

# A Review on Remanufacturing of Engine Oil Filter

Vishal Bhise<sup>1</sup>, Hemant Kuwarkar<sup>1</sup>, Kunal Pawaskar<sup>1</sup>, Devendra Pakhare<sup>1</sup>, Yogesh Pagare<sup>1</sup>,  
Dr. B.F.Jogi<sup>2</sup>, Ankush Pawaskar<sup>3</sup>

Asst. Professor, SCOE, Navi Mumbai, vishalbhise79@gmail.com

BE student, SCOE, Navi Mumbai, hemantkuwarkar4@gmail.com

BE student, SCOE, Navi Mumbai, kunal\_pawaskar@yahoo.in

BE student, SCOE, Navi Mumbai, devpakhare444@gmail.com

BE student, SCOE, Navi Mumbai, yogeshpagare15@gmail.com

Associate professor, DBATU, Lonere, bfjogi@gmail.com

Proprietor, Akshay Fabrication works, Mumbai, kunal\_pawaskar@yahoo.in

**Abstract:** As the population of the world is increasing rapidly, it is important to fulfill their needs. To fulfill their needs lots of burden is imposed upon the natural resources which may lead to depletion of those resources and make them extinct in future. So to avoid this situation it is necessary to reuse and recycle this resource. Thus, remanufacturing becomes a very important and useful in such circumstances. Remanufacturing is the rebuilding of a product to specifications of the original manufactured product using a combination of reused, repaired and new parts. It requires the repair or replacement of worn out or obsolete components and modules. This paper gives us brief information about the engine oil filter, its components and its function. The paper mainly focuses on the methodology used to remanufacture the engine oil filter and its performance in normal working conditions.

**Key words:** Remanufacturing, Re-development, Engine Oil Filter, Filter Element, Filter Casing.

## 1.0 INTRODUCTION

Due to increase in population the needs of the mankind are also increasing. So to meet the increasing demands of the mankind it is necessary and important to reuse and recycle the products so that they can be used again. Because of the increasing demands have put a lot of burden on the natural resources which are non renewable. So to prevent these resources from becoming extinct remanufacturing technique has been adopted to reuse the products. Engine oil filter is one such product which is thrown away after using it once.



Fig 1 : Thrown Away Oil Filters

According to statistics up to April 2016,

Type	Numbers in millions
Passenger vehicle	2.79
Commercial vehicle	0.69
Total	3.48

In commercial vehicles the oil filter is usually changed after 5 to 6 months while in commercial vehicles it is usually changed after 8 to 9 months. While changing the oil filter the whole oil filter is replaced by a new one even though its casing which is made up of metal is not damaged. The components of the engine oil filter are casing, sealing ring, cover plate, filter media, relief spring, bypass valve. Only the filtering element that is the filter media is damaged and is needed to be replaced but the whole oil filter is replaced. Thus if the whole Oil Filter is replaced large amount of natural resources are getting depleted and the process is very costly and time consuming too.

So to reduce the cost and to prevent the natural resources we are going to remanufacture the engine oil filter in such a way that only the damaged part i.e. the filter media is replaced and all the other old components can be reused. This will reduce the cost associated with changing of the oil filter and also the time required to change the oil filter.



Fig 2: Sectional View of Engine oil Filter

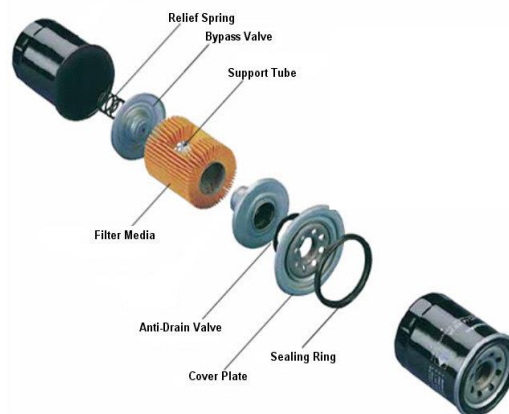


Fig 3: Exploded View of Engine Oil Filter

## 2.0 LITERATURE SURVEY

The process for finding out various functions and its working parameters of oil filter requires a literature survey of the author who made research in this area. Reputed journals like Elsevier, Springer Open, and ASME etc. were referred and the useful papers were taken into account according to latest research. Keywords like engine oil filter, remanufacturing, redevelopment were given importance. About 2/3<sup>rd</sup> of the papers were researched between the years 2011 to 2016. Pie chart given below shows the year wise distribution of literature review.

