Design And Manufacturing Of Oil Separator.

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Abstract

Metals such as Fe, Al, etc. are widely used in manufacturing to produce almost all kinds of industrial and consumer products. Each year, a huge amount of metal chip solid waste is generated from the manufacturing industry. These manufacturing chips, mixed with cutting fluid, are difficult to recycle. Current manufacturing companies either landfill these wastes or pay a third party to haul them away, causing both environmental and economic issues. As widely recognized recycling these metal chip wastes could enhance the economic profit and reduce the environmental impact of manufacturing. Because these metal chips are a mixture of different materials, the first step for recycling is to separate different metals from each other, while until today there is a lack of effective and economical ways to separate these metal chip mixtures on an industrial scale. As most of the manufacturing metal chips are composed of Fe and Al, ; in this study, a combined hydrodynamic and electromagnetic approach is used to separate the Fe and Al metals in the wasted mixture, based on the different moving behaviours of different metal chips resulting from their different sizes and density in the coupled magnetic and hydrodynamic field. The motion of the metal chips in a fluid- electromagnetic coupled field will be simulated by using computational fluid dynamics (CFD). Per the simulated different motion behaviour and experimental separation results of metal chips, the effectiveness and efficiency of the metal chips separation will be investigated both theoretically and experimentally. Composition of the metal chip mixture before and after the experiment will be analysed using inductively coupled plasma mass spectrometry (ICP-MS) method.

Keywords *– motor, gear box, rotor net, cylinder, oil, bearings, and propeller shaft...etc.*

1. Introduction –

It is necessary to remove oil from burr, centrifugal type oil-burr separators are often a good solution because they remove the oil using only centrifugal force. The separator modules are permanent and require little to no maintenance, no absorbents or other consumable items (such as filter cartridges) are required, and the oil that is separated is often recyclable. No pumping or other utility costs are usually required. They can be designed to function under a great range of operating conditions and handle input oil contents up to 100%. Separator set up are located in besides the CNC and Lathe Machine where the burr is produced which contains the cutting oil. Centrifugal motion is preferred because of the wet burr for better removal of cutting oil because oil-burr separators operate using centrifugal motion as the operating principle, their design is more difficult and requires more expertise than the design of separation or other systems that operate under pressure. It the ongoing benefits of low operating and low maintenance costs and the sale of recyclable cutting oil, usually outweigh the slight added expense of the initial designs. No absorbents are required, so disposal costs are limited only to the disposal of the recovered oil.

2. Problem Statement –

Cleanliness of the oil is a vital problem and it have to be free of particulate materials such as sludge, carbon, water, burr etc. Oil collapse on the allotment surface may happen if sufficient quenching interruption is not provided Cutting oil is got worse resulting in formation of burr, sludge, lacquer and carbon with use .After process cutting oil which is contained in burr is get wasted hence to recycle this cutting oil Oil-Burr separator set up is used.

3. General Information –

3.1. Purpose

The main purpose of project to save money &eco-friendly. The new system is economical and user friendly than previous system.

1. Easy to operate
2. Smooth running
3. Economical
4. Effective means to control pollution
5. Higher oil removal rates
6. The new system is flexible in operation.

3.2 Scope

The purpose of this manual is to provide practical ideas for reducing metalworking fluids and lubricant wastes Compliance with the many environmental laws and regulations that govt. waste treatment and disposal is beyond the scope of this manual. However, in waste reduction efforts, it is important to at least be aware of the regulatory issues involved in disposing of the wastes. This regulatory framework is one important reason for working on the front end of the operation to reduce the amount of waste sent to disposal. The major environmental issue in disposing of metalworking fluids and lubricants is whether or not the wastes are hazardous. Hazardous wastes are specifically listed and closely regulated under RCRA (the Resource Conservation and Recovery Act). A detailed set of regulations require generators to register with the EPA, comply with labelling and containment requirements, and maintain records to document the origin, handling, and ultimate disposition of all hazardous wastes.

