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Automation in Burr Removal Techniques

Sohail S Sayyed[1], Naazneen A Pathan[2], Rahul Y Sutar[3], Aparna B Gangane[4], Prof.R.S.Gorde[5]

[1-4]Students, [5]Head of Department
Dept. of Mechanical Engineering, JSPM's Jayawantrao Sawant Polytechnic Hadapsar Pune -411028

Abstract – *From literature we have observed that one of the concerns in Die Shop is Burr collection and Burr Disposal Technique. The technique mainly uses various types of conveyors. Manual Burr removal method is also seen in the die shop. But manual burr removal method can be a headache or major accidental concern to the workers. By our observation the burr produced from machines (both CNC & HSM) gets collected near the machine by their respective conveyors & then the overall burr from all machines together .To reduce this effort there is scope for designing any kind of system for burr management. Electromagnet can also be used to collect all burr particles. This system is safe for human damage. Many of the costs incurred due to deburring come from the labor time involved in the process. In certain circumstances it is necessary to dismantle assemblies after drilling in order to remove any burrs, this significantly increases cycle times. Alternatively, if automated deburring is being used, it requires an extra process step leading to increased cycle times and increased cost. For applications that require exceptional precision and cleanliness, any displaced metal can cause critical and potentially hazardous situations. Future work can be made by using different techniques, different size of motor, various size of magnet and alignment of total structure of system.*

Keywords- ***Electromagnet, V-Grooved Pulleys, Nylon Rope, Frame, Motor, Condenser, Wiring, Switches.***

INTRODUCTION

As an advanced manufacturing technology which has been developed rapidly in recent years, high speed machining is widely applied in many industries. The chip formation during high speed machining is a complicated material deformation and removing process. In research area of high speed machining, the prediction of chip morphology is a hot and difficult topic. A finite element method based on the software ABAOUS which involves Johnson-Cook material model and fracture criterion was used to simulate the serrated chip morphology and cutting force during high speed machining of AISI 1045 hardened steel. The serrated chip morphology and cutting force were observed and measured by high speed machining experiment of AISI 1045 hardened steel. The effects of rake angle on cutting force, saw tooth degree and space between saw teeth were discussed. The investigation indicates that the simulation results are consistent with the experiments and this finite element simulation method presented can be used to predict the chip morphology and cutting force accurately during high speed machining of hardened steel. Burrs are one of the most serious obstacles to precision manufacturing and manufacturing process automation. Burrs are formed in various machining process as a result of plastic deformation due to plasticity during mechanical manufacturing process and have been defined as undesirable projections of material beyond the edge of a work piece. Recently, the trends of machined parts move towards more miniaturization and precision, burrs cause many problems during inspection, assembly, and manufacturing automation of precision components. Burrs have to be removed by a debarring process for functional and aesthetic reasons after the part is machined. However, debarring processes are usually not very precise and may decrease the precision of the machined parts, damage surface finish, and produce residual stresses in the component. Moreover, adding a debarring process means extra cost, extra manufacturing time, and an extra machining station. Gillespie found that on precision components, debarring operations can account for as much as 30% of the total part cost. Since burr generation in cutting cannot be avoided completely, it is very important to find a solution for minimizing the burr formation or more effective debarring method. It is also necessary to understand the burr formation mechanism and the relationship between the parameters

involved in the machining operation and burr formation. A thorough analysis of mechanism of burr formation may improve the quality of the machined parts greatly and thus be critical. A great deal of research has focused on the development of more efficient debarring techniques to reduce the cost of debarring. In contrast, only a few studies have been carried out on the mechanisms of burr formation and the influence of cutting parameters to assist in the reduction of burrs and the production of burr-free components. Gillespie identified the machining burrs into four specific types based on the mechanism of their formation: Poisson burr, rollover burr, tear burr, and cutoff burr.

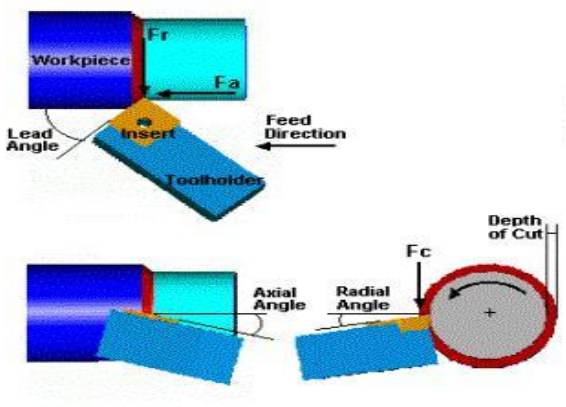

Fig- Metal Cutting

In order to clarify the effects of tool and work piece geometry on burr formation, it is desirable to simulate, as closely as possible, these types of stress fields along the work piece edge for various tool and work piece geometry combinations. Co and Downfield proposed a quantitative model of burr formation for ductile materials in orthogonal machining. Later, Co and Downfield proposed a new model that caters for both ductile and brittle materials in orthogonal cutting. Chern extended Ko and Cornfield's model of burr formation with more realistic machining operations and cutting conditions. According to his observation, four different types of burrs—knife-edge, curl, wave, and secondary burr—were formed with variations in depth of cut and in-plane exit angle. The manufacturing processes efficiently and smoothly, especially in today is unmanned machining systems. In machining short broken chips are desired because unexpected long chip may damage the finished work piece Surface may cause the inserts broken, or even hurt the operator.

