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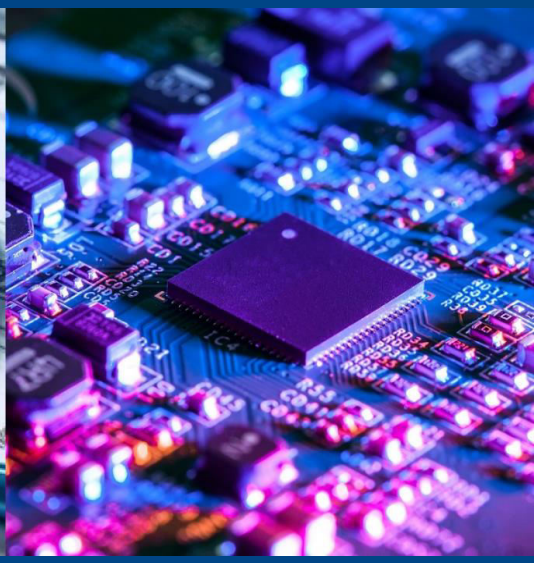

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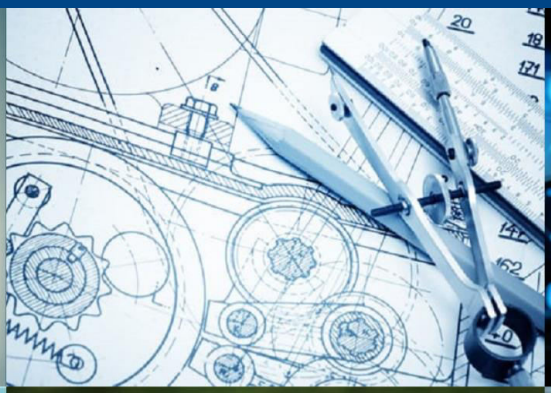

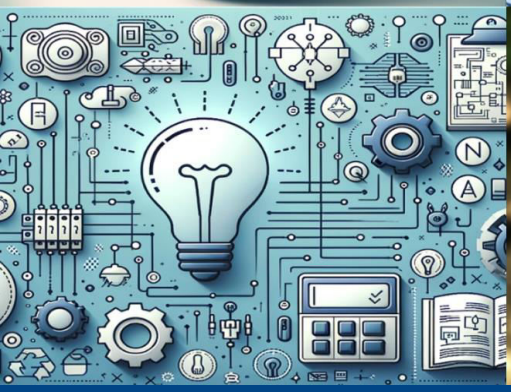

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Fabrication of Belt Type Oil Skimmer

Dr. R Rakesh, S Sanjay, I Nishwin Akash, Mohammed Ameen, Sankaranarayanan M

Associate professor, Dept. of Mechanical, Francis Xavier Engineering College, Tirunelveli, Tamil Nadu, India

UG Student, Dept. of Mechanical, Francis Xavier Engineering College, Tirunelveli, Tamil Nadu, India

ABSTRACT: A device used to extract floating oil from a liquid medium is known as an oil skimmer. Oil floats on the surface because it has a lower density than water. Water molecules are more attracted to each other than oil molecules since they do not mix. Our objective intends to build a belt type oil Skimmer due to the necessity of oil skimmer. Belt, bearings, engine, pulleys, shaft, and collecting tank are all included in the belt type oil Skimmer. Our project strives to ensure that the dimensions of the components are properly selected and designed, as well as that they are assembled correctly. With a tiny amount of water, the skimming medium runs over the water's surface, eliminating oil. The primary purpose of this produced skimmer is to filter water by eliminating various dirt oils and impurities. The skimmer is much economical and easier to manufacture than more expensive treatments like membrane filters and chemical treatments

I. INTRODUCTION

Oil is one of the precious crude and being used in many routine application of human life. Since most of the oils are toxic so quite dangerous for alive when it comes to direct contact with them. During the years of recent decades, world has witnessed many oil spillage tragedies and subsequent damage to alive and environments. Many countries has made stringent safety norms for waste water disposal contained with oils mainly typically from petrochemical and process industries so that such industries are equipped with such kind of oil skimmers to separate the oils from disposal water. The continuous removal of oil from process fluids; increases the life of the fluid; resulting of: a) Reduce the machine fluid refilling cost. b) Improves the disposal water quality.