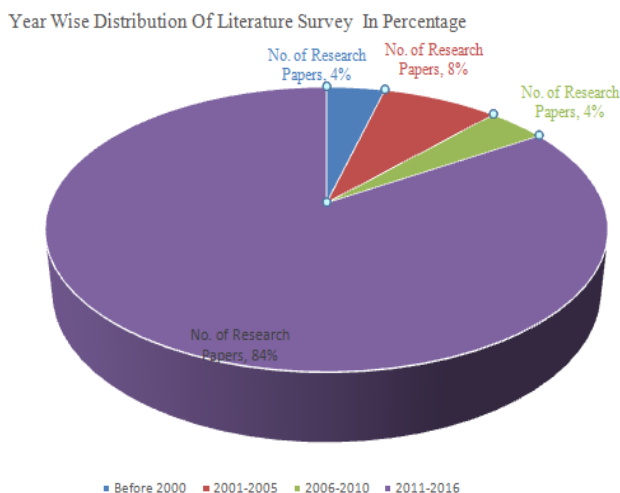


Fig 4: Year Wise Distribution of Literature Review in Percentage

Xuan Xhou, et al [14] The above research paper focuses on proactive remanufacturing method by which we are able to determine performance of the product and whether the product is remanufacturable or not. the design of the product can be changed systematically to improve the “best timing point” of the product.[13]

ManjunatheshwarKj, et al[14] This research paper highlights the working and structure of exhaust valve and how by remanufacturing the exhaust valve we can reuse the exhaust valve. The exhaust valve is fastened together by externally threading the head part and internally threading the steam par and replacing the head region which is damaged due to its working at high temperature.[14]

Sandra Seifret, et al[13] From this paper the industries which are facing the complexities in remanufacturing process can implement the above techniques and reduce the cost for remanufacturing using

KPI and derivation approach solution technique companies and avoid the complexities.[20]

Magdalene Andrew, et al[15]This research paper focuses on the remanufacturing processes and the products that can be reduces the amount of waste in energy, material etc. each provides a excellent surface finished increases the life of the product[4].

Matsumoto, et al[11] In this research paper study has been done on various remanufacturing techniques that are operated in Japan with the help of case studies. On the basis of the results of case studies. Clarification is made on the problems faced by the remanufacturers and what measures need to be taken to prevent the obstacles in remanufacturing.[19]

JevgenijsSemjonovs, et al[14]this research paper highlights how we can increase the change of oil intervals in the internal combustion engine. This can be achieved by

introducing an additional oil filter to the internal combustion engine because of which there is less contamination of oil and the oil can be changed after a greater interval of time. as there are many contaminants’ in the engine due to combustion if more oil filters are placed in the internal combustion engine then less contaminants will be formed and the time interval for remanufactured. It also studies about the properties of the product before remanufacturing and after remanufacturing. It helps in determining the life of the product before remanufacturing and after remanufacturing. The cost associated with the remanufacturing of the product and if the product is of use to remanufacture or not. So it focuses on reducing the burden on environment by saving the resources and also the time and the cost associated with remanufacturing of that particular product. changing the oil filter is increased. [15]

Jerome Geyer, et al[1973] This patent is for the use of transition metal compound in oil filters to reduce acidic nature of lubricating oil. due to which break down of oil molecule is reduced which is responsible for sludge formation. By using this method the time interval for changing the oil filter can be increases as the filtering element will not wear out. [25]

Xia Wen-Hui, Jia, et al[15] It focuses on creating low carbon logistics the paper analyses remanufacturing process cycle. It explains and suggests recommendation for remanufacturing reverse logistics.[8]

