

COST ESTIMATION ANALYSIS OF SCRAP OIL SEPARATING MACHINE

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Abstract:

When machining auto components we need to used enormous straight cutting oil to increase production capacity and increase quality a components in this situation. The oil will be mixed with burr (or) scrap and the total oil will be wasted. To separate this oil, we are provided scrap oil separated machine reusable to continue production through our project. When the drum will be rotated the centrifugal force generated on the drum. Due to this centrifugal force, the oil will be separated from have to collect it for reusable to machines It is mainly used in manufacturing of auto component industries

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

INTRODUCTION:

Machine shop was oil to transfer the heat generated during the machining process away form cutting tools and parts being produced the oil collected in and reticulated from a sump, during use the oil collect oil the machine process. this oil called tramp oil, contributes the oil sumps contain from 20 to 1 ga, each and depending on maintenance practices, the oil may require monthly or even weekly replacement eve a small shop will have several machine tools and large shop can have 100 and more.The separating chips in oil capable of separating chips includes scrap pf iron and impurities which are mixed in oil used in industrial machine such as grinding machine, metal cutting machine, and rolling machine. The apparatus comparing a chip separation devices for separating course chip by passing oil containing various chips, produced in the course grinding, cutting, through a partitioning filter or a course of grinding, cutting or rolling.

PARTS OF MATERIALS:

- Shaft
- Ball bearing
- Belts and pulleys
- V-belt



Figure1-Shaft

Shaft is a rotating member which transmits power from one point to another point torsion. Transmission of torque to the shaft transmits power from the source of machines. They carry machine parts such as pulleys, gears, or wheels. Hence they are subjected to bending in addition to the twisting.

1.1 BALL BEARING



Figure2- Ball bearing

The rolling contact bearings may be a ball bearing or roller bearing depending on the rolling element used.

The inner race is mounted on the shaft or journal and rotates with it; the outer race is stationary and carried by the housing or casing. A number of balls or rollers are provided in between the inner and outer races.

1.2 BELTS AND PULLEYS

Flexible machine elements like belt ropes or chains are used to transmit power between two parallel shafts by means of friction. They absorb shock and damp out vibrations which occur in the driving belts. Belts transmit power over comparatively long distances. Both belt and rope drives are positive drives, while the chains drive is a positive drive.

V-BELTS:

V-belts have a trapezoidal cross-section. They require V-grooves on the pulley for seating. They are used in places where a greater amount of power is to be transmitted between two pulleys. A single V-belt may not be sufficient. In such cases, a wide and deep groove is provided with a belt. Belt drives used for power may be transmitted from one pulley to another pulley. A belt drive is used for shafts arranged in parallel and rotating in the same direction. The lower side of the belt is the tight side and the drive, the ratio of tension is greater for smaller

pulley since lap angles is less than for smaller pulley since lap angles is less than that at large is less than for smaller pulley since lap angles is less than that at large pulley.

They roll about their axis when the shaft rotates. A cage or retainer is provided to keep the balls or rollers in their respective position without touching each other

V belts (also style V-belts, vee belts, or, less commonly, wedge rope) solved the slippage and alignment problem. It is now the basic belt for power transmission. They provide the best combination of traction, speed of movement, load of the bearings, and long service life.



Figure3- V Belts

They are generally endless, and their general cross-section shape is trapezoidal (hence the name "V"). The "V" shape of the belt tracks in a mating groove in the pulley (or sheave), with the result that the belt cannot slip off.

The belt also tends to wedge into the groove as the load increases—the greater the load, the greater the wedging action—improving torque transmission and making the V-belt an effective solution, needing less width and tension than flat belts.

V-belts trump flat belts with their small center distances and high reduction ratios. The preferred center distance is larger than the largest pulley diameter, but less than three times the sum of both pulleys. Optimal speed range is 1,000–7,000 ft/min (300–2,130 m/min). V-belts need larger pulleys for their thicker cross-section than flat belts.