Problem statement

Oil leakage in industries and reservoirs must be effectively managed. Oil is squandered, and the ecosystem is harmed as a result of the spill. It is necessary to segregate the oil that pollutes the environment. As a result, our study intends to achieve effective oil separation and collection in both domestic and industrial settings. In our project, we use a belt-type oil skimmer. The project's work entails the creation of the following components: 1. Shaft 2. Bearings 3. Pulleys (Driver, Driven) 4. Belt After the project is completed, the benefits will include efficient, portable equipment that may be employed in the affected areas.

II. MANUFACTURING PROCESS

Manufacturing processes are the steps through which raw materials are transformed into a final product. The manufacturing process begins with the creation of the materials from which the design is made. These materials are then modified through manufacturing processes to become the required part. Manufacturing processes can include treating (such as heat treating or coating), machining, or reshaping the material. The manufacturing process also includes tests and checks for quality assurance during or after the manufacturing, and planning the production process prior to manufacturing.

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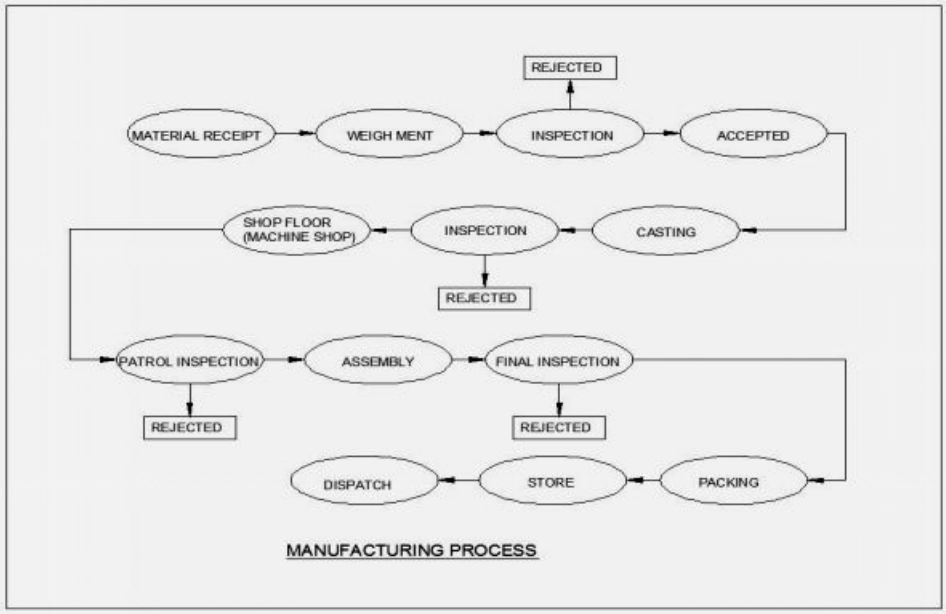
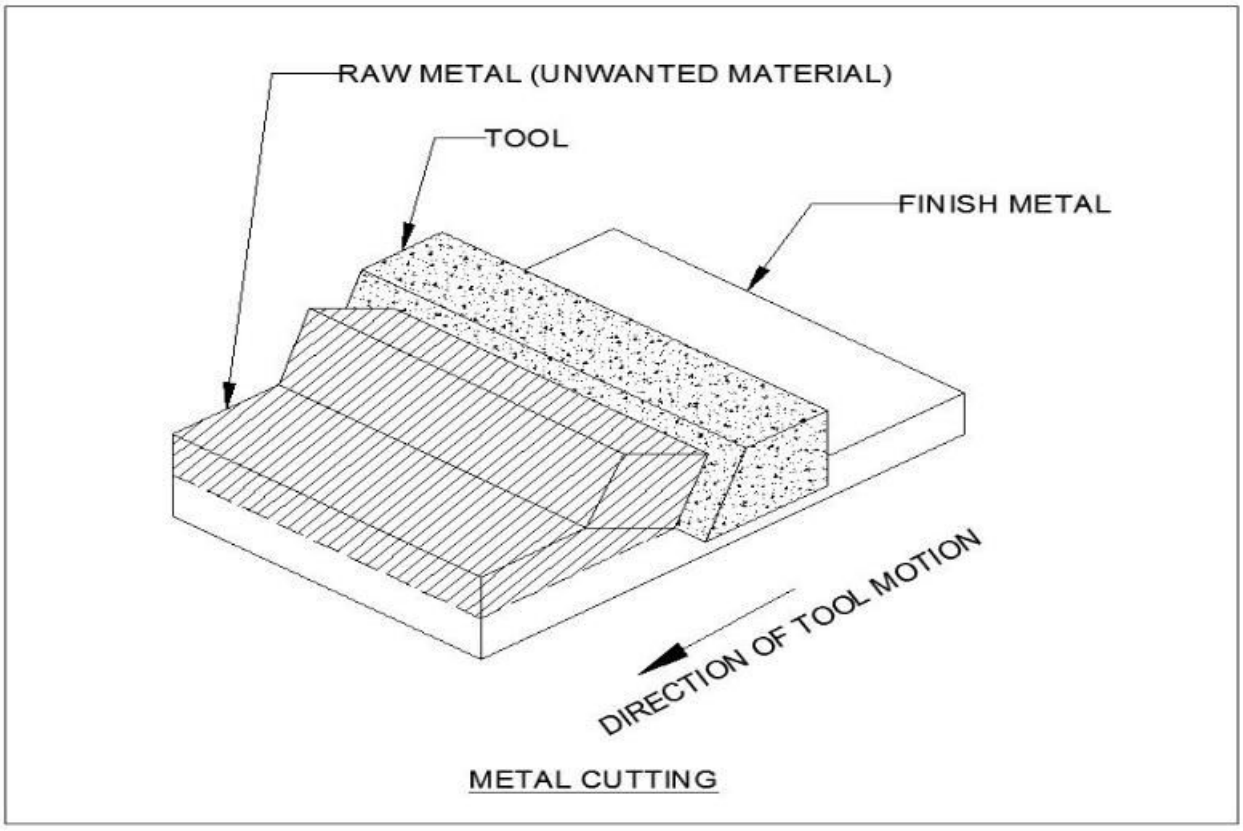


