

Centrifugal Scrap and Oil Separator

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Abstract: *The main aim of the project is to improvise the quality of scrap and to reduce the time required for separation of scrap and oil so as to consume less time in separation of scrap and to get good value of scrap. As a part of industrial project under the syllabus prescribed for Mechanical Engineering, we as a group are working with collaboration of Himanshu mechanization Pvt. Ltd. The various type of scrap is generated in the company. A new system for separation of scrap & oil tends to improve functionally, longer service life, consumes less time, easy installation, user friendliness and ensuring proper optimization of cost, material, timing as well as the prevention of wastage of oil.*

Keywords: centrifugal force, filter net, Ac motor,

I. INTRODUCTION

Centrifugation is one of the most important and widely applied research techniques in biochemistry, cellular and molecular biology, and in medicine. Current research applications rely on isolation of cells, subcellular organelles, and macromolecules, often in high yields. A centrifuge uses centrifugal force (g- force) to isolate suspended particles from their surrounding medium on either a batch or a continuous-flow basis. Applications for centrifugation are many and may include sedimentation of cells and viruses, separation of subcellular organelles and isolation of macromolecules such as DNA, RNA, proteins, or lipids. But we are using this centrifugal force for separation of oil & scrap filter. Industrial centrifugal separator is a coolant filtration system for separating particles from liquid like, grinding machining coolant. It is usually used for non-ferrous particles separation such as, silicon, glass, ceramic, and graphite etc. The filtering process does not require any consumption parts like filter bags, which saves the earth from harm. Revolutionize your fluid management with our cutting-edge Centrifugal Scrap and Oil Separator. Engineered for peak efficiency, this innovative device utilizes centrifugal force to swiftly and effectively separate solid particles and oil from liquids. Ideal for diverse applications across industries, it ensures optimal equipment performance, extends fluid life, and promotes environmental compliance. Elevate your operations with a solution designed for continuous performance, reduced maintenance costs, and a sustainable future. Welcome to the forefront of fluid cleaning technology. Step into a realm of enhanced fluid management with our state-of-the-art Centrifugal Scrap and Oil Separator. Seamlessly combining cutting-edge technology with efficiency, this revolutionary device is designed to cater to the evolving needs of industries reliant on pristine liquids for optimal machinery performance...

II. LITERATURE SURVEY

"It seems like you're asking for information related to a literature survey on the topic of "centrifugal scrap and oil separator." A literature survey involves reviewing existing literature, research papers, articles, and relevant publications to understand the current state of knowledge on a specific subject. Unfortunately, as of my last training cut-off in January 2022, I don't have direct access to current literature. Still, I can guide you on how to conduct a literature survey on the topic:

Online Databases: - Utilize academic databases like PubMed, IEEE Explore, Science Direct, or Google Scholar to search for peer-reviewed articles, conference papers, and journals related to centrifugal scrap and oil separators.

Keywords:- Use a combination of keywords such as "centrifugal separator," "oil and scrap separation," "industrial centrifuge," and "fluid cleaning" to narrow down relevant literature.

Review Articles:- Look for review articles that summarize and analyze existing research on the topic. These articles often provide a comprehensive overview and highlight gaps in knowledge.

Industry Reports: Explore industry reports and publications from relevant organizations or manufacturers. These reports may provide insights into the practical applications, advancements, and challenges in the field.

Books and Manuals: Check for books and manuals on fluid separation technologies, industrial processes, or environmental engineering that may cover the principles and applications of centrifugal scrap and oil separators.

Citations: Pay attention to the citations within the papers you find. This can lead you to other valuable sources that might not appear in your initial search.

Theses and Dissertations: Consider looking into academic theses and dissertations, as they often delve into specific aspects of a topic in detail.

Conference Proceedings: Explore conference proceedings related to fluid separation, industrial processes, or environmental engineering. Conferences can be platforms for the latest research findings.

International Standards: Check if there are any international standards or guidelines related to centrifugal scrap and oil separators. These might provide insights into industry best practices.

Collaboration and Networking: Connect with professionals, researchers, or experts in the field. Networking can lead to additional resources, insights, and potential collaborations.

III. PROBLEM STATEMENT

The conventional system used for separation of oil and scrap is time consuming. It takes about 2-3 days for separation of 650 kilograms of scrap and oil mixture. Also scrap separated by this system is wet scrap which has low market value. Thus company was getting less profit due to wet scrap. Also less amount of cutting oil is generated from this conventional system. This directly affects the quality of scrap and thus profit of company

IV. PRIMARY SEPARATION TECHNIQUE

A company used to rely on conventional system which includes of a drum, capacity of 650-700 kg having holes at its bottom side. In this system, workers feed scrap-oil mixture of 600-650 kg to separate. It works on the gravitational force. Oil starts coming downwards due to acceleration. But this process takes almost 2-3 days to get separated. But most of the oil sticks between the scrap. Thus separated scrap is in wet form

V. NEW SYSTEM

The problems were identified and various techniques were studied so as to improve quality of scrap & to minimize the time required for the separation of oil & scrap. The study resulted in the use of centrifugal separation process the oil separation is needed from the oil-scrap mixture. After submitting the proposal for the new system for separation, the company observed the differences & decided to switch to the new method of separation as it was found to be less time consuming system, so we started working on this new oil & scrap separator.