For high-power requirements, two or more V-belts can be joined side-by-side in an arrangement called a multi-V, running on matching multi-groove sheaves. This is known as a multiple-V-belt drive (or sometimes a "classical V-belt drive").

V-belts may be homogeneously rubber or polymer throughout, or there may be fibers embedded in the rubber or polymer for strength and reinforcement.

The fibers may be of textile materials such as cotton, polyamide (such as Nylon) or polyester or, for greatest strength, of steel oraramid (such as Twaron or Kevlar).

When an endless belt does not fit the need, jointed and link V-belts may be employed.

Most models offer the same power and speed ratings as equivalently-sized endless belts and do not require special pulleys to operate. A link v-belt is a number of polyurethane/polyester composite links held together, either by themselves, such as Fenner Drives' Power

Twist, or by metal studs, such as Gates Nu-T-Link. These provide easy installation and superior environmental resistance compared to rubber belts and are length adjustable by disassembling and removing links when needed.

Trade journal coverage of V-belts in automobiles from ownership and no longer refers to multiple-V-belt drive alone.

OBJECTIVES

- The design and optimization of scrap oil separator base on laws of centrifugation.
- To study machining processes.
- To develop experimental setup for removal of coolant oil from scrap.

CONSTRUCTION

The outer drum is firmly fixed with stand which can be tilted to pour the burr or scarp material after the central shaft which supported by bearing and the shaft would get the rotary motion from the motor through out belt.

The inner drum is covered with perforate sheet to enable release oil where the centrifugal force acts on them the motor is bolted in the bracket which also firmly welded to the outer drum so that the drum also the motor enables to tilted when required

The motor shaft has also fitted with pulley which facility the proper selection of speed of inner drum shaft the pulley and inner drum shaft it coupled through the v- belt to decrease the slip of the belt.]

We also provided round MS plate to prevent leakage of oil from bearing and driving shaft which collected in the outer drum.

The drain plug is provided to discharge the scrap oil which collected in the outer drum we have provided the filter sheet in the drain plug and also the collecting tank which placed in suitable height below the drain pipe the whole assembly is kept at safety place to avoided any hazard to operator.

WORKING PRINCIPLE:

When the driving shaft is rotated at high speed, the centrifugal force will be developed on the scarp material which is held on the inner drum, such that the material contains oil will be separated towards the outer surface of drum .Since inner drum has provided with perforate holes the will forced out from the inner drum which may be collected in the outer drum and furthers it may be drained through drain plug and can be used for further usage of filter oil .So that this re-cycling of oil required cost of purchase as well as reduce waste of oil in scrap.

A centrifugal oil separator, centrifugal oil–water separator or centrifugal liquid–liquid separator is a device designed to separate oil and water by centrifugation. It generally contains a cylindrical container that rotates inside a larger stationary container.

The denser liquid, usually water, accumulates at the periphery of the rotating container and is collected from the side of the device, whereas the less dense liquid, usually oil, accumulates at the rotation axis and is collected from the center .

Centrifugal oil–water separators are used for waste water processing and for cleanup of oil spills on sea or on lake.

Centrifugal oil–water separators are also used for filtering diesel and lubricating oils by removing the waste particles and impurity from them

A mix of oil and water is pumped constantly into a cone-shaped separating apparatus at an angle, which creates a spinning vortex .

The filtration is a result of the force balance that occurs on fluids in a vortex. High-density liquids will move to the outside, along with any contaminant, displacing the lower-density liquids to the inside (center of rotation). Water, being the more dense liquid, sits on the outside and is removed through a discharge outlet. [5] discussed about a disclosure which is made regarding a driving alert system which is designed in the form of a neck cushion which has the capability to sense the posture of the drivers neck position so as to identify whether the driver is alert and if he is dozing of. The system is made intelligent to obtain data from the movement so as to produce triggers to alert the user and to keep him/her awake to avoid accidents. The system is also linked to a mobile computing device so as to provide a report of the analysis done. The drivers location can also be tracked using the same.