METAL CUTTING

Metal cutting or machining is the process of by removing unwanted material from a block of metal in the form of chips.



Cutting processes work by causing fracture of the material that is processed. Usually, the portion that is fractured away is in small sized pieces, called chips. Common cutting processes include sawing, shaping (or planning), broaching,

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drilling, grinding, turning and milling. Although the actual machines, tools and processes for cutting look very different from each other, the basic mechanism for causing the fracture can be understood by just a simple model called for orthogonal cutting.

In all machining processes, the work piece is a shape that can entirely cover the final part shape. The objective is to cut away the excess material and obtain the final part. This cutting usually requires to be completed in several steps – in each step, the part is held in a fixture, and the exposed portion can be accessed by the tool to machine in that portion. Common fixtures include vise, clamps, 3-jaw or 4-jaw chucks, etc. Each position of holding the part is called a setup. One or more cutting operation may be performed, using one or more cutting tools, in each setup. To switch from one setup to the next, we must release the part from the previous fixture, change the fixture on the machine, clamp the part in the new position on the new fixture, set the coordinates of the machine tool with respect to the new location of the part, and finally start the machining operations for this setup.

Therefore, setup changes are time-consuming and expensive, and so we should try to do the entire cutting process in a minimum number of setups; the task of determining the sequence of the individual operations, grouping them into (a minimum number of) setups, and determination of the fixture used for each setup, is called process planning.

These notes will be organized in three sections:

(i) Introduction to the processes,
(ii) The orthogonal cutting model and tool life optimization and
(iii) Process planning and machining planning for milling.

