Superintendent

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PRESSURE
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&
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Services of Colombo Plan Expert Also Available

FORM D (II)

*(Prescribed under Rule 7 (2) of the Registration and
Licensing of Industrial Undertakings, Rules, 1952)*

APPLICATION FOR LICENCE OR PERMISSION

(To be submitted with 10 spare copies)

This form is to be used for application for a licence or permission for establishment of a new industrial undertaking (under section 11 of the Industries (Development & Regulation) Act 1951) where no foreign collaboration, import of capital equipment or issue of capital is involved or where an application in Form D (I) relating to the same scheme has received the approval of the Government in principle.

1. Serial No. allotted to the application for industrial licence
2. Name of the Schedule Industry or Industries to which the articles proposed to be manufactured relate
3. Name and address of the applicant
4. Name and address of the Industrial Undertaking
5. Whether it is proposed to be undertaken by proprietors, partners, private limited or public limited company
6. Names of proprietors, partners, or Board of Directors and their addresses
7. Name and address of the Managing Agent, if any
8. Obligations, rights and privileges of Managing Agents in the constitution and working of the company
9. How is it proposed to finance the undertaking?
10. Proposed location of the factory :
Tehsil
District
State

11. Lines of manufacture proposed :

Name of product and bye-product	* Proposed (annual) installed capacity

12. Manufacturing Programme :

(a) Existing activities, if any :

Sl. No.	Items of production	Existing capacity		Current annual production	
		Quantity/ Tonnage	Value	Quantity/ Tonnage	Value
1.					
2.					
3.					
etc.					

(b) Final manufacturing programme for items in respect of which this application is made :

Sl. No.	Items of manufacture	Annual capacity		Estimated annual production		C.I.F. value of unit product
		Quantity/ Tonnage	Value	Quantity/ Tonnage	Value	
1.						
2.						
3.						
etc.						

* Basis of estimating installed capacity should be clearly stated, viz., whether the operation will be continuous or by shifts and the number of shift days assessed for estimating the annual capacity.

13. Phased manufacturing programme for 12 (b) above, if any :

Year	Item of production	Annual turnover		Percentage by value of imported content (i.e., total of all imported raw materials and components.
		Quantity/ Tonnage	Value	
1st year				
(i)				
(ii)				
(iii)				
(iv)				
2nd year				
(i)				
(ii)				
(iii)				
(iv)				
3rd year				

(Attach sheet, if necessary)

14. Estimated requirements of main raw materials :

Name of raw material	Whether indigenous or imported, if the latter, the country of origin	Quantity required per year	Estimated value

15. Requirements of capital equipment. Total value of equipment required :

- (i) Imported—
Please give name of the countries in the order of preference ...
- (ii) Indigenous—

16. Indicate requirements of rail transport for movement of raw materials and finished products in the proforma attached.

17. Water supply :

- a) Will it be ample for requirements of
- (1) factory, and ...
- (2) township or staff quarters? ...
(State approximate quantity)
- (b) Will it be drawn from public supply? ...
- (c) Effluent problems, if any ...

18. Power supply :

- (a) Total requirements proposed to be drawn from :—
- (1) Own generating station ...
- (2) Public supply ...

19. Indicate the requirements of coal / coke in the proforma attached ...

20. Indicate the estimated requirements of fixed assets, i.e., investment in land, building and machinery :—

Land ...

Building ...

Machinery ...

Note: Where the land and / or building is rented, the capitalised value of the same may be given.

21. Give a brief description of the processes involved in the manufacture and factors favourable for their adoption ...

22. Staff and Labour

Proposed to be employed on implementation of the project

- (a) Managerial ...
- (b) Supervisory ...
- Technical ...
- Non-technical ...
- (c) Clerical
- (d) Labour
- Skilled ...
- Semi-skilled ...
- Unskilled ...
- (e) Other categories, if any ...

Place :

Date.

Signature of the Applicant

(To be filled in by the Government of India)

Date of receipt of the application.

Signature of the Receiving Officer.

PROFORMA REFERRED TO IN ITEM 16 IN FORM D (II)

STATEMENT SHOWING THE RAIL TRANSPORT REQUIREMENTS OF M/s.....

FOR THE MOVEMENT OF RAW MATERIALS AND FINISHED GOODS FOR THE MANUFACTURE OF.....