Disposal of hazardous waste is very expensive, and, if the regulations are violated, there can be severe fines and even criminal penalties. There are many varieties of metalworking fluids and lubricants used in metal fabrication. Initially it is necessary to determine whether the product itself is classified as a hazardous waste. In some cases this information can be found on the Material Safety Data Sheets (MSDS) that the process fluid vendor is required to provide. However, do not assume that ingredients in Section 2, “Principle Hazardous Components" of the MSDS automatically imply that the fluid is classified as a hazardous waste. Rather, the RCRA regulations, which are included in Section 7 of the MSDS, state the appropriate method of disposal for a given product.

If the product itself is hazardous from a waste disposal standpoint (RCRA), consider asking the vendor about non-hazardous alternatives.

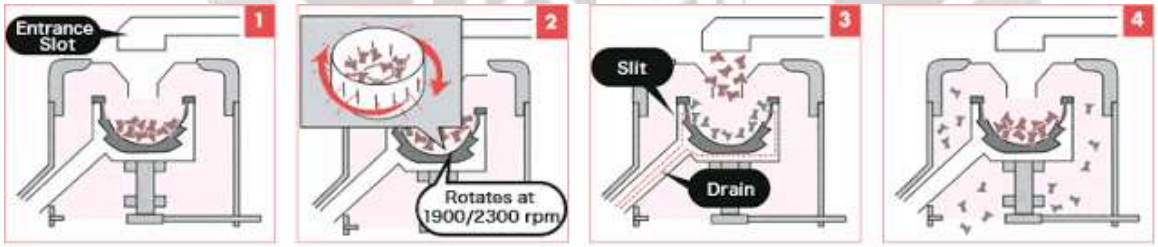
Metalworking fluids may also become hazardous during use because they ‘pick up’ other waste materials. Therefore, the chemical component of the wastes reflect not only the *original makeup* of the process fluid, but also the operation and conditions of their use. In fact, many metalworking fluid wastes contain higher percentages of lubricating oil and suspended solids (dirt), and metal fines than they do metalworking fluid. If working with metals other than carbon steel, there is a possibilities that *heavy metals* (such as cadmium, copper, chromium, lead, mercury, nickel, silver, zinc) in the fluid waste will result in it being classified as hazardous waste. To find out whether the specific waste is hazardous, a sample must be sent to an EPA certified lab for analysis using the TCLP (Toxicity Characteristic Leaching Procedure) test method. Even after all tramp oil, chips and fines have been removed, consult the local wastewater authority before disposing of metalworking fluid waste in the municipal sewer treatment system. Significant surcharges could result if discharge limits are violated and if waste is disposed of without proper authority.

Fig: Steel swarf

Fig: Brass swarf

4. Working –

Oil Recovery Centrifuge works on principle of centrifugal separation. Rotor bowl made of perforated steel screen is driven by motor. Chips / Parts from which oil is to be recovered are loaded in the rotor bowl. Centrifugal force created in the rotor separates oil from surface of Chips / Parts. Collected oil is drained out by opening valve provided at the bottom of unit.



The chip conveyer brings a specific quantity of oiled machining swarf from the cutting machine to the rotary bucket.

The rotary bucket rotates at high speed. Deoils machining swarf centrifugally.

Removed oil is recovered separately from the drain.

After deoiling, the new machining swarf is brought into the bucket, and then the old swarf is ejected from the ejecting slot.

4. Centrifuge this type of unit generally is used in conjunction with positive filters to remove extraneous oil and small fines from metalworking fluids. The fluid mix feeds into a spherical open-type bowl, which spins at a high rpm. Centrifugal force pushes the swarf to the outside of the bowl. The clean fluid spills over the top of the bowl and is fed back to the machine. As sludge builds up in the bowl, the centrifuge automatically ejects it; if not, the centrifuge must be stopped manually and cleaned or replaced

Advantages:
• Excellent for removal of extraneous oil.
• No disposable filter media

5. Oil and grease always on the water surface. They do not mix with water. Separation of it is based on the surface tension, specific gravity and viscosity of them. The "oil and grease separator unit has special purpose belt, which is rotated by mechanical means such that it just touches the surface of water the oil and grease particle stick to the belt material and travels with the belt up to scrapping arrangement where scrapping of oil and grease occurs and oil grease are collected