SAWING

Cold saws are saws that make use of a circular saw blade to cut through various types of metal, including sheet metal. The name of the saw has to do with the action that takes place during the cutting process, which manages to keep both the metal and the blade from becoming too hot. A cold saw is powered with electricity and is usually a stationary type of saw machine rather than a portable type of saw.

The circular saw blades used with a cold saw are often constructed of high speed steel. Steel blades of this type are resistant to wear even under daily usage. The end result is that it is possible to complete a number of cutting projects before there is a need to replace the blade. High speed steel blades are especially useful when the saws are used for cutting through thicker sections of metal.

Along with the high speed steel blades, a cold saw may also be equipped with a blade that is tipped with tungsten carbide. This type of blade construction also helps to resist wear and tear. One major difference is that tungsten tipped blades can be re-sharpened from time to time, extending the life of the blade. This type of blade is a good fit for use with sheet metal and other metallic components that are relatively thin in design.

WELDING

Welding is a process for joining similar metals. Welding joins metals by melting and fusing 1, the base metals being joined and 2, the filler metal applied. Welding employs pinpointed, localized heat input. Most welding involves ferrous-based metals such as steel and stainless steel.Weld joints are usually stronger than or as strong as the base metals being joined.

Welding is used for making permanent joints. It is used in the manufacture of automobile bodies, aircraft frames, railway wagons, machine frames, structural works, tanks, furniture, boilers, general repair work and ship building.

OPERATION

Several welding processes are based on heating with an electric arc, only a few are considered here, starting with the oldest, simple arc welding, also known as shielded metal arc welding (SMAW) or stick welding. In this process an electrical machine (which may be DC or AC, but nowadays is usually AC) supplies current to an electrode holder which carries an electrode which is normally coated with a mixture of chemicals or flux. An earth cable connects the work piece to the welding machine to provide a return path for the current. The weld is initiated by tapping ('striking') the tip of the electrode against the work piece which initiates an electric arc. The high temperature

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generated (about 6000°C) almost instantly produces a molten pool and the end of the electrode continuously melts into this pool and forms the joint.

The operator needs to control the gap between the electrode tip and the work piece while moving the electrode along the joint.

In the shielded metal arc welding process (SMAW) the 'stick' electrode is covered with an extruded coating of flux. The heat of the arc melts the flux which generates a gaseous shield to keep air away from the molten pool and also flux ingredients react with unwanted impurities such as surface oxides, creating a slag which floats to the surface of the weld pool. This forms a crust which protects the weld while it is cooling. When the weld is cold the slag is chipped off. The SMAW process cannot be used on steel thinner than about 3mm and being a discontinuous process it is only suitable for manual operation. It is very widely used in jobbing shops and for onsite steel construction work. A wide range of electrode materials and coatings are available enabling the process to be applied to most steels, heat resisting alloys and many types of cast iron.

DRILLNG

Drilling is a cutting process that uses a drill bit to cut or enlarge a hole of circular cross-section in solid materials. The drill bit is a rotary cutting tool, often multipoint. The bit is pressed against the workpiece and rotated at rates from hundreds to thousands of revolutions per minute. This forces the cutting edge against the workpiece, cutting off chips (swarf) from the hole as it is drilled.

OPERATION

The geometry of the common twist drill tool (called drill bit) is complex; it has straight cutting teeth at the bottom – these teeth do most of the metal cutting, and it has curved cutting teeth along its cylindrical surface. The grooves created by the helical teeth are called flutes, and are useful in pushing the chips out from the hole as it is being machined. Clearly, the velocity of the tip of the drill is zero, and so this region of the tool cannot do much cutting. Therefore it is common to machine a small hole in the material, called a center-hole, before utilizing the drill. Center-holes are made by special drills called center-drills; they also provide a good way for the drill bit to get aligned with the location of the center of the hole. There are hundreds of different types of drill shapes and sizes; here, we will only restrict ourselves to some general facts about drills.

