

CENTRIFUGAL OIL-BURR SEPARATOR MACHINE

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Abstract – A centrifugal oil- burr separator is a machine designed to separate oil from burr by centrifugal action. It's has a cylindrical shape of container that rotate inside larger stationary container. The cutting oil needs to be separate from burr after use which can be reuse for the further processes . Centrifugal oil burr separator is used for waste oil recovery and cleanup of oil. It is also used for filtering oil by removing waste particles and impurity from them.

advantages of low working and low support costs and the offer of recyclable cutting oil, as a rule exceed the slight included cost of the underlying plans.

After producing burr from machining processes burr collected in bucket of setup. Due to centrifugal action the cutting oil comes out of the net and fills the casing after which it passes through the drain. The cutting oil impinges on outer stationery casing under pressure, where a burr are retain and cutting oil falls below from where is taken out. Complete oil recovery is possible with help of this setup hence it reduces the oil consumption.



Fig. 1.1.1. Oil collecting drum

Keywords: cylindrical container, centrifugal action, cutting oil, machining burr with oil, oil recovery

1. INTRODUCTION

On site separation of industrial fluid- oil coolants and liquid is must in most modern manufacturing operations. Efficient separation prolongs to the lifetime fluids thus lowering the production cost and reducing the environmental impact. Furthermore clean fluids are crucial for maintaining a consistent quality in manufacturing process and minimizing downtime for manufacturing and service. A centrifugal separator has a few moving parts and requires very little maintenance. It is supremely easy to use and operates independently without special monitoring.

It is important to expel oil from burr radial type oil-burr separators are regularly a decent arrangement since they evacuate the oil using only centrifugal force .The separator modules are perpetual and require no upkeep, no sponges or other consumable things, (for example, channel cartridges) are required, and the oil that is isolated is regularly recyclable. No pumping or other utility expenses are generally required. They can be intended to work under an awesome scope of working conditions and handle input oil substance up to 100%.Separator set up are situated in other than the CNC and Lathe Machine where the burr is created which contains the cutting oil. centrifugal motion is favored due to the wet burr for better evacuation of cutting oil. Since oil-burr separators work utilizing centrifugal movement as the working rule, their plan is less troublesome and requires less ability than the outline of partition or different frameworks that work under pressure. The continuous

2. PROBLEM STATEMENT

Problem definition is most important step in any problem solving is said that very probably defined problem is half way towards the solution of problem hence systematic methodological approach of problem definition is adopted.

Many industries consist of machining process like honing, broaching etc. In this process high rate of burr is removed which contains high amount of cutting oil . Now a days burr which contain cutting oil is disposed without separating cutting oil. Hence it needs to separate cutting oil from the burr.

Oil contain in burr is intrinsic problem hence separation of oil from burr system is statistically impossible to clean whole oil content from burr by this method of centrifugation whole oil contain in burr is separated.

3. OBJECTIVES

1. The design and optimization of centrifugal oil separator base on basic laws of physics such as centrifugation.
2. To study various machining processes.
3. To study various types of cutting oil used in machining process.

4. To develop experimental setup for removal of cutting oil from burr.
5. Testing of setup and modification in it, if necessary.

4. METHODOLOGY

1. Literature Survey For:

- i) Machining Process
- ii) Cutting Oil
- iii) Coolants

2. Designing of various components used in setup.
3. Fabrication of experimental setup.
4. Performance evaluation experimental setup.
5. Finally results will be summarized.

4.1 Cutting Fluid Use for Metal Working:

This type of product is not mixed with water, but is applied directly. Neat cutting oils are primarily used when good lubricating properties are required, such as in deep-hole drilling, threading and reaming. Cutting oils have different viscosities, base oils and additives depending on the processes and which metals are being machined. Mineral oils, synthetic oils, white oils and esters are used as base oils. „Fatty oils“ are also often added (such as vegetable oils, animal oils or esters) to protect against wear. EP additives are also sometimes used (e.g. sulphur, phosphorus or chlorine).

4.2 Desirable Characteristics

Technical primary characteristics:-

A cutting fluids needs to cool and lubricate up successfully in the metalworking procedure. It likewise needs to keep machines and apparatuses spotless and free of wreckage.

- Effective cooling and lubrication
- Good cleaning of machines and tools
- Effective removal of swarf
- Good cleaning of the grinding disc

Technical secondary characteristics:-

There are also secondary considerations with regard to technical properties. Here are some examples:

- Good corrosion/rust protection
- Low foaming tendency
- Low tendency to emulsify in leaked oil
- Must not damage machines or components
- Simple preparation
- Simple control methods
- Bio stability

To choose the right cutting fluid, It must consider:-

- The types of material being machined.
- The type of machining.
- The premises, environmental and health & safety aspects.

5. PRINCIPLE AND WORKING OF OIL SEPARATOR

5.1 Principle:-

Centrifugal oil burr separator works on the principle of basic laws of physics such as centrifugal motion . It causes a centrifugal motion due to rotation of shaft with the help of belt and pulley arrangement and the power is supplied from the motor due to which the bucket carrying net spins at high rpm.