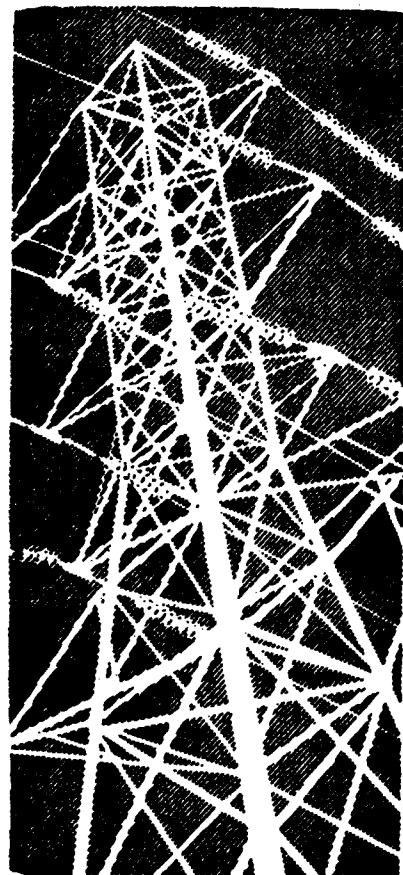
Exact location of the undertaking and railway station which will serve it	Commodity required to be manufactured	Quantities of finished products in tons required to be moved by rail year by year during the next few years		The direction-wise breakdown of traffic as stated in col. 3 on a daily basis indicating important stations / areas to which the despatches are to take place	Name of each raw material
		Annual movement (tons)	Daily average (tons)		
(1)	(2)	(3)	(4)	(5)	(6)

Source of supply of each raw material indicating stations and areas etc.	Quantity of each raw material		Brief indication of special facilities if any required at the despatching and receiving stations including special types of wagons	Any other information relevant to railway transport requirements
	Annual movement (tons)	Daily movement (tons)		
(7)	(8)	(9)	(10)	(11)

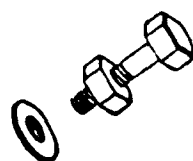
PROFORMA REFERRED TO IN ITEM 19 In FORM D (II)
STATEMENT SHOWING THE REQUIREMENTS OF COAL/COKE OF M/s.....

Exact location of the Undertaking and the Railway Station which will serve it	Grade, Class, etc., of coal/coke required		Quantity of coal/coke required per month	
	Coal	Coke	Coal	Coke
(1)	(2)	(3)	(4)	(5)

Source of supply indicating stations and areas	Date of commencing of the works	Type of burning equipment used
(6)	(7)	(8)

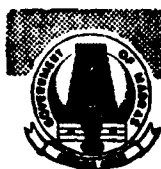


BIG *or*
SMALL

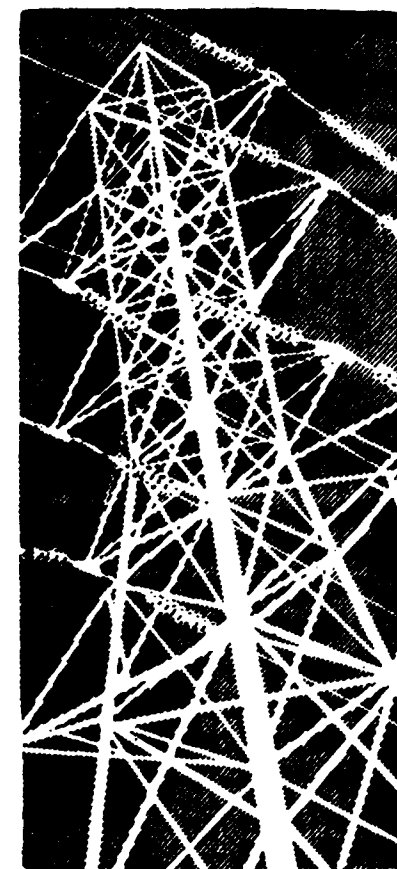


save them
from
CORROSION
by

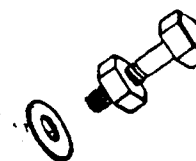
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GOVT. GALVANIZING PLANT
METTUR DAM (Salem Dist)



BIG *or*
SMALL



save them
from
CORROSION
by

HOT DIP GALVANIZING



GOVT. GALVANIZING PLANT
METTUR DAM (Salem Dist)

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PRESSURE DIE CASTINGS
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INVENTIONS PROMOTION

BOARD-OBJECTS AND FUNCTIONS

The Inventions Promotion Board, as its name implies, is an organisation formed by the Government of India with the purpose of guiding, helping and inculcating the spirit of invention among Scientists, Engineers, Workers, Artisans and Technicians working in Government or private undertakings.

The Board was formed in the year 1960 under the Ministry of Industry with a Governing Council of eleven members. The board is now functioning with Dr. H. Zaheer, Director General of Council of Scientific and Industrial Research, as its President, Shri K. V. Venkatachalam, Joint Secretary, Ministry of Industry and supply, as its Vice-President and Shri N. Bhavanani, as its Executive Director.