Common drill bit materials include hardened steel (High Speed Steel, Titanium Nitride coated steel); for cutting harder materials, drills with hard inserts, e.g. carbide or CBN inserts, are used;

In general, drills for cutting softer materials have smaller point angle, while those for cutting hard and brittle materials have larger point angle;

If the Length/Diameter ratio of the hole to be machined is large, then we need a special guiding support for the drill, which itself has to be very long; such operations are called gun-drilling. This process is used for holes with diameter of few mm or more, and L/D ratio up to 300. These are used for making barrels of guns;

Drilling is not useful for very small diameter holes (e.g. < 0.5 mm), since the tool may break and get stuck in the work piece; - Usually, the size of the hole made by a drill is slightly larger than the measured diameter of the drill – this is mainly because of vibration of the tool spindle as it rotates, possible misalignment of the drill with the spindle axis, and some other factors;
For tight dimension control on hole diameter, we first drill a hole that is slightly smaller than required size (e.g. 0.25 mm smaller), and then use a special type of drill called a reamer. Reaming has very low material removal rate, low depth of cut, but gives good dimension accuracy.

INSPECTION

Critical appraisalinvolvingexamination, measurement, testing, gauging, and comparison of materials or items. An inspection determines if the material or item is in proper quantity and condition, and if it conforms to the applicable or specified requirements. Inspection is generally divided into three categories: (1) Receiving inspection, (2) In-process inspection, and (3) Final inspection. In quality control (which is guided by the principle that "Quality cannot be

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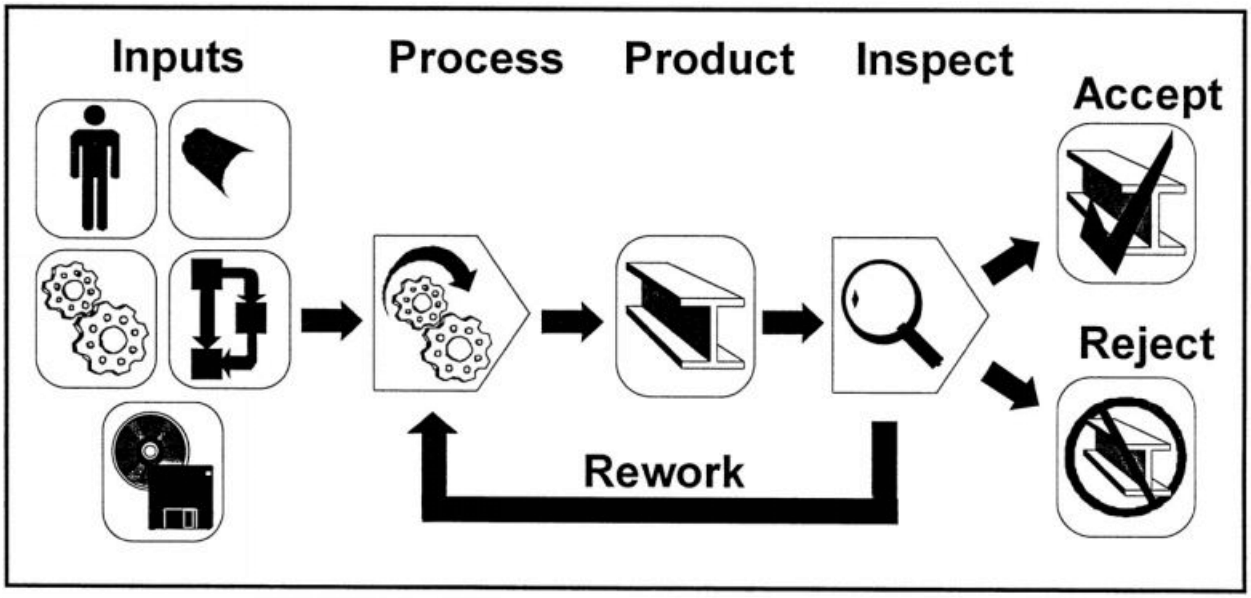
inspected into a product") the role of inspection is to verify and validate the variancedata; it does not involve separating the good from the bad.



