

MANUFACTURE OF OIL SEALS

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A seal can be defined as a product designed to prevent the leakage of gases, liquids or solid particles. Oil seals constitute the very critical part of machines and automobiles. The demand for oil seals has been increasing rapidly because of their usage in automobiles, machinery and equipment. A single product such as a car engine may contain over a hundred different seals. Seals themselves, though relatively small are often used in highly critical applications. If the good quality could be ensured, the oil seals have tremendous scope from the marketing point of view.

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Rubber based seals are used in many areas and often have unique and demanding role to play. The elastomeric property of the seal is required to mould itself accurately to the fine contours of a part (usually metallic) and the further maintaining a sealing force on it. The rubber used should be relatively soft, yet extremely strong, having in particular high mechanical strength in compression. Therefore the seal must be carefully manufactured from an appropriate design for the given application.

Before the invention of synthetic rubbers, natural rubber was used extensively in making seals of different types. But for the seal that comes in contact with oils and fuels the performance of natural rubber is poor as it tends to swell in contact with them.

Later it was found that reclaimed rubber could give

a better resistance to swelling by oil/fuels than natural rubber. The discovery of oil resistant synthetic rubbers such as Nitrile Rubber and Neoprene greatly increased the use of rubber in fuel lines, gaskets, insulations and similar uses where the rubber comes in contact with oils that could swell or dissolve natural rubber.

Raw Materials

Rubber is the basic material used in making the final rubber compound. Therefore it is necessary to select an oil resistant rubber (such as NBR, Neoprene) for the oil seals that comes in contact with fuels. Nitrile rubber gives a very satisfactory performance at a reasonable cost in most of oil seal applications.

The plasticizers used should be for polar type such as Dibutyl Pthalate or, Di Octyl sebacate in order to be compatible with Nitrile Rubber which too is polar in nature. Curing system which includes activators, accelerators, sulphur is selected not only to obtain a short curing cycle but also to obtain a good resistance to compression set.

However the small industrialists those who cannot invest a large capital to buy a mixing mill will be able to buy the ready made rubber compounds from Rubber Products Development and Services Centre of Industrial Development Board or other available sources of rubber compound supply in the country.

Land and Building

For this project a building of about 750 sq.ft. having 3 phase electricity obtained on lease would be sufficient.

Utilities

Three phase electricity is required for this project and well water can be used for this industry.

Machinery

- 18" x 18", 2 day light
- Hydraulic press - 01 No.
- Power press (capacity 15 ton) - 01 No.
- Spring winder - 01 No.
- Sheet metal cutter - 01 No.

Equipment

- Weighing scale - 01 No.
- Moulds - 04 Nos.
- Grinder wheel - 01 No.
- Pair of scissors - 01 No.
- Table clock - 01 No.

Process of Manufacture

- i. Steel parts preparation
- ii. Rubber parts preparation

Steel Parts

The metal sheets are available in 8' x 4' sheet form and can be obtained in the required thickness. They are cut into parts of desired size and punched into circles by dies on a power press. The circles are bent in size and shape to given specifications. Then the surface of the rings are cleaned and applied with bonding agents before moulding. The metal springs are made using spring winding machine.

Rubber Parts

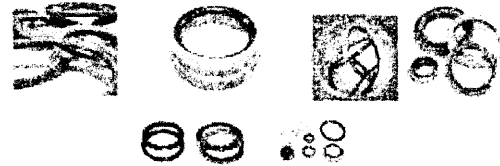
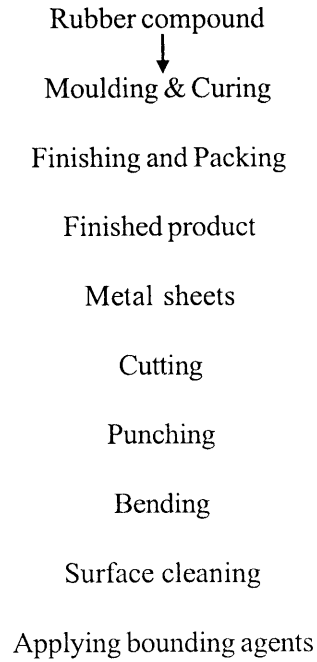
Rubber compound can be purchased from Rubber Products Development & Services Centre of the Industrial Development Board. The sheets of rubber compound are cut into required shape of the article. This is called blank preparation. The weight of the blank should be little more than the weight of the article to be manufactured because some of the compound will flow out of the mould while moulding. Therefore each and every blank has to be weighed before moulding. The moulds are made out of mild steel and are generally in two parts.

Moulding and Vulcanization

Moulds are cleaned, and applied with mould releasing agent (silicone emulsion) and preheated on the press. The steel rings, applied with bonding agents are inserted in the steel moulds with rubber blanks and they are brought under pressure between the heated platens of the hydraulic press, for a pre-determined period of time at a given temperature (around 150°C). The cured products are removed from the mould by means of compressed air and pry bar. The metal spring is

then inserted right round the inner surface of the seal. Then the seals are buffed and packed in polythene packs.

Process Floor Chart



Different types of Oil Seals

Cost of the Project

Fixed capital	-Rs. 900,000
Working capital	-Rs. 250,000
Total investment	-Rs. 1,150,000

Based on 300 working day single shift of 8 hrs. per day the unit is designed to have an annual production of 20,000 numbers of oil seals. It is assumed that the semi processed material, rubber compound is purchased from Rubber Products Development & Services Centre of the Industrial Development Board.

Labour

The manpower requirements for this unit would be 04 persons comprising, Manager, semi skilled operator and 02 unskilled labourers.