The principal functions of this Board are to encourage and inculcate the spirit of invention amongst independent workers, artisans and technicians; to assist in guiding the country's inventing talent in the most fruitful channels; and to promote and implement such ideas, and inventions by suitable technical and financial assistance.

The nature of financial assistance which the Board would give for the foregoing objectives, would be in the form of Grants and Prizes.

Grants would be in the form of an outright payment of a sum to meet the anticipated development expenditure, or a subsidy for the purpose of supplementing his own resources, and/or assistance in kind, such as technical services or experimental facilities, etc.,

Development expenditure such as expenditure for designing, drafting and preparing detailed drawings, etc., cost of raw materials, power, labour, etc., fees to laboratories or workshops for the fabrication or trial or experiments, cost of patenting, and in exceptional cases (after careful scrutiny) subsistence or other personal expenditure to be incurred by the inventor in connection with his development work, may be recognised for such grants.

Prizes would be awarded bearing in mind the following principles. Only inventions and ideas which have been put into practice or whose practical workability has been amply demonstrated by initial experimentation would be recognised, irrespective of whether the invention or idea has been patented or not, or whether it has been actually exploited in industry or not.

Applications for financial assistance/prize awards on prescribed forms obtainable from the Board's office, and enquiries related thereto may be sent to the Board at 22, Pusa Road, New Delhi-5.

JANUARY — MARCH 1965

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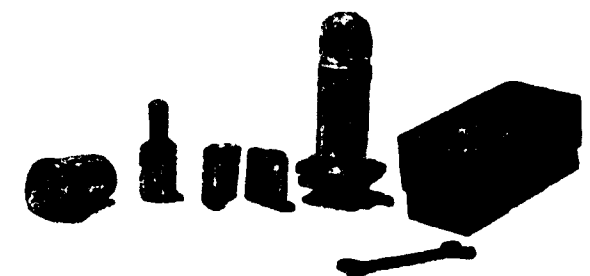
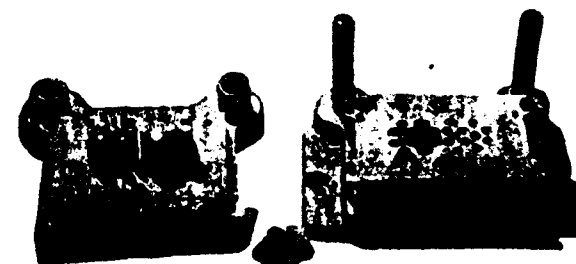
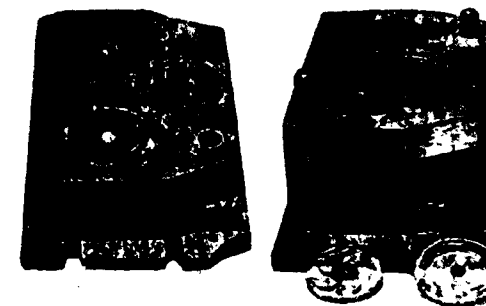
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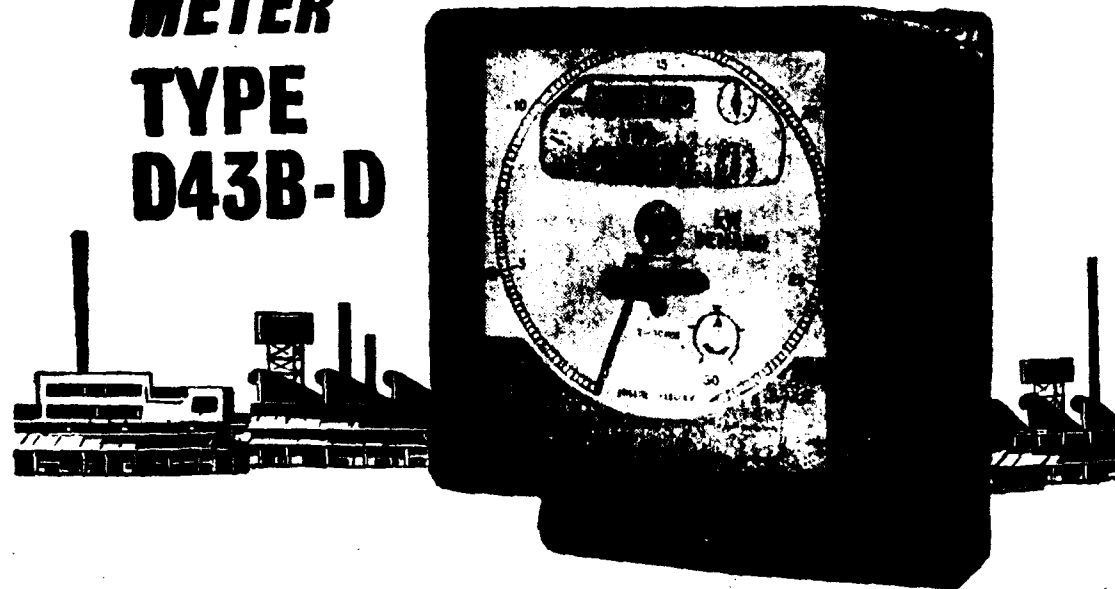
Please Contact :