Any segregated oil can now safely be recovered through a suction orifice at the center. The process will continue to function in this fashion as long as sufficient oil is added to maintain coverage of the suction orified

There are other types of separators that use gravitational forces to separate mixtures, but these other types of forces are not as strong as the centrifugal force in the centrifugal separator. Other types of separators are coalescing plate pack separators and petrol interceptor separators. Coalescing plate pack separators work very differently from centrifugal separators. [7] discussed about a disclosure which is made regarding a gear blocking gear cover for the four wheeler vehicle where the protective cover has been with touch sensors and biometric sensors. Here in case of theft even if the car is started without a key the gear system is locked using biometric locks which can read the palm of the user to unlock the gear system thus protecting the vehicle against any form of theft. This device can be attached to any type of four wheeler vehicle. With the plate packs, water is fed into the separator through gravity through the inlet pipe, then the mixture is spread evenly through the separation chamber where the coalescing plate packs are

. In the plate packs the oil will rise because of their buoyancy and coalesce on the underside of the plates and form globules of oil that rise to the surface. From there the waste oil globules go into the clean water chamber and are discharged through the lower portion of the separator.

With the interceptors the dirty water mixture enters the first tank of the interceptor where that tanks builds up hydrocarbons and other hazardous material in a layer.

Then comes the second and third tanks of the interceptor that are all connected through pipes called “dip pipes” which don’t allow the hydrocarbons and other contaminants to pass through. The same process that happened in the first tank will happen in the second and third tanks just with less and less contaminants.

In a centrifugal oil and water separator the force of gravity is one-thousand times greater than that of the coalescing plate pack separator or the petrol interceptor, so the separation is that much greater. Not only is the force of separation greater but there are fewer working parts so maintenance is much easier and cheaper. More advantages of the centrifugal oil and water separator include compact equipment size, versatility, ease of use, low cost, and high performance.

A high speed rotating (air)flow is established within a cylindrical or conical container called a cyclone. Air flows in a helical pattern, beginning at the top (wide end) of the cyclone and ending at the bottom (narrow) end before exiting the cyclone in a straight stream through the center of the cyclone and out the top. Larger (denser) particles in the rotating stream have too much inertia to follow the tight curve of the stream, and strike the outside wall, then fall to the bottom of the cyclone where they can be removed. In a conical system, as the rotating flow moves towards the narrow end of the cyclone, the rotational radius of the stream is reduced, thus separating smaller and smaller particles.

BLOCK DIAGRAM:

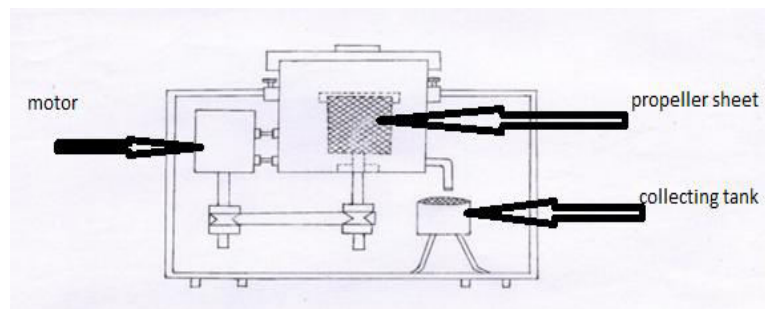


Figure4- Block diagram of Scrap oil separating Machine

ADVANTAGES:

- Its price is low cost for industries
- It will separated in few seconds
- The oil will used for re-cycling process also
- Floor area is less
- In this oil will be reused
- The scrap will be reused for many industrial

APPLICATIONS:

1. Its mainly found application in machine of single spindle lathe machine, multi spindle machine, CNC lathe machine, CNC milling machine, CNC drilling machine, CNC grinding machine, CNC thread Machine , CNC boring Machine, CNC counter boring Machine etc.,
2. It also found application automobile industries, aerospace texture, ship building etc.,
3. It is mainly used in manufacturing of auto component industries
4. Gun Drilling
5. Spring manufacturing

