CHAPTER - 1

PROFILE OF DIESEL OIL ENGINE INDUSTRY

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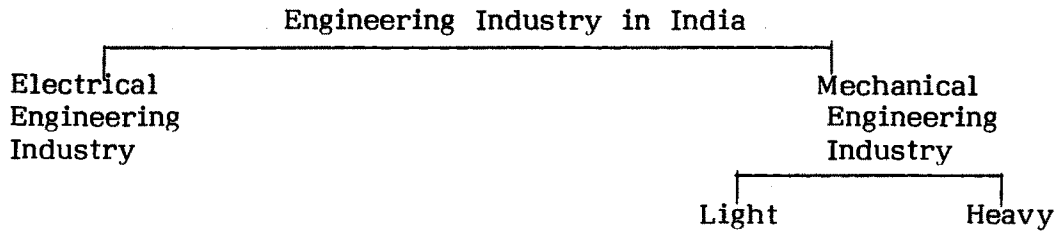
A) DEVELOPMENT OF DIESEL ENGINE INDUSTRY IN INDIA

1) Introduction :

Development of diesel engine industry is closely associated with the development of engineering industry in India. Engineering Industry is complex in character, because the production of this ranges from making of large components for steel plants and gaint cranes for harbours to small items like pins, screws, bolts nuts, wire-nails and a wide variety of instruments and a host of heavy and light mechanical and electrical engineering goods.

Chart 1.1 gives a schematic presentation of branches of engineering industry in India.

Chart 1.1



Source : Organisation and financing of Industries in India
Memoria C.B. Kitab Mahal, Allahabad 1971
P.-609.

Oil engine industry comes under the head of light mechanical engineering industry.

2) Development of diesel oil engine industry in India :

Prior to the first world war in India there were a few private engineering units. A large part of the country's requirement for engineering goods and even for raw material had to be met by importing

from foreign countries. Like other engineering goods, oil engines were also imported as per requirements. As agriculture was not mechanised and farmers were using conventional methods of agricultural operations like threshing; lifting water, the demand for diesel engine was negligible.

In 1920, there were only three workshops manufacturing diesel oil engines in India.[1] At that time production of diesel oil engine was very small. During the decade 1920 to 1930 this industry did not make much progress because in 1929 general depression set in and whole engineering industry suffered a set back due to fall in demand for engineering goods. In decade 1930 to 1940 few companies started production of diesel oil engines. In 1932, Cooper Engineering Limitted, Satara started production of slow speed Rustan type engines followed by Oriental Engineering Works, Lahore, Kirloskar Sons and Company, Ruston and Hornsby (India) Poona, and Kulko Engineering Works, Kolhapur. After 1940, with outbreak of second world war industry got fillip. Number of units increased to 20. These units were concentrated at Rajkot, Calcutta and Kolhapur.

Since independence there has been a phenominal progress of this industry. As first five year plan (1950 to 1955) laid emphasis on development of agriculture; diesel oil engine industry received much attention. The value of production of diesel engines increased from Rs. 1.1 crores to Rs. 3.25 crores. During this period, Government of India banned import of some import substitute goods. Diesel oil engine was one of them. This gave encouragement to new and innovative entrapreneurs. As a result of this cities like Kolhhapur,

Rajkot, Coimbatore came forth in desel oil engine production. Many repair workshops started producing components and became production units. The production of diesel oil engine increased substantially. The number of manufacturing units increased to 16, producing 10,369 engines per year. The output of stationary diesel oil engine increased from 3500 to 10,400 units in 1955. Diesel oil engine industry is characteristically divided into two sectors - one fully organised sector of few large scale units and the second scattered, unorganised small units.

Second five year plan emphasised development of basic and heavy industries. A number of workshops, foundries, forge and structure shops were established and substantial progress was achieved in mechanical engineering industry. Production of diesel oil engines rose steeply from 10,400 units to 44,700 units from 1955 to 60.

During the third plan (1961 to 65) greater emphasis was laid on the development of structural engineering industry. Encouragement was given to private investors. As a result of this production of diesel engines in unorganised and small sector rose to 46,000 units per year. Slow but steady growth continued till 1966.