The General Superintendent,

GOVERNMENT TOOL ROOM SHOP,
Industrial Estate, Guindy, Madras-32.

for years of accurate service

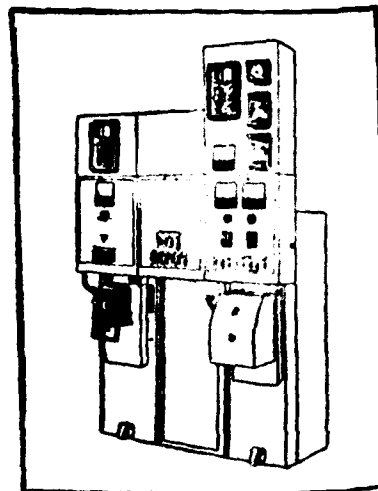
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Here is the most modern single disc polyphase meter, available in house service and switchboard patterns with cyclometer or pointer register.

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★ 'Molyon' is a trade mark of 'ENGLISH ELECTRIC'



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EPC-120

MICA INSULATION BRICKS

JL
K8m / N45
N65.20

The Central Glass and Ceramic Research Institute, Jadavpur, has developed a process for the manufacture of mica insulation bricks as a substitute to vermiculite bricks. These bricks are useful as a second line insulation material for furnaces, boilers, cupolas, ovens and wherever heat radiation has to be prevented. It is also possible to produce the product in any shape and size required by the consumer. Since these bricks prevent radiation, usage of these bricks economises fuel consumption which ranges from 5% to 15%. Besides economy in fuel consumption, non-radiation of heat to the surroundings makes the operators and the workers who work around, more comfortable with the result that efficiency of the worker increases.

A factory has already been started at Bhilwara in Rajasthan making use of the above patent, and the Andhra Pradesh Mining Corporation has secured patent rights for the manufacture of these products in South India. A Pilot Plant has been set up at Gudur in Nellore District which is a mica bearing area. It is proposed to expand the factory as the demand for this product increases.

The Plant is now in a position to supply the following products in small quantities and would be glad to entertain enquiries for larger orders.

1. Mica insulation bricks of standard size and any other sizes that may be needed by the consumer.
2. Mica insulation grog of various sizes as per the requirements of the consumers.
3. Mica insulation mortar.
4. Mica powder of various mesh sizes.
5. Fire cement.

Data sheet relating to chemical and physical properties of the material is given below:

Chemical composition of mica insulation bricks, mortar and grog.

SiO ₂	53.29
Al ₂ O ₃	31.65
Fe ₂ O ₃	2.16
TiO ₂	0.840
CaO	0.995
MgO	0.957
Moisture	0.255
Loss on ignition	0.665

Physical properties of bricks:

Density	35 to 45 lbs per cft.
Crushing strength	90 to 100 P. S. I
Porosity	65 to 70 %
Thermal conductivity	1 to 1.5 B.T.U. at 500°C.
Maximum safe temperature	1050 to 1100°C.

The Mica insulation grog and mica insulation mortar are supplied in the grain size as per individual requirements also.

Further details and rates can be had on request from the Office of the Andhra Pradesh Mining Corporation Limited, Hyderabad-4.

GOVERNMENT OF MADRAS
CHEMICAL TESTING AND ANALYTICAL LABORATORY,

Industrial Estate — Guindy — Madras-32.

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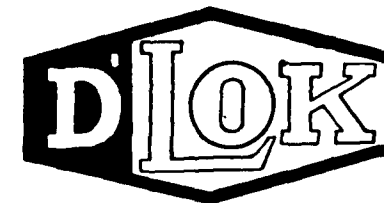
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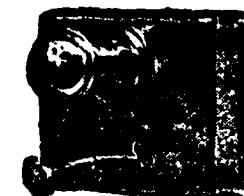
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THE JOINT DIRECTOR OF INDUSTRIES AND COMMERCE,
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