DESIGN AND DEVELOPMENT OF ROTARY ACCUMULATOR

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Abstract : A rotary conveying, accumulating and qualifying mechanism to accommodate articles of various shapes. In our case bearing cup. Our aim is to design and develop rotary accumulation table consisting of round table made of ultrahigh molecular weight nylon(polyethene). It also consist of Asynchronous motor and the power will be transmitted with the help of chain drive. It acts as a buffer or accumulator when input feed is greater than output feed also helps in arranging and stacking of finished products. It acts as a buffer or accumulator when input feed is greater than output feed also helps in arranging and stacking of finished products. A stand-alone parts accumulator that can be retrofit as a unitary add-on to an existing production line. The prototype is to be made in same scale (1:1) of the actual model in order to save cost and also prove effectiveness of process. The variable frequency drive will be used to control the speed and torque of the motor by varying motor input frequency and voltage. The turntable used in industries is of ultrahigh molecular weight nylon(polyethene)material, since this material is quite expensive hence for our 1:1 model we will using acrylic , also support is made of extruded aluminium which will be replaced by mild steel. A lid will be attached to the central overhead bridge which is connected to a sensor, and if the lid is raised during the operation the system comes to a halt and thereby ensuring safety of the worker. Further improvements in the working of the prototype will be our objective and also the improvement in the actual number of components coming out. Additionally the various types of materials used in manufacturing and their effect on our prototype will be analyzed.

I. INTRODUCTION

In an assembly line, we have often seen that due to some malfunction of any unit in an assembly line the production rate is altered. Thus by making use of this table, it will accommodate time for the worker or technician to rectify and give solution to the problem faced. It will accumulate the product until the fault is rectified hence there will be no alteration in production. Rotary tables, also referred to as accumulation table or unscrambling table, were designed to support a variety of conveyor system requirements. They are often used with round containers, such as bottles, to accumulate or unscramble bulk, so that they can be discharged in a single file line, In our case bearing cups. Rotary tables enable the collation and accumulation of products from conveyor lines and packing areas creating a buffer zone on a low speed line and also providing accumulation at the end of a production line. Ideal for areas that are not large enough or not suitable for an automated system.

3.1 Sample Size

For the results 20 set of repeated operations were performed in order to obtain the final result. Each operation contained the minimum and the maximum range of operations by virtue of experiments.

3.2 Data and Sources of Data

For this study we collected data from the industry which we worked at and the ideas obtained through industry experimentation and expertise.

Equations

Number of cups that will be occupied = $\frac{circumference\ of\ turntable}{daimeter\ of\ bearing\ cup}$

$$= \frac{2\pi R}{D} + \frac{2\pi(R-D)}{D} + \frac{2\pi(R-2D)}{D} + \cdots + \frac{2\pi(R-8D)}{D}$$

I. RESEARCH METHODOLOGY

Modes of operation: The product can be used in broad based industries which increases the scope of product. The use of Ultra High Density molecular Nylon as the base plate material enabled us to provide high abrasion resistance to mirror finished products as well as use in pharmaceutical industry which requires materials that do not react with the environment or the products, The Rotary Accumulator can also be used in Food Industry which enables us to use the same product in a variety of industries without changing the overall design or materials of the Rotary Accumulator.

3.2 Data and Sources of Data

For this study data was collected from various journals and industry expertise having practical knowledge in Automation field and mass production.

3.3 Theoretical framework

For starting the design, we got input as diameter of cup. Then we calculated the number of cups that can accommodate on the table due to centrifugal force the cups will be arranged circumferentially from where it goes for corresponding operation. the next step was the calculation of the total mass the components involved are turn-table flapper to guide the product support where the flapper is pinned. thus the total mass was calculated .the mainly concerned mechanism is the speed of the turntable. the speed has to be accordingly selected because if the speed is increased more than the desired the components will be thrown out and we will not get the products at output. motor selection is a challenging part as by the torque and power to be consumed we selected appropriate motor after considering all the losses. since the angular speed of table is very low we reduced the speed coming from motor through chain mechanism. thus chain drive was designed accordingly. next part is the bearing design to determine life of bearing before it fails. lastly the frame which accommodates the entire project was designed successfully from aesthetic point of view thus material was so chosen. For easy transportation and mobility we implanted castor wheels with levelling mount on it

IV. RESULTS AND DISCUSSION

4.1 Results of Descriptive Statics of Study Variables

Table 4.1: Descriptive Statics

Speed	Output
6	6
7	6
8	7
9	7
10	8
11	8
12	9

The Final product which we delivered at the industry enabled them to increase the scope of use and any kind of mass scale assembly involving a single type of product, we can use the Rotary Accumulator. This also enabled the industry to use the same product for the different kinds of customers having their own industrial needs without major modifications every time the customer approaches. Just by setting the lever positioning and the range of LVDT in the Computer (Depends if the product is hollow or not). We can vary the variety of products that can be used from industry to industry.

Figures

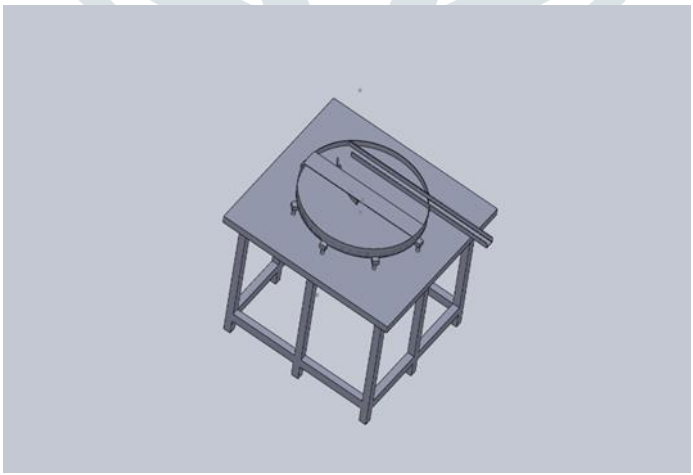

Table 1 Table Type Styles

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