FIG NO. 1

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VI. WORKING

In this project, we have a –phase A.C. motor of 2hp on its shaft end it has a solid pulley of 4 inches in diameter is of mild steel. The shaft is fitted inside a hollow shaft by bearing arrangement through forging process .One end of the shaft is fitted to a pulley of 10 inch diameter. The bearings used are roller bearings used are cylindrical roller bearing. On the frame fixed drum is fitted through welding. The drum earlier was a M.S sheet of 4mm thickness which is than roller cylindrical shape. In that filter there is one rotary drum (i.e. filter) which is 5 feet *1 feet in which there are holes of 1micron. For transmission of power a v-belt is used to avoid the slipping as in the flat belt.. According to working, as the motor starts rotating, the shaft end also starts rotating. Pulley connected to motor shaft starts rotating and thus driven pulley also starts rotating. It rotates the main shaft. One end of the shaft is linked to the rotating drum as the rotating drum (i.e. filter) starts rotating, the scrap inside in it also rotates. Because of centrifugal action the oil and scrap gets separated. The separation action is done in such a way that oil is splashed on the walls of fixed drum & scrap remains in rotary drum. An oil seal is provided in between rotary drum which is made up of cast iron with the help of nut and bolting assembly. By providing the oil seal, the leakage oil from rotating drum to shaft in has been completely avoided or stopped. After the centrifugal action, the oil flows down from fixed drum and remains in Between the gap of filter and drum at bottom. This oil is than drained out by providing a drain pipe is made up of mild steel which has 20mm diameter. This oil flows down and is collected in various operations. The machine is mostly preferred in small scale industries where initial investment is less.

VII. WHAT IS SCRAP OIL SEPARATORS?

A centrifugal oil separator utilizes Centrifugal force to separate oil or Coolant which is mix up in scrap. Centrifugal oil separator are usually Cylindrical- shaped units that will turn and Rotate high speed. The main aim of a Centrifugal oil separator is to remove the Oil in scrap and main tine the selling cost as per market value

VIII. HOW SCRAP OIL SEPARATORS WORK

- Grasp the bin which consist the mixture of scrap & oil.
- Place it inside the fixed drum over the circular plate
- Switch on the power supply.
- Machining time was 10 minutes for 13 kg of mixture.
- Switch off the power supply
- Grasp the moveable bin witch contents
- Only dry scrap (no oil was present) and place aside.
- Process is continuance

IX. CONSTRUCTION

Oil and scrap filter mechanism which works on principle of centrifugal action is mechanically operated unit consists of following component:

- Body.
- Drive motor.
- Driven shaft.
- V-belt.
- Drain pipe
- Driven pulley (connected to motor)
- Driven pulley (connected to drive)
- Fixed drum.
- Rotating drum.
- Bearings (roller)
- Motor tightening mechanism

X. THE ASSEMBLY MADE IN SOLID WORK

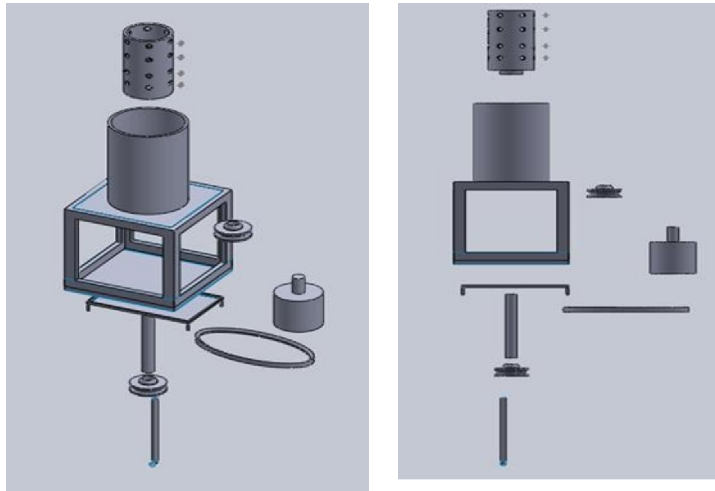


FIG NO 2

XI. WHY USE SCRAP OIL SEPARATORS?

Using scrap oil separators can help industries reduce waste and improve sustainability. By separating oil from water, these devices can prevent pollution and protect the environment. They can also help companies save money by reducing the amount of wastewater they need to treat and dispose of. Additionally, scrap oil separators can help companies comply with environmental regulations and improve their reputation as responsible corporate citizens.

XII. ADVANTAGES

- Centrifugal oil separator is simple to use and maintain.
- Centrifugal oil separator to avoid the reduction in cost of scrap as its dry
- Centrifugal oil separator is reduce wastage of cutting oil.
- Centrifugal oil separator to maintain the market value of the scrap.
- To save the time which was been consumed.
- Reusing of cutting oil.
- Complete oil recovery.
- Substantial saving on cost of oil

XIII. FUTURE SCOPE

In these machines further improvement can be done. Even after filtration small amount of scrap materials may enter. To avoid these secondary filter can be introduced this secondary filter is stationary have very small holes so as to block that very fine particles of scrap. Oil will go to secondary filter this filter will block the small particles and very clean filtered oil can be obtained. Also some automation can be done by providing density sensor as density of oil & scrap mixture come to a certain level machine will start automatically.

- 1) Good corrosion/rust protection Effective cooling and lubrication.
- 2) Capital is there for Large as well as small scale industries grape easily.
- 3) Simple controlling method.
- 4) To reduce the wastage of oil or lubrication fluid.
- 5) Reduced pollution and environmental impact.

XIV. CONCLUSION

In conclusion, scrap oil separators are a comprehensive solution for waste reduction in industrial settings. They can help industries maximize efficiency and sustainability by separating oil from oil and preventing pollution. By using scrap oil separators, industries can save money on waste oil treatment and disposal costs, comply with environmental regulations, and improve their reputation as responsible corporate citizens. The future of scrap oil separators is bright, and they will continue to play an important role in reducing waste and improving sustainability in industrial settings.

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