S.L. Soh, et al[14] ] This paper explains methods to be adopted for Design for Disassembly (DfD). This method ensures easy disassembly of product. thus it increase remanufacturing rate by reducing disassembly time.[18]

EyalZussman, et al[02] This paper study the alternative material used and there effect on energy consumption throughout the life cycle i.e. EOL end of life cycle. It make use of cumulative energy method CED to study two case study 1. Alternator, 2.Engine block. [22]

George J. Maddox, et al[01] The paper explain each step of centrifugal pump remanufacturing process. it explain disassembly, hydraulic design evaluation, engineering review, manufacturing routine, assembly and performance testing. [24]

Harpreet Singh, et al[16] This paper focuses on use of electrochemical honing process for remanufacturing. ECH proves to give better result compare to mechanical honing process and especially pulse associated honing PECH give more efficient result for surface.[1]

## 3.0 Methodology

From the last decade, efforts have been made to conserve the natural resources so remanufacturing and redevelopment is considered very important the steps involved in remanufacturing of the engine oil filter are shown below with the help of a flowchart.

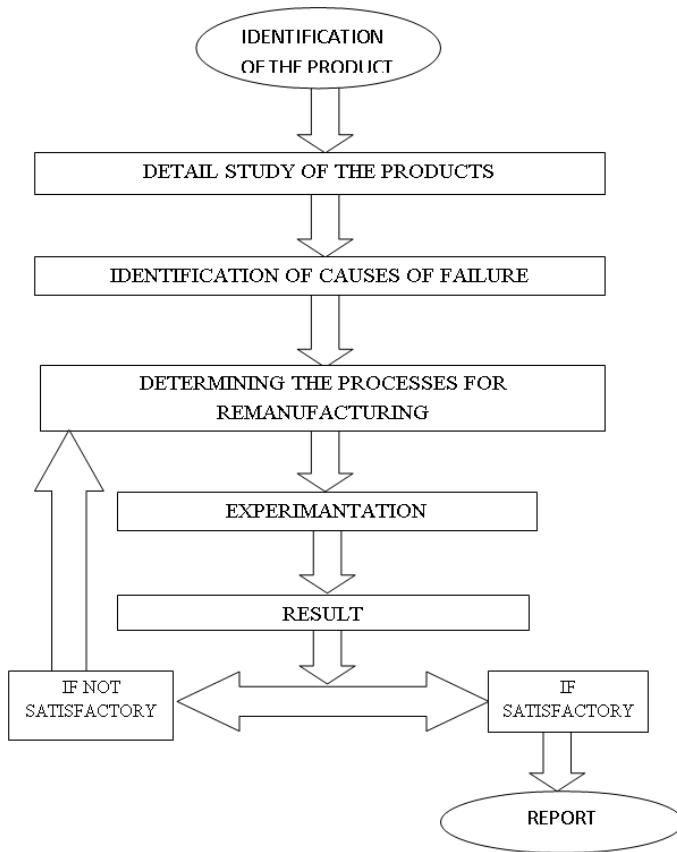


Fig 5: Flowchart of the Process Involved In Remanufacturing

**3.1 Identification Of Product:** in this step the product on which remanufacturing can be done is identified according to its working parameters. Engine oil filter is selected as the product to remanufacture due to its vast usage

**3.2 Detail study of the product:**the product on which remanufacturing has to be done is studied in detail to see whether its remanufacturing is feasible or not. Thus detail study about the engine oil filter and its components is done.

**3.3 Identification of failure:** to identify the causes of failure of the product and the component of the product which fails. In engine oil filter the filtering element of the engine oil filter is damaged and required to be changed. Because the oil filter is press fitted it cannot be individually replaced so it is completely replaced by a new oil filter.

**3.4 Determine the processes for remanufacturing:** to determine the process by which the cause of failure can be solved. Only the filtering element can be replaced by opening the oil filter either by screwing or threading it.

**3.5 Experimentation:** to perform the process selected for remanufacturing of oil filter.

**4.0 Conclusion:** from the above research we conclude that the replacing of engine oil filter has a great impact on natural resources .so to conserve this resources it essential to remanufacture and reuse engine oil filter.

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