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Automation for Teflon Washer Deburring Process

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ABSTRACT: As per survey, deburring operations in washer industries have traditionally been done using manual or semi-automated methods. Manual deburring is typically done with hand tools such as files, burring tools and deburring wheels. Semi-automated methods use power tools such as belt grinders and rotary burr tools.

As per our industrial survey in 'Hindustan Polymer' Teflon and carbon washer manufacturing industry, we found that this industry produces washers in mass quantity. But the current deburring process is manual. That impacts the overall production time and labour cost.

Automatic Teflon Washer Burr Removing Machine will be helpful to overcome above situation as the machine will have Three main systems namely feeding, machining and ejection. Feeding washers in certain quantity will help to labour to do another productive work. Automatic machining will reduce deburring time and precise deburring. Ejection will done and washers will be collected in stack form. Coordination of these three systems will be achieved by integrating these systems with microcontroller.

KEYWORDS: Deburring operation, Teflon washer, Microcontroller, feeding, machining, ejection

I.INTRODUCTION

Teflon washers are flat discs with a centrally located hole that are made of PTFE. Teflon washers are used in a wide variety of applications due to their excellent chemical resistance, non-stick properties, and high temperature tolerance. Hindustan Polymer is a manufacturer of PTFE (polytetrafluoroethylene) products, including Teflon washers. The company is located in Sawantwadi, Maharashtra, India. Hindustan Polymer has been in business since 2003 and offers a wide range of PTFE products

As per our survey, we found that burr is a raised edge of material that is left behind on a machined or moulded part. Burrs can be caused by a variety of factors, including the machining or moulding process, the type of material being machined or moulded, and the cutting tools used.

Burrs can have a negative impact on the performance of Teflon washers in a number of ways. For example, a burr on the edge of a Teflon washer can cause the washer to leak, which can lead to problems such as fluid contamination or loss of pressure. Additionally, a burr on the sealing surface of a Teflon washer can prevent the washer from forming a tight seal, which can also lead to leakage.

Burrs can make Teflon washers look less appealing and reduce their overall quality. Burrs can cause delays in the production process and increase the cost of manufacturing Teflon washers. Burrs can be sharp and can cause injury to workers who are handling Teflon washers.

To avoid the negative effects of burrs on Teflon washer manufacturing, it is important to take steps to remove burrs from Teflon washers after they have been machined or moulded. This can be done using a variety of methods, such as deburring tools or brushes or abrasive materials.



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Manual deburring of Teflon washers in this industry is a simple and inexpensive process, but it can be time-consuming and labour-intensive. For high-volume production applications of this industry, automated deburring methods are profitable

II. ANALYSIS OF INDUSTRIAL SURVEY





Fig II.1) Teflon Washers (Product)





Fig II.2) Current deburring process

A] Outcomes of Industrial Survey for current deburring process

As per conduction industrial survey in 'Hindustan Polymer' which is manufacturer of Teflon and carbon washers. During the processing of Teflon washers there is problem of generation of burr at inner diameter of washer. So, before transferring for inspection there is need of cleaning of each washer to make it burr free as a final product.

At this stage burr is removed from each washer manually with the help of two additional labor with rate 800 washers per hour (6400 per day).

So, this process is time consuming and increases labor cost in production. The company's target is to produce 10,000 washers/day which is not possible manually at current situation.

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B] Problem Statement

Therefore, there is need of developing a system which perform deburring operation on Teflon washers by automatic feeding and collecting in stack form.

III. METHODOLOGY

A] Objectives

- 1. Develop feeding system for feeding Teflon washer in certain quantity
- 2. Develop machining system for deburring operation
- 3. Develop ejection system for collection of washers
- 4. Integrate feeding, machining and ejection system with microcontroller

B] Block Diagram



IV. DETAILED PROCESS



Fig IV.1) Detailed Process

There will be 3 main systems i.e., feeding, machining and ejection. For feeding system, washers in certain quantity will be feeded through vertical hollow pipe in stack form. That will reduce feeding time of worker. Feeded washers will be oriented in vee of indexing mechanism. Then oriented washer will pass to machining system by indexing mechanism which will work on screw drive.

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Machining system will have clamping system, tool and machining system. Oriented washer from feeding system will be clamped in machining system. Then tool will come downside and will do deburring operation on washer with respect to specified edge. Deburred washer should be ejected for inspection and packaging. Indexing system and ejection system will work combine for collection of deburred washers in stack form.



Fig IV.2) Working Principle

It will consist of an indexing plate coupled to the stepper motor shaft. Indexing plate consist of 'Vee' in which circular washer will fit. Deburring tool will be attached to dc motor shaft. There will be provision to remove used tool and insert new manually. DC motor will be connected to solenoid actuator. Solenoid actuator gives linear reciprocating motion which can be controlled by Arduino. Washers will be feeded in stack form. As the stepper motor shaft rotates single washer will be controlled by Arduino. Deburring tool will move in down motion and it will remove burr produced at inner side of washer. Solenoid actuator will operate in up direction. That washer will be again indexed by stepper motor and ejection will be done at next step. All these operations, movements will be controlled by Arduino.

V. CONCLUSION

In this paper, a survey outcome about deburring process of Teflon washers in manufacturing industry and a basic mechanism to develop an automatic Teflon washer deburring machine is presented. As the time required to deburring washers manually is more, systems in machine will be automatic so, it will save time and also labour expense. Worker will be able to do another productive job in that time.

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