During the fourth plan, in 1970, [illegible] oil engine industry had to face demand recession due to withdrawal of taccavi loan facility. There were 31 units in the organised sector. The industry got somhow stabilised in terms of capacity utilization due to new types of applications of diesel engines (multi cylender higher H.P. engines) after 1974. In 1974-75 production of diesel oil engine (in both organised and small scale sector) was 3,85,000 units and capacity utilization in organised sector was still around 50 percent only.

As a result of this, companies like kirloskar Oil Engines Limitted and Ruston Hornsby concentrated on production of multi cylinder higher horse power (H.P.) engines which give higher returns than low H.P. range. This shift in production resulted in small scale sector entering in the area of engine production in the lower ranges and filling up the gap. Entry of small scale sector resulted in increased production of cheaper oil engines in slow speed range.

During fifth plan, specifically in 1975-76 total production of oil engine was 4,32,000 units. During 80-81 diesel engine production was 4,56,000 units. In 1985-86 it was 4,80,000 units. During 6th plan the total number of manufactures producing Petter and Lister type diesel oil engines was around 900 to 1000. Out of these nearly 200 manufactures were registered with Bureau of Indian standards under ISI mark. Now capital investment in this industry is Rs. 36 crores and 25,000 workers are engaged in production.

Diesel engine manufacturers have been manufacturing "Petter type" engines for last four decades. Lister type engines are manufactured at some places because Indian farmers seem to have gained confidence in 'Lister' and 'Petter' engines because of their reputed reliability and also because they can be recommisoned very eaisily in case of failure. Now both petter and lister type midium speed and low speed engines in the range of 5 HP to 10 HP are manufactured by Indian producers. These engines account for 90 percent of the total production. These types of engines cover mainly the requirements of agriculture and about one or two percent of industrial application and of small power generaters.

3) **Export** :

India exports diesel oil engines to sixty countries including England, the U.S.A. European countries, Far East and Middle East countries. In global diesel oil engine market. Rumania, Czechslovakia, East Germany, Japan, Italy and Korea are India's rivals.

In last two decades some of the European Countries and the U.S.A. have withdrawn their intrest from international diesel oil engine market. As a result of this, Indian manufactures found wide potential opened to them to export diesel oil engines. Now India has achieved capacity to export to those countries from whom it was importing oil engines before independence.

India's export of diesel oil engines started after 1970. Initially very few companies like Kirloskar Oil Engine Company, Copper Company undertook to export diesel oil engines.

India's exports of Diesel Oil Engines can be seen from table 1.1

Table 1.1

Export of Diesel Oil Engines

Year	Number of diesel oil engines Exported	Value of exports (crores of Rupees)
1970-71	4,546	2.37
1974-75	41,649	19.11
1979-80	53,801	41.74
1984-85	86,722	64.92
1989-90	1,14,147	89.07

During the period of 1974-75 and 1989-90 exports of diesel oil engines increased by 174.07 percent giving an average annual rate of growth of 11.60 percent. As against this, value of exports increased by 366.09 percent having an average of 24.4 percent increase per annum.

4) **Chief Centres of Production** :

Diesel oil engine industry in India has grown, developed and concentrated in very few pockets in India. Diesel engines were mostly produced in Maharashtra, followed by Gujarat, Tamilnadu and the Panjab. Diesel oil engine industry is mainly concentrated in Kolhapur. (Maharashtra) Rajkot (Gujrat) and Coimbatore (Tamilnadu). Factors responsible for the current production centers are (i) ban on imports, (ii) demand for cash crops, (iii) minor irrigations.

The reason for Kolhapur and Rajkot for emerging as major centres are that initially some engines were imported to these areas and then manufacturing started with foreign collaboration to meet the growing demand of irrigation for the production of cashcrops in these days.

There was no valid reason why production of diesel engines could not be initiated in other regions where there is scope of minor irrigation. Kolhapur and Rajkot received advantage of early start. Due to initial impetus in the Western Sector the industry grew mainly in Kolhapur and Rajkot. With the emergence of need and demand this industry also flourished in Agra. Recently few centres like Kanpur, Madras, Culcutta have come forth in production of diesel oil engines.