COST SAVING ANYALYSIS:

NO. Of Hours Per Day	2 Hrs = 120 minutes
Time Required for 1 Oil Recovery Operation	3 to 5 Minutes
No. Of Cycles Per Day	40 (120*3)
Chips Loaded Per Charge	4 kg
Chips Processed Per Day	240 kg(4*3)
Qty. Of Oil Recovered Per Charge	40ml
Oil Recovered Per Day	2 litre (40*0.04)
Cost Of Cutting Oil Per Liter	Rs.160
Savings Per Day Per Machine	Rs.320(4*160)
Savings Per Month(25 Days)	Rs.8000(320*25)
Savings Per Year	Rs.192000

Table 1: Cost saving analysis**CONCLUSION:**

The scrap oil separator is used for separating coolant oil from scrap by centrifugal phenomenon. This scrap oil separator is used for filtering the oil by removing the scrap of the machine process. This separator aims to save cost and reduced wastage oil consumption to increase the profit of industry. From The Table 1 the results shows that savings per year was estimated as Rs.192000. Hence we are suggested.

REFERENCE:

- [1]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 .
- [2]AwasthiAnshita and Srivastava Akansha works on "Oil Water Separation By Centrifugal Force". S-JPSET ISSN : 2229-7111, Vol. 7.
- [3]Devanagoudar Naveen V, Kumar Hemanth works on Fabrication of Oil Separator in Industry. International Journal of Science and Research (IJSR) ISSN (Online): 2319-7064 .
- [4]Design data book of engineers by PSG college-kalaikathirAchchagam Coimbatore Design of machine element by "V.B. Bhandari" of Tata McGraw, M. Ben-Daya,
- [5]. Christo Ananth,Dr. S. Selvakani,Dr. R. Latha,Dr. S. Pushpa, Dr. R. Kesavan, "Neck Cushion Based Alert System", Application number: 320692-001, Cbr number: 15490, Journal No.: 40/2019 , Journal Date: 04/10/2019, Indian Patents, Design & Trademark Office, 4th October 2019.
- [6]. S.W. Chiu, Y.P. An Economic Production Quantity Model withthe Steady Production Rate of Scrap Items, Journal of the Chaoyang University ofTechnology. 8, 1, 225-235, 2003.
- [7] Christo Ananth,Dr. J. Mahil,Dr. A. Anto Spiritus Kingsly,Stalin Jacob,Jenifer Darling Rosita,Niha K, "Touch Based Gear Locking", Application number: 320649-001, Cbr number: 15401, Journal No.: 41/2019 , Journal Date: 11/10/2019, Indian Patents, Design & Trademark Office, 11th October 2019.
- [8]. Y-S.P. Chiu, S.W. Chiu, Solving an EPQ Model with Rework andService Level Constraint. Mathematical and Computational Applications, 11, 1,75-84, 2006.
- [9]. S.W. Chiu and Y-S.P. Chiu, Mathematical modeling for production system withbacklogging and failure in repair, Journal of Scientific & Industrial Research. 65, 6,499-506, 2006.

- [10]. K.J. Chung, Bounds for Production Lot Sizing with Machine Breakdown, Computers and Industrial Engineering. 32, 139-144, 1997.
- [11]. P.A. Hayek and M.K. Salameh, Production Lot Sizing with the Reworking of Imperfect Quality Items Produced, Production Planning and Control. 12, 6, 584-590, 2001.
- [12]. H.L. Lee and M.J. Rosenblatt, Simultaneous Determination of Production Cycle and Inspection Schedules in a Production System, Management Science. 33, 1125-1136, 1987.
- [13]. J.J. Liu and P. Yang, Optimal lot-sizing in an imperfect production system with homogeneous reworkable jobs. European Journal of Operational Research. 91, 517-527, 1996.