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Manufacturing of Chamfering and Deburring Unit Using Lathe Attachment

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Abstract— This paper explores the description of special purpose unit made from a cylindrical grinding attachment of lathe machine to perform chamfering and deburring operation on workpieces of various sizes. Chamfering and deburring operations are necessary for many industrial products in order to keep the edges from being damaged and also to remove sharp edges. The other advantages of chamfering and deburring are high quality finish of the product, safer material handling, increased personal safety. Conventional methods used for these operations consume major machine setting time and also requires skill. Manufacturers are turning to special purpose units to achieve consistent results and to reduce other machine engagement times and to lower costs. Considering all the aspects, a special portable unit is made from existing grinding attachment. Chamfer of acceptable quality having required depth can be achieved. Angle can be set as 45° ±15°. The advantage of this unit in terms of reduction in process time and less skill while maintaining quality of chamfer is justified by practical trial observations.

Keywords— Chamfer, Deburr, Lathe Attachment, Cylindrical Grinding, Beveling, Finishing, Special purpose unit

INTRODUCTION

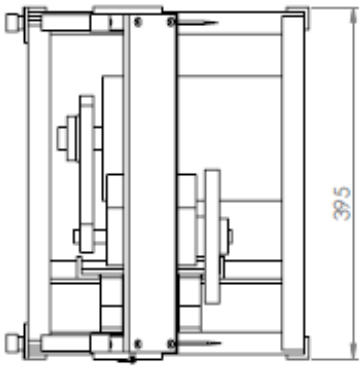
Chamfering and deburring, two terms used in manufacturing process of finishing machined parts. Chamfering means to make a bevel and deburring is to remove any rough ridges, sharp edges or areas from a part after shaping. Chamfering is a finishing process which removes excess material that remains on the metal part after manufacturing. It is an important step which ensures that part falls within specifications. Deburring removes sharp edges, imperfections that can interface with function of a part. Chips may break off during operation causing damage to other parts and injuries. Till today hand finishing is more common but our aim is to provide manufacturer a consistent result with lower cost with the help of this unit. As chamfering and deburring are labor intensive, they are expensive steps that increase the total cost of the product. Hand finishing though common, can be inaccurate and inconsistent furthermore if part does not meet specification reworking will be necessary. Here a quick and easy unit is manufactured which avoids time consuming steps such as material handling, fixing of fixtures, need of skilled manpower for chamfering and deburring purpose.

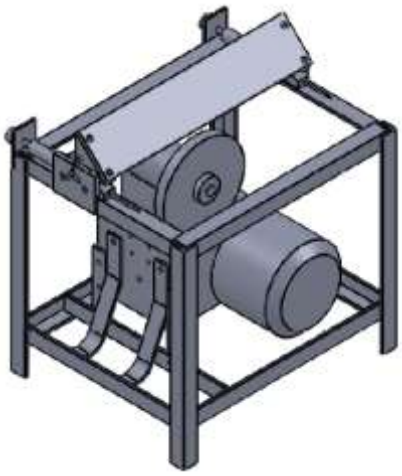
UNIT DESCRIPTION

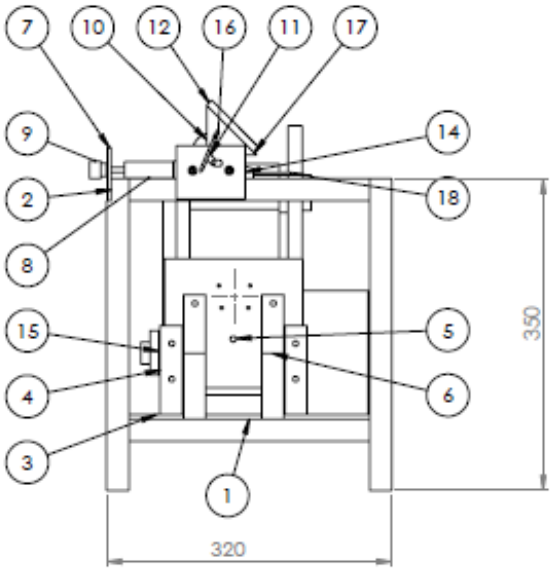
The weight of the attachment is around 20 kg. For the carrying this load, M.S. Angle of size 25x25x5 mm was selected from standard sizes. M.S. Angles are widely used in engineering works, construction work. They are strong and durable. To take the load of attachment as well as the frames, welding was done to make the overall structure robust and to minimize the vibrations. The outer dimensions of the motor unit are 230x260x300 mm. By keeping suitable clearance on all sides for belt drive and wiring box and grinding wheel, overall size of the unit was decided as 395x320x350. Clearance of 80 mm is kept on each side of the motor along length and clearance of 30 mm each is kept on belt side and wheel side along breadth.