5. Methodology –

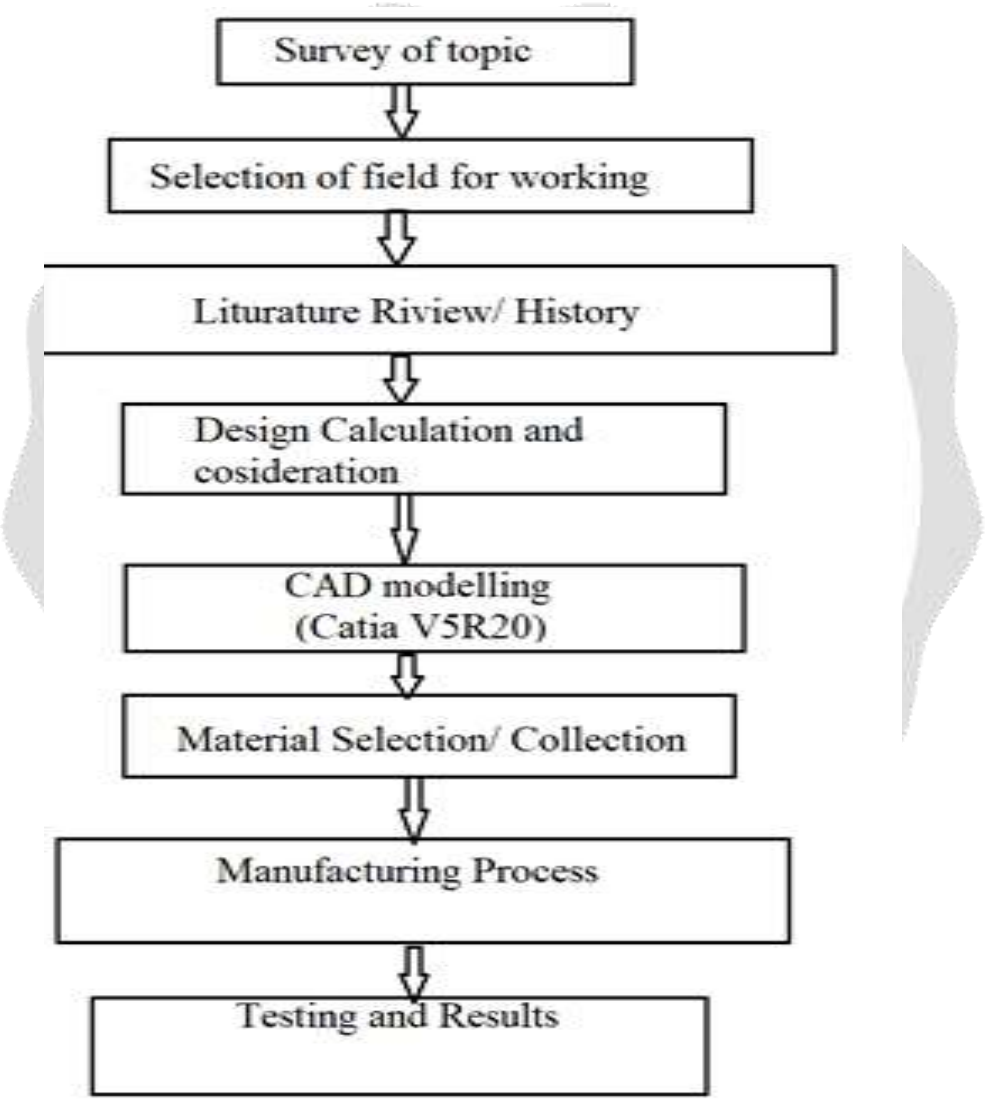


Fig- Methodology

6. Application –

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

7. Advantages-

1. Complete Oil Recovery
2. Improved Product Finish
3. Reduce Oil Consumption
4. Substantial Saving On Cost Of Oil
5. Save Over One Thousand Liter Oil Per Month
6. Reduce Pollution And Environmental Impact
7. Save Hidden Costs
8. Lower Overall Cost

8. Disadvantage-

1. Initial running cost is high
2. System is bulky

9. Conclusion –

The main aim of project to save money &eco-friendly. The new system is economical and user friendly than previous system. Easy to operate, smooth running, higher oil removal rate, economical, the new system flexible in operation.

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