The development of diesel oil engine industry gave encouragement to the activities of component manufacturing. Due to very strong infra-structure existing for component manufacturing activities in places like phagwarra, Ludhiana, Vijaywada, these centres came forth as manufacturers of diesel engine components. Now, components of diesel oil engines & catering for needs of replacement market may run around 8,000 to 10,000 units. The ancillaries situated at all above places not only meet the requirements of engines but also of replacement and of export market.

In early days oil engines useful for agriculture alone were produced. But now variety of engines are produced for didfferent uses like power stations, dry docks, fire fighting operations; fertilizers and chemical companies.

5) **Changes in design and structure of oil engines** :

Development of diesel oil engine industry is not limited to number of units and number of engines produced.

In early days of diesel engine production, most of the manufacture such as Kirloskar, Cooper, copied Ruston model of engines. These engines were horizantal, heavy and sturdy. But they were not economical. After 1955, production of petter type vertical engines in the range 1500 RPM to 2500 RPM was started. These engines were treated as high speed engines. However, because of development of still higher speed now same are termed as medium speed engines.

Over past few decades no revolutionary changes took place in structure and design of diesel oil engine. Few changes, such as

change in the diameter of flywheel, use of aluminium, to reduce weight in some spare parts such as crankshaft, connecting rods, were made but ultimate diesel engine design remained the same.

6) **Changes in method of production** :

Over last 40 years little progress is made in method of production of diesel oil engine. In early days engines were manufactured with old and conventional general purpose machinery such as lathes, shaping machines or drilling machines but now special purpose machines are used for each component (especially for crank case, camshaft, connecting rod etc.) Due to use of special purpose machines the rate of production has increased by 7 times.

7) **Technological Progress** :

Over the years, the diesel oil engine industry in India barring a few exceptions could not make much progress on technological front. On the other hand over a recent years there has been a remarkable progress on global front in terms of

1) Better fuel efficiency.
2) Reduced weight power ratio
3) Better reliability.
4) Sophistication in terms of reduction in noise, viabrations and pollution levels.

8) **Entrepreneurship in oil engine industry** :

In early days manufacturers of diesel oil engine were craftsmen with a little technical knowledge. They merely copied foreign horizontal Ruston and Lombardini models of engines. In those days

production was limited and whatever was produced was sold. As a result, not much attention was paid to financial and marketing management.

However, because of ristrictions on import of diesel oil engines and growth of agricultural demand for diesel oil engines, a number of entrepreneurs stepped into produce diesel engines. It became necessary to raise adequate funds and to make systematic financial arrangements because production had to be stepped up and producers had to stand in intense competition. Proper planning in production, marketing, finance, inventory and manpower became necessary. All these things made entrepreneurs to adopt commercial view regarding production of diesel engine. Thus the early entrepreneurs who was innovative and technical man has now become a commercial and market minded man.

Though production of diesel engines increased diesel engine industry is not modernised.

The growth of diesel engine industry was quantitative and not qualitative

B) EVOLUTION OF DIESEL ENGINE INDUSTRY IN KOLHAPUR

Kolhapur was one of the leading cities in manufacturing diesel oil engines. About 22.89 percent of small scale engineering units in Kolhapur in 1987-88 were engaged in production of oil engines and their spare parts.

Oil engine industry is the foundation of engineering industry of Kolhapur. The first oil engine in Kolhapur was prepared by S.Y. Kulkarni in 1940. In early days of 1945 industrial units in Kolhapur were mainly repair workshops. They were repairing machines like pumps, grinders, threshers and diesel oil engines. Later, they started producing spare parts of oil engines to meet demand from large companies like Kirloskar and Cooper. In 1950, units manufacturing diesel oil engines were established at Kolhapur. Oil engine units have remained small all over this period.

After 1950 a large market was opened for diesel engines because government of India banned the import of diesel engines to protect this industry. Diesel engines were one of the import substitute goods. This policy accelarated growth of this industry.

At the same time first five year plan, which was agirculture oriented, necessitated extension of irrigaion facilities. In the remote and dry places, where the irrigation facilities were not existant, oil engines were used to lift under ground water. As a result, demand for oil engines and pumpsets increased immensly. Kirloskar, Cooper and Rustan were three competitors for Kolhapur quality engines. However, the competition was not very stiff, because their's were high quality, high priced products, which small poor farmers could hardly afford to buy. On the other hand, Kolhapur provided cheap, sturdy and heavy engines.