5.2 Working:-

Oil Recovery Centrifuge works on principle of centrifugal separation. Rotor bucket made of perforated mild steel is driven by motor. Burr from which oil is to be recovered are loaded in the rotor bucket. Centrifugal force created in the rotor separates oil from surface of burr. Collected oil is depleted out by opening valve located at the base of unit.

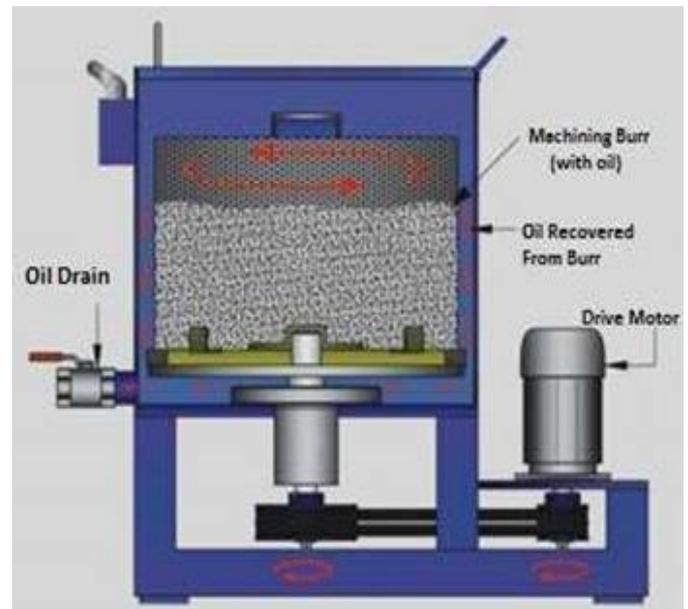


Fig.-: Setup of oil separator

Centrifuge is used in conjunction with positive filters to remove extraneous oil and small fines from metal working cutting oil. The fluid mix feeds into a centrifugal open type net, which rotate at a high rpm. Centrifugal force pushes the swarf to the outside of the bucket. The cutting oil from the net spilt into bucket and then its filtered.

6. COST SAVING ANYALYSIS:-

NO. Of Hours Per Day	4 Hrs. = 240 Minutes
Time Required for 1 Oil Recovery Operation	3 to 5 Minutes
No. Of Cycles Per Day	80 (240/3)
Chips Loaded Per Charge	5 Kg
Chips Processed Per Day	240 Kg. (80x3)
Qty. Of Oil Recovered Per Charge	50 ml
Oil Recovered Per Day	4 Litre (80x0.05)
Cost Of Cutting Oil Per Liter	Rs. 160
Savings Per Day Per Machine	Rs.640 (4x160)
Savings Per Month(25 Days)	Rs.16000(640x25)
Savings Per Year	Rs. 192000

6.1 ENERGY CONSUMPTION BY MOTOR:-

0.5 HP Motor (440 volt)

Energy consume for 1hrs - 5 unit cost of unit 1 unit- Rs. 3.5
 Energy consumption per day- 4hrs

- $4(\text{hrs}) * 5(\text{unit}) * 3.5(\text{rs})$

- Rs. 70

Energy consumption per month -25 days

- $25(\text{days}) * 4(\text{hrs}) * 5(\text{unit}) * 3.5(\text{rs})$

-Rs. 1750

7. ADVANTAGES AND APPLICATION

7.1. Advantages

1. Complete Oil Recovery.
2. Reduced Oil Consumption.
3. Substantial savings on cost of oil.
4. Reduced pollution and environmental impact.
5. Improved Product Finish

1.6.2. Applications

1. Gear Manufacturing
2. Fastener Manufacturing
3. Spring Manufacturing
4. Gun Drilling
5. CNC Machines
6. Auto Components

8. CONCLUSION

The oil separator machine is used for separating cutting oil from burr due to centrifugal action . This centrifugal oil burr separator is used for filtering the oil by removing waste particles and impurity from them.

Recovery of oil from waste disposal. This separator aims to save cost and reduced oil consumption which will be going to increase the profit of industry.

REFERENCES

Chavan S. D., Karande A. V. works on “Design and Development of Centrifugal Oil Cleaner and Finite Element Analysis using ANSYS”. International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395 -0056 Volume: 03 Issue: 06 | June-2016 .

Awasthi Anshita and Srivastava Akansha works on “Oil Water Separation By Centrifugal Force”. S-JPSET ISSN : 2229-7111, Vol. 7.

Devanagoudar Naveen V, Kumar Hemanth works on Fabrication of Oil Separator in Industry. International Journal of Science and Research (IJSR) ISSN (Online): 2319-7064 .

Design data book of engineers by PSG college-kalai kathir Achchagam Coimbatore Design of machine element by “V.B. Bhandari” of Tata McGraw-

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