Burr Removal with the help of Electromagnet (Model Based Project)

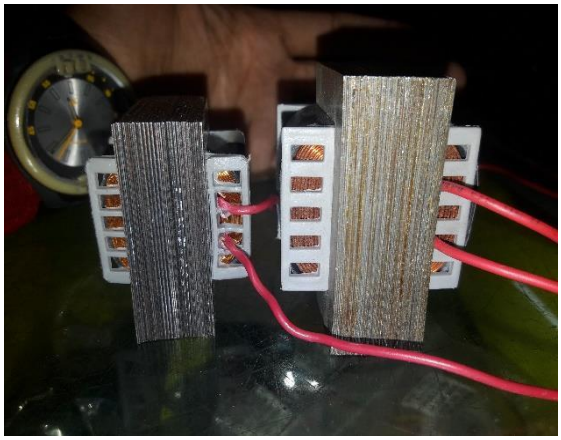

Fig- Electromagnets

Electromagnet is one of the world's most technologically sophisticated industries & is often viewed as a research test bed to stimulate innovation in areas of interest to the manufacturing / automotive industry. A soft-iron core that is magnetized by passing a current through a coil of wire wound on the core. Electromagnets are used to lift heavy masses of magnetic material and to attract movable magnetic parts of electric devices, such as solenoids, relays, and clutches. The difference between cores of an electromagnet and a permanent magnet is in the retentively of the material used. Permanent magnets, initially magnetized by placing them in a coil through which current is passed, are made of retentive (magnetically "hard") materials which maintain the magnetic properties for a long period of time after being removed from the coil. Electromagnets are meant to be devices in which the magnetism in the cores can be turned on or off. Therefore, the core material is no retentive (magnetically "soft") material which maintains the magnetic properties only while current flows in the coil.

CONSTRUCTION OF MODEL

Fig Experimental Setup

We have innovated a new method of automatic burr removal using a electromagnet as a working factor. The operation is trouble free due to better construction material of the component and their metallurgical control. The plan requires less space for installation, manufacturing and designing of suitable machining for it's appliances. The Automatic burr remover should be such that it's operation should be simple it's should work with minimum economic input with it's low depreciation cost. In our project, first we took a inside crane which is utilized in the industries on production line. on that board we have constructed a whole mechanism laterally we constructed a whole mechanism. On both lateral side of machine we fixed a rotary rods. These rods have pulley which rotates with it's own axis. Another movement is the suitable diameter rods on which we tight ally mount electromagnet as per our requirement. This has led to new set of goal for this new kind of project course one of the important goals remains this development of usual facts but it is no longer the major one more important i.e. on increased understanding at the principals understanding intelligent behaviours . A typing starting is modelling of some aspects of system. A set of design principles as a theoretical frame work for understanding intelligence scheme desirable for number of reasons first at least at the movement there do not seen to any real alternatives. In our project transmission is the more important part and it is necessary is to work noisy. Relative motion is produces by motor. Now we introduce and attachment for machine to overcome said errors in convention machines. Here we have tried to implement pulley transmission which gives higher accuracy.

The basic principle that has to be taken into account for the attachment on machine is the conversions of rotary motion into intermitted motion. The pulley transmission gives higher accuracy. In this two rods are attached laterally and rods axis are parallel to each other. Because of this our machine gives high efficient work and easy to transfer motion between pulley without slipping of belts. In mechanism the intermitted rod do not rotate with it's own axis it is stable only it is vertical and reciprocates horizontally. The mechanical power produced by prime over is used to drive various machines in the industries. A transmission system is the mechanism with deals transmission of the power and motion from prime mover to shaft or from one shaft to another shaft. The rotary motion of the one pulley is transmitted to the operative working or auxiliary motion. When the motion is rotary the transmission takes place through mechanism that transfer rotary motion from one shaft one shaft to another. The right side rod is rotated by motor and by pulley transmission left side is rotated and by both left and right side rotated and by both left and right side rod provide intermitted motion to middle rod which is on machine.

ADVANTAGES

- Plants and components produced and installed by A- D are usable in all metal-cutting plants.
- Their infinite flexibility and the extremely little space required for the whole pipe system provide a safe, fast and clean method of chip disposal.
- The small dimensions of the pipe system allow the chip disposal to be used in any desired area. In the machine standstills, pollution of the working areas and danger of injury through the chips can be avoided.
- No trolleys or other transportation vehicles are necessary. Moreover, inflexible and fixed conveyors or scrapers, fitted in the floor, no

DISADVANTAGES

- High voltage electric supply is required. This machine is not shock proof .
- Electric fluctuations can also damage the system
- One part damage can stopes the whole system

APPLICATIONS

- In lathe machine industries.
- In automobile industries
- In metal cutting industry.
- In surface finishing

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CONCLUSION

Manual Burr handling is totally eliminated .The Automation concept allows great flexibility regarding amendments and re-arrangements. Reduction in manufacturing cycle time which results into high productivity rate. Tool wear reduces due to continuous burr removal procedure, as a result of this high machining accuracy is obtained. Henceforth we get high quality products. Fast and Safe Chip removal is achieved by installing Automated system over conventional.

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