One more reason for rising demand for Kolhapur engines was extension of Tacoavi loans for purchase of diesel oil engines by state governments,. This increased the demand for diesel engine of Kolhapur.

It gave encouragement to new entrepreneurs in Kolhapur to manufacture oil engines.

A number of small workshops started producing various components of oil engines for principal manufacturers and a few of them in course of time developed their own product.

First such effort was made by Shri. S.A. Patil. He tried to manufacture entire diesel oil engine under one shed; but his experiment could not succeed; because the engine became so heavy that its operation could not be controlled. After that Shri. Vishnupant Utkar copied Ruston prototype engine. Shri. Y.P. Powar tried to copy (Czekoslovakian) model but could not succeed. He therefore turned to manufacture 'Ruston' type engine. A little latter Mahadba Shelke (Mestri); Shri. B.T. Undale; Shri. M.G. Karajgar entered into oil engine production activity. Then Shri. L.B. Sawant and Shri. D.R. Patil also set up individual units, 'Shiv Oil Engine' 'Nutan diesel Oil Engine' 'Hasti' oil engine, 'Charane Oil Engine, 'Vishwas Oil engine' were the few names of quality engines produced by the above named entreprenuers.

A large number of diesel oil engines of Kolhapur used to be sold in Punjab, Uttar Pradesh and Andra Pradesh to the farmers against Taccavi loans granted by respective State Governments. However in 1969, State Government withdraw this facility because recovery of these loans was not satisfactory. As a result of this, major demand for diesel oil engine of Kolhapur camedown and this shrinking demand for diesel engine gave a rude shock to this industry. At the same

time, vertical engines were put on the market by Kirloskar, Cooper and Ruston. These engines provided a good substitute to Kolhapur horizantal engines because they were more economical in operation and maintainace.

The falling demand for Kolhapur engines necessitated technological up-gradation of pettor type vertical oil engines through the process of financial and technological readjustments. The production of Petter vertical engine also required greater accuracy than that required by horizontal engines.

Above mentioned, two incidents called for diversification of production. Many units started producing spare parts of oil engines. They began to supply spare parts mainly to Kirloskar, Cooper and Ruston. Thus, instead of manufacturing entire oil engine they turned to produce components of it.

However, recently efforts have been made by few entreprenuers to manufacture diesel oil engines having up-graded technology. One such effort was made by Shri. G.T. Vasa who introduced 'Commet' Portable engine in 1989.

This engine is technically superior to other engines as it is light in weight and its weight to power ratio is lower than that of the other engines.

In the decade of 50's annual production at Kolhapur was 5000 diesel engines. In the decade of 60's annual production went up to 6000 engines but in decade of 70's it shrunk to 4500 units.

Thus, gradually production of diesel oil engine came down.

In the decade of 80's fifty percent of the total manufacturing units were either closed or had to diversify their production due to falling demand for oil engines. Many manufacturing units became repair workshops. Many units like 'Charane Oil Engine' stopped manufacturing oil engine and began producing oil engine spare parts.

Thus, the present industrial growth of Kolhapur has its roots in the stupendous work put by the early local crafts-men of thirties.

Family craftsmen of that period developed technical skill, beginning from repairing, diesel oil engines to the manufacturing of such engines; and introduced oil engine as the end of product.

C) PRESENT SCENARIO OF DIESEL ENGINE INDUSTRY OF KOLHAPUR :

The engineering industry at Kolhapur has developed around the diesel engine industry. However, from 1980 the industry showed a declining trend. Yearwise figures of industrial units show that the percentage of newly established oil engine manufacturing units is declining. It is evident from table 1.2

Table 1.2

Decadewise growth of diesel oil engine manufacturing units

Period	Total engineering units	Oil Engines and component producing units	Percentage
1960	51	17	34
1970	358	143	41.10
1980	568	116	20.24
1990	470	53	11

Source : Collection of data from records of Distric Industries Center and Shop inspector's office.

Analysis of figures given in table 1.2 tells a bewildring story. The number of engineering units increased phenomenally by 6% 96 percent during first decade, this rate of growth dropped down to 58.66 percent in the next decade and became negative at 17.25 in the final period of ten years. As indicated in the fourth column of table 1.2 percentage of oil engine producing units to total of engineering units shared a marked dedine after a marginal rise in the first decade.

