Computerized Moulding And Manufacturing of A Component

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Abstract- *Machining is an important manufacturing