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Design and Development of Drilling Tool for VMC Machine

Rahul Sarjerao Patil[1], Shivam Sadashiv Mahadik[1], Bipin B. Patil[2]

Students[1], Professor[2]

Department of Mechatronics (MK), Mechanical Engineering

Sharad Institute of Technology, Polytechnic, Yadrav, Maharashtra, India

Corresponding Author's Email: *rp2433553@gmail.com*

ABSTRACT

The design and development of the "special drilling and bore tool of vmc machine" is the subject of this article. The aim of this VMC machine tool is to operate bore and drill. This instrument performs operations similar to a single CNC machine. Utilized tool material is essential for producing tools and boosts output. In JAGADEESH IRON & STEEL PVT.LTD, PLOT NO. 23 D23 MIDC INDUSTRIAL AREA, MIRAJ, this vmc machining tool is in use.

KEYWORDS: *VMC machines bore and drill tool, CAD (Computer-Aided Design) software, 3D printing, and tool design concepts*

INTRODUCTION

The vmc machine's bore and drill tool were used in the design and development of the subsequent steps. Recognize the particular application needs, including the material to be worked on, thread type, bore size, and production volume. Create preliminary tool design concepts that take durability, cost-effectiveness, efficiency, and ease of use into account. To generate detailed designs of the bore and tap tool that include dimensions, materials, tolerances, and mechanical features, use CAD (Computer-Aided Design) software. Create working prototypes based on the design to evaluate performance and functionality. 3D printing could be used for prototyping. Using vme machining or other production methods conduct extensive testing on the prototype in order to assess its durability, dependability, and performance. Adjust the design in light of test findings and user comments. After the design is complete, get ready for mass production through the selection of suitable manufacturing techniques and the procurement of materials Use quality control procedures all the way through the production process to guarantee the end product's dependability and consistency.

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Put the bore and tap tools together and package them properly for distribution, taking into account things like end-user convenience and shipment protection. Produce technical documentation and user guides to instruct users on how to maintain, operate, and troubleshoot the bore and drill tool. Create and implement a marketing plan that will showcase the features, advantages, and competitive advantages of the bore and drill tool as it is introduced to the target market.

LITERATURE REVIEW

Examining the entire production process makes it clear that many components were rejected because of poor finishing and irregular drilling. The traditional approach can only be worked on one job at a time. As productivity needs rise, a specialized instrument or accessories that can boost productivity are needed. A. Carrying out a lot of operations on several jobs at once, or B. Carrying out a lot of activities in a single cycle. Customers expect products that are appropriate in terms of quality, quantity, affordability, and timing in today's market. Increasing both productivity and quality is therefore essential. That can be accomplished by using a multi spindle drilling head. For mass production, several spindle chilling machines are used.

March 2012, P. R. Sawant et al.:-

Created the 17-machine's main objective was to tap and drill the TATA cylinder block. There are eight drills in it; seven have 06.75 mm holes and one has Ø 12 mm holes. Additionally, tapping operations for 12 mm and 5.1 mm, respectively, are included, both linear and angular. Because hydraulic clamping has automatic control, it minimizes work rejection and increases productivity by cutting down on the time required for loading and unloading.

Prof. Chukwumuanya ET. Al (November):-

In November, Prof. Chukwumuanya et al. Prof. Chukwumuanya et al. carried out research in November 2016 on the design and construction of a multiple spindle drilling 41-head system for the mass production of Peugeot 504 automotive brake drums. For this design, they developed a multi-spindle drilling head that can drill six holes at once: two 08.5 mm holes and four 014.5 mm holes. They investigate the various gear forces theoretically. The finding is that mash increases production rate compared to a single drilling operation.

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Method The boring process is used in other procedures or on drilled holes to create spherical interior profiles. One way to describe a single-piece cutting instrument is boring her. A boring bar is rotated against a fixed work piece using boring machines (10) On a turing machine, bearing can be established with a fixed boring bar in the tool position and the work piece kept in the late chark.

Mukesh mane SRTC VIT kamshet, pune:-

This publication contains information on drilling and tapping processes. The past year has seen an increase in focus on the design and development of machinery that currently exists. In this context, attempts have been made to develop a tool that can simultaneously perform tapping and drilling operations on the same apparatus. Many tools have been developed, such as portable drills, automated tappers, and manual tappers. According to some research, utilizing a drill finish tool on a VME machine increases the product's production rate.