Number of diesel oil engine producing units registered a growth of 741.18 percent during the first decade. Then the industry began to experience reversed trend at accderated rate. In second decade decline in the number of units was 18.88 per cent and in the third 54.31 percent.

It is interesting to note that declining trend in diesel oil engine producing units began in the very second decade when the number of engineering units was showing an upward trend. In the first decade rate of growth in number of diesel oil engine producing unit was greater than that in engineering units while in the last decade rate of decline was faster.

At present about 240 units are working in diesel oil engine industry. Survey conducted for diesel engine manufacturing units reveals that individual and partnership concerns exist in overwhelming majority. Sixty five percent of the total engineering units are propriatory units. Thirty two percent are partnership units and three

percent units are private limited firms. Change in organisation was rarely observed.

Table 1.3 exhibits the picture of present position of capital investment employment, production and export.

Table 1.3

Capital, employment, production and export of diesel oil engine industry in Kolhaour (Year : 1988-89)

Total Units	Capital investment (Rupees)	Employment (Number of workers employed)	Production (Rupees)	Export (Rupees)
240	3,36,00,000	2,800	11,00,00,000	1,61,09,000

Source : 1) Registers of District Industries Center, Kolhapur.

2) Records of MSSIDC Office.

3) Files of Engineering Association, Kolhapur.

Capital Investment and Machinary :

Generally an oil engine manufacturing unit has one or two Kirloskar, Rajkot, Anil type lathes. A few units have good quality milling machines, one or two drilling machines and locally fabricated special pupose machines. Average investment in machinary is Rs.7 lakhs.

Expenditure on labour and labour charges paid on an avarage per unit came to Rs. 12,000 per month.

Energy charges on an average per unit are approximately Rs. 800 per month.

Per month value addition is Rs. 14,000.

Average monthly turnover is Rs. 80,000.

Machineshops in Kolhapur have annual turnover of Rs. 50 crores and total sale of diesel oil engine manufacturing units is 22 percent of the total sale.

Capital productivity in diesel oil engine units in Kolhapur is 0.70, labour productivity 3.90 and total factor productivity is 0.53.

Conclusion :

Diesel oil engine industry is a part of engineering industry. Because of varity in production engineering industry is complex in character. Growth of diesel oil engine industry in India began around 1920 and it has grown through ups and downs. Second world war gave a fillip to this industry. During planning period the growth is phenomenal. Import of diesel oil engines was banned; State Governments approved granting taccavi loans for purchase of diesel oil engines. Growth of agriculture was given more emphasis during planning period application of diesel oil engines to various new uses. These were the reasons for the growth of the industry.

India's exports of deisel engines began around 1970. Rumania, Czechoslovakia, East Germany, Japan and Italy are India's major

competitors. The U.S.A. and some of the European Countries have withdrawn from internationl oil engine market. Now India has achieved capacity to export oil engines to those countries from whom it was formerly importing.

Over the period of time new centres producing oil engines have emerged. Light, weight, highspeed, campact vertical engines have replaced old, heavy, low speed, bulkey, horizontal engines. Increasingly special purpose machines are used to produce diesel oil engines. Technological improvements have brought fuel efficiency improved weight - power ratio, increased reliability, reduced noise, vibration and pollution level.

With a change in the character of diesel oil engine industry entrepreneur commanding the units has changed functionally as well as attitudally. He was intially a craftsman selling whatever was produced; he became a marketing person producing what could be sold and has turned into a finance man raising and utilising funds efficiently and economically.

From early days of 1924 Kolhapur has been a leading centre manufacturing diesel oil engines. It has changed from repair workshops to production units to ancillary units. It is most sensitive to the policy changes of the Government of India, State Governments and of the Reserve Bank of India, Kolhapur oil engine industry is at odds in competiting with large units on one hand and with centres producing oil engines at less cost. The initial growth of the industry at Kolhapur was a very personalised.

Entrepreneurs in diesel oil engine industry in Kolhapur have learnt lessons from the setbacks received from time to time and have changed their outlook, attitude, style of management and product mix accordingly.

The number of units producing oil engines has dedined considerably. Investment, per unit is Rs. 1,40,000, employment twelve and annual production Rs. 4,58,333.

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