ASSEMBLY

An assembly line is a manufacturing process (most of the time called a progressive assembly) in which parts (usually interchangeable parts) are added as the semi-finished assembly moves from work station to work station where the parts are added in sequence until the final assembly is produced. By mechanically moving the parts to the assembly work and moving the semi-finished assembly from work station to work station, a finished product can be assembled much faster and with much less labor than by having workers carry parts to a stationary piece for assembly.

III. WORKING PRINCIPLE

As the BELT rotates, oil adheres to the belt surface separating it from the water. Oil is wiped from the belt surface and drained into the collection trough. In a full size skimmer the oil would be pumped or sucked out to a remote containment location. Floating oil cling to skimming media more readily than water, and water has little affinity for the media. This allows skimming media in the shape of a belt, etc. to pass through a fluid surface to pick up floating oil with very little water. This oily material is subsequently removed from the media with wiper blades or pinch rollers. Design of the proposed skimmer. An oil skimmer is a device used to remove oil floating on the surface of a liquid, such as a pond, River, or ocean. The oil skimmer typically consists of a belt conveyor, which is a continuous loop of material that moves along a set of rollers. Here is a general outline of the procedure for using an Oil Skimmer with a belt conveyor: • Preparation: Before starting the skimming process, ensure that the area you are working in is safe and that the oil skimmer is properly set up and connected to a power source. • Start the belt conveyor: Turn on the motor that drives the belt conveyor. The belt should start moving along the rollers. • Adjust the speed of the belt conveyor: If necessary, adjust the speed of the belt conveyor so that it is moving at an appropriate speed for the conditions. The speed of the belt conveyor will affect how much oil is removed from the surface of the liquid. Lower the skimming unit: Slowly lower the skimming unit into the liquid until it is just below the surface. The skimming unit should be positioned so that it is touching the surface of the liquid and the belt conveyor is partially submerged. • Start skimming: Once the skimming unit is in place, the belt conveyor will start collecting oil from the surface of the liquid. As the belt moves along the rollers, the oil will adhere to the Surface of the belt. • Remove the collected oil: As the oil is collected on the surface of the belt, it will eventually reach the end of the conveyor. At this point, the oil can be removed from the belt and disposed of Properly. • Repeat the process: Repeat the above steps as necessary until you have removed as much oil from the surface of the liquid as you need to

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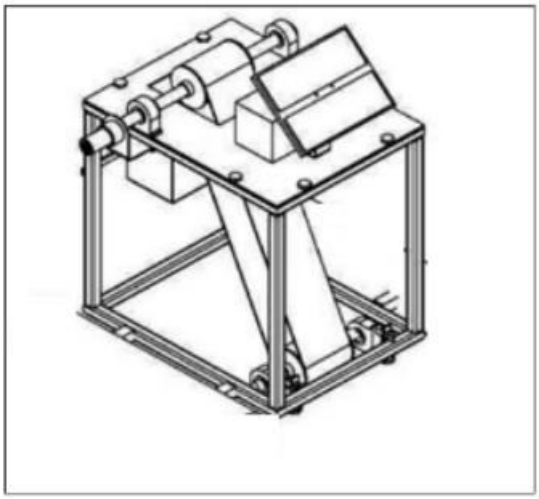
IV. 2D DRAWING



V. CONCLUSION

From the above literature survey, we have studied various types of oil skimmer used in various fields of applications. We have to develop the oil skimmer for the sugar industry, where oil removal load to be handled by oil skimmer is not that heavy as compared to some other field of applications. From the study of this review, we got to study about the belt type oil skimmer, its configuration and area of application. As a result, we decided to employ belt-type oil skimmer in the proposed sugar industry. Sugar industry requires the simple mechanism as compared to the types discussed above in review to remove oil from effluent. It has optimum efficiency as per the requirement of the sugar factory. If placed before an effluent treatment system an oil skimmer may give greater overall oil separation efficiency with improved wastewater quality. It helps to increase efficiency and industrial growth of industries where water pollution is a serious issue.

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