This universal drill machine has higher working stability than a portable drill machine. It also seems to offer more advantages than conventional drilling machines. This is lightweight and portable. This results in better control being given throughout the process. Because the joints are made to allow for increased performance and rotation in all directions, it works as it should. There is a reduction in the quantity of manpower required for the drilling operations as well as the overall energy consumption for the same jobs. It also requires less space and is simple to handle.

PROBLEM DEFINATION

In **jagadeesh eng. iron and steel pvt. ltd , miraj** manufacturing industry in manufacture multiple parts.

and the one of them is portal cover so, my group is identified this parts works in 2 cnc machine and 1 vmc machine .the following operation performing older operation.

Part name: - portal cover

In this parts works in 2 cnc machine and 1 vmc machine. the following operation performing.

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1st step: In this step the first side finish of portal cover operation completed in cnc machine

Total time in 1st operation:-

CNC machine:-6minutes30sec

Part clamp unclamp time:-minimum1minute 30 sec. to maximum 2 minute

Checking time:-minimum1minute to maximum 1minute 30 sec.



Figure 1: First Side Operation Photograph

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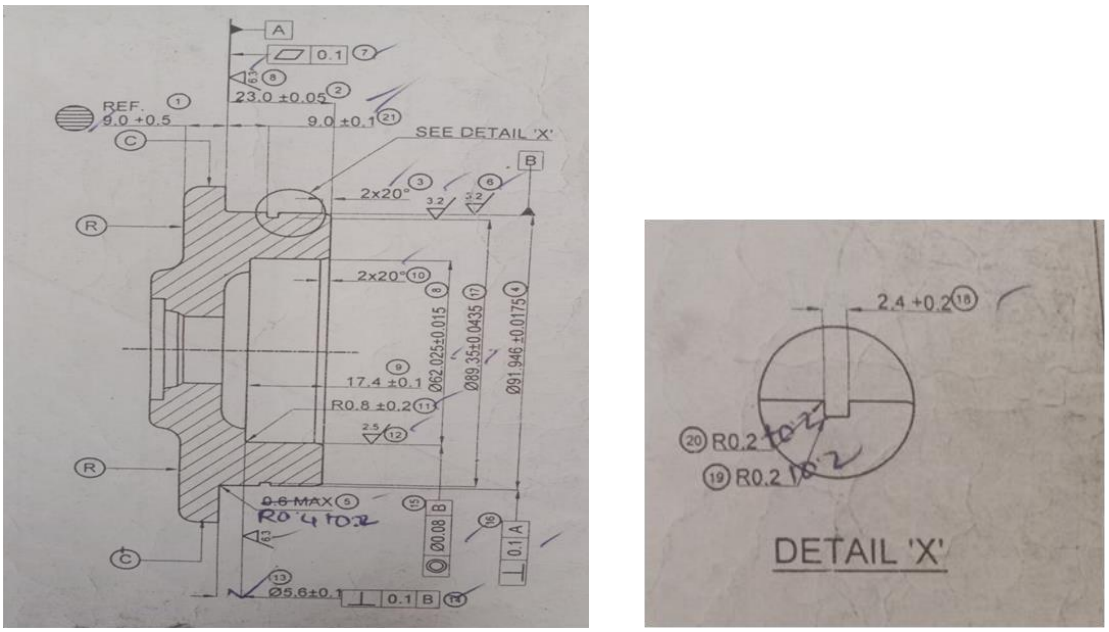


Figure: 2 SOP (Standard Operating Procedure)

1st setup CNC machine

2nd In this step second side of portal cover bore or drill (9mm) operation perform in vmc machine is completed operation and ruffing center hole.

VMC machine:-3minute20sec

Part clamp unclamp time :-minimum1minute 30 sec. to maximum 2 minute

Checking time :-minimum1minute to maximum 1minute 30 sec.

In this work, recent advances in evaluating the

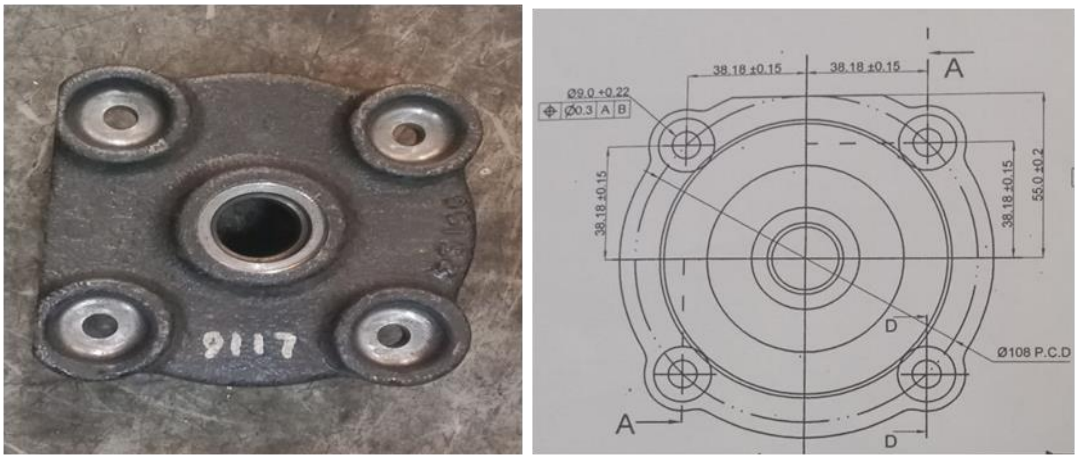


Figure: 3 2nd side operation photograph Sop (Standard Operating)

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Figure: 4 Old Ruffing Tools for Centre Hole

3rd in this step threading and finish operation is completed in cnc machine.

CNC machine:-1minute30sec

Part clamp unclamp time: minimum1minute 30 sec. to maximum 2 minute

Checking time:-minimum1minute to maximum 1minute 30 sec.

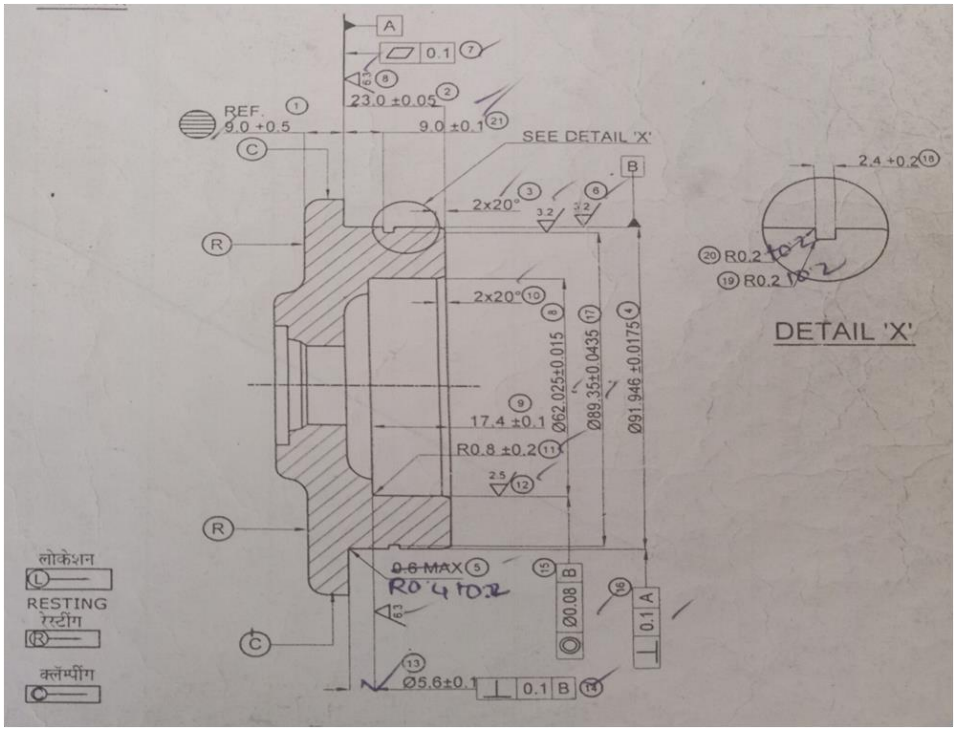


Figure: 5 SOP (Standard Operating Procedure) 3rd Setup Cnc Machine

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In old process 3 operation perform with minimum17minute to maximum 19 minute



Figure: 6 3rd side operation photographs

But this operations is possible in 1 cnc machine and 1 vmc machine

SOLUTION

Operations are possible in 1 cnc machine and 1 vmc machine. Using the new vmc drilling tool.

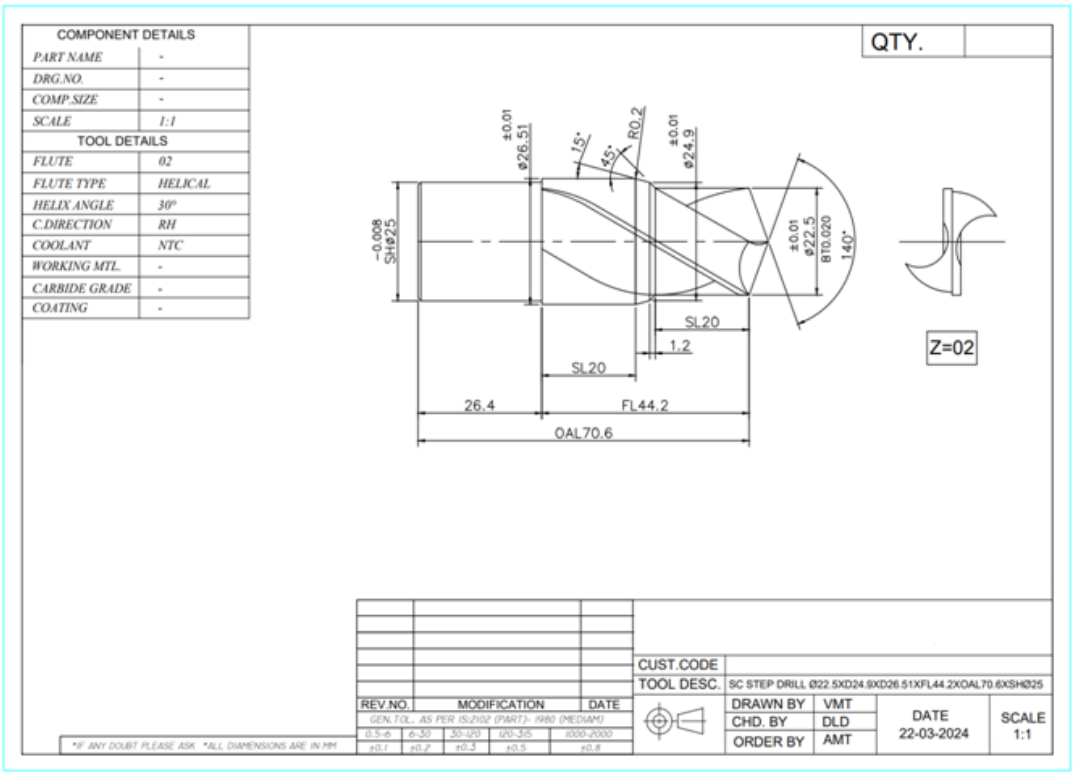


Figure: 7 Desine Of New Drilling Finish Tool of Vmc Machine

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Figure: 8 Photograph Of new Drilling Finish Tool for Vmc Machine

Note: The Design Has Complited by Group Members, Insitute Mentor, Industry Mentor and New Tool Is Sponser by Jagadeesh Iron & Steel Pvt. Ltd. Industry)

After the new drilling tool installing the following operations sucessfully performed.

1st In this step the first side finish of portal cover operation completed in cnc machine.

(Note: in 1st oprection is similar to old machine operation)

CNC machine:-3minute 40sec

Part clamp unclamp time: minimum1minute 30 sec. to maximum 2 minute

Checking time:-minimum1minute to maximum 1minute 30 sec

2nd in this step included new designed and developed bore and drill tool is added in vmc machine so, 1 machine performing 2 operations one is bore or drill, taping operations.

VMC machine:-3minite20sec + 1minite30sec (cnc machine operation added)

Total time = 4 minute 50 sec.

Part clamp unclamp time:-minimum1minute 30 sec. to maximum 2 minute

Checking time:-minimum1minute to maximum 1minute 30 sec + minimum1minute to maximum 1minute 30 sec

Total time = 3 minute

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Figure: 9 2nd Side Operation Photograph

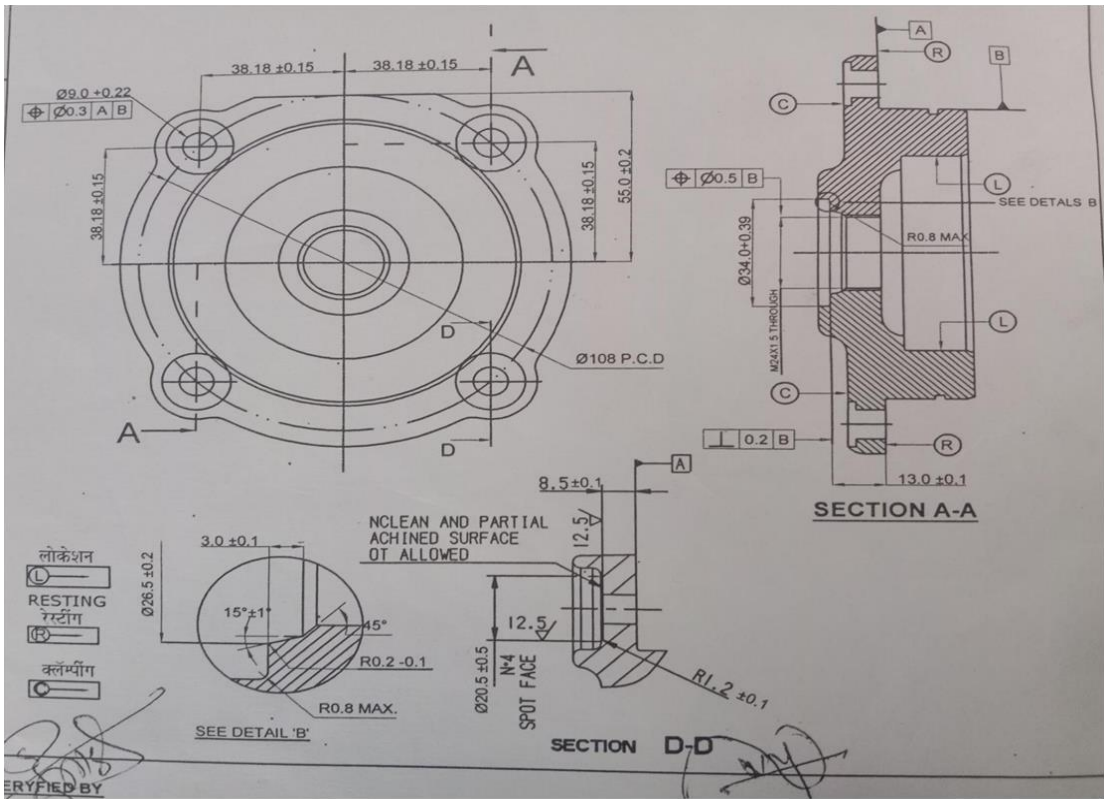


Figure: 10 Sop (Standard Operating Procedure) new 2nd setup vmc mac

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Comparison of old process and new process for portal cover part manufacturing:-

	Old Opertion process	New Opertion process
Machine operations	2 cnc machine and 1 vmc machine use for machining operations	1cnc machine and 1 vmc machine use for machining operations
Operation time	20 min. to 21 min. 1 part manufacturing	18 min. to 21 min. 1 part manufacturing
Production rate	In 1 shift(8 hours) 24 part manufactured	In 1 shift(8 hours) 28part manufactured
Tool life	Drill ruffing tool :- 50 to 60 operation performed in vmc machine Drill finish tool :- 15 to 20 operation performed in cnc machine	Drill ruffing tool :- 50 to 60 operation performed in vmc machine Drill finish tool :- 50 to 60 operation performed in vmc machine
productivity	Normal productivity rate	Increases productivity rate

RESULTS

1. 3 minute time saving per part manufacturing.
2. Increase productivity.
3. Reducing 1 cnc machine operation.

CONCLUSION

The productivity of indian industries determines their growth. Exmine various papers on automation and intigrate operations in order to increase productvity. Information about drilling and boring is provided in this project is to design and build a specialized machine that can be used to simultaneously drill and bore work pieces of varyning thicknesses and materials.

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