The plate **5** is fastened to the attachment by using nuts and bolts. Now two vertical supports **4** are fastened to the plate **5**. The attachment along with fastened plate **5** and vertical supports **4** into the bottom frame **1** is now put inside the box structure. The attachment is now mounted on the horizontal angle **3** by nuts and bolts. The attachment is pulled towards the horizontal angle **3** side and inclined support **6** are fastened. This completes the bottom subassembly**.** Top sheet metal cover is now fastened to the top frame. Screws are inserted into the screw guide plate **7** and jams nuts are added by keeping small clearance between the jam nuts and screw guide plate **7**. Then screw guide plate **7** is fastened to the top frame. Crescent support block **8** are kept on to the top frame, motion screws **9** are inserted into the cylinders. Stopper **17** is attached to the rest plate **12**. Rest plate **12** is fastened to the prism **11**. Prism **11** is then fastened to the crescent **10**. Now this is kept in the slot provided on the crescent support block **8**. Angle adjust plate **14** and angle adjust plate2 **13** are fastened to the top frame. This completes the top subassembly. Two linear scales are fastened to the top frame at their positions. Sheet metal box is now fastened to the whole unit.

UNIT DETAILS







ITEM NO.	PART NUMBER	QTY.
1	BOTTOM FRAME	2
2	COLUMN	4
3	HORIZONTAL ANGLE	1
4	VERTICAL SUPPORT	2
5	PLATE	1
6	INCLINED SUPPORT	2
7	SCREW GUIDE PLATE	2
8	CRESENT SUPPORT BLOCK	2
9	MOTION SCREW	2
10	CRESCENT	2
11	PRISM	2
12	REST PLATE	1
13	ANGLE ADJUST PLATE2	1
14	ANGLE ADJUST PLATE	1
15	MOTOR	1
16	ANGLE POINTER	1
17	STOPPER	1
18	POINTER	3

WORKING PRICIPLE

The workpiece to be chamfered is supported by a rest plate with stopper. The required angle can be set using angle adjustment provision. The workpiece is then touched to the grinding wheel and required depth is set using forward motion screws and scale. Now, the chamfer can be cut by sliding the workpiece from one side to the other.

OPEARTING PROCEDURE

Workpiece to be chamfered is kept on the rest plate. Workpiece is supported by a stopper provided on the rest plate. Rest plate is moved forward or backward by turning motion screws so that the edge of the workpiece just touches the grinding wheel. Subassembly can be moved forward by turning the knobs attached to motion screws in anticlockwise direction. 0.5 mm depth of chamfer is set by

turning the knobs anticlockwise. This depth can be measured using linear scale and pointer arrangement provided on the top frame. Required depth can be achieved by multiple passes. Crescent can be rotated by loosening the cap bolt provided on the angle adjust plate. Crescent rotates freely in the slot given in the crescent support block. Angle can be read by aligning the angular pointer with the markings. The subassembly can be held in this position by tightening the bolt given on the side plate. Now the motor is turned on. Vibrations, if any, can be minimized by matching the level by turning the adjustable legs. Now the workpiece is moved from one side to other against the rotation of grinding wheel.

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CONCLUSION

Using the cylindrical grinding attachment of lathe machine, a special purpose unit for chamfering and deburring is manufactured. Overall cost associated with the unit is also less, and it is simple in construction and rigid. The unit requires less floor space, and it is found effective to chamfer along the edge of the rectangular type of workpieces, considering the machine setup. The chamfers can be obtained easily with less time. Manufacturing of this chamfering and deburring machine cannot be judged without practice.

REFERENCES:

[1] Keith Stouffer, John Michaloski, Bob Russell and Fred Proctor. “ADACS - An Automated System for Part Finishing.” National Institute of Standards and Technology Robot Systems Division March 1993.
[2] Seng-Chi Chen, Pi-Cheng Tung. “Trajectory planning for automated robotic deburring on an unknown contour.” International Journal of Machine Tools & Manufacture 40 (2000) 957–97.
[3] Naoki Asakawa, Kenji Toda, Yoshimi Takeuchi. “Automation of chamfering by an industrial robot; for the case of hole on free-curved surface.” Robotics and Computer Integrated Manufacturing 18 (2002) 379–385.
[4] Seyed Ali Niknam, Yasser Zedan, Victor Songmene. “Machining Burrs Formation & Deburring of Aluminium Alloys.” Light Metal Alloys Applications (2014) 100-116.
[5] M. Abdel Mohsen Mahdy. “Economic drilling conditions for a given deburring radius.” Journal of Materials Processing Technology 110 (2001) 197-205.
[6] S. T. Bagde, A. V. Kale. “Development of Low Cost Deburring Setup with Feedback Capability”. 5th International & 26th All India Manufacturing Technology, Design and Research Conference (AIMTDR 2014) December 12th–14th, 2014.
[7] Leo Princely F, Selvaraj T, “Vision Assisted Robotic Deburring of Edge Burrs in Cast Parts”, Procedia Engineering 97 (2014) 1906 – 1914.
[8] S. K. Hajra Choudhary, A. K. Hajra Choudhary, Nirjhar Roy, 2010, “Elements of Workshop Technology, Vol : II” ,
[9] R. S. Khurmi , J. K. Gupta, 1979, “A Textbook of Machine Design.”
[10] V. B. Bhandari, 2013, “Design of machine elements.”
[11] Joseph E. Shigley , Charles R. Mischke, “Mechanical engineering design”
[12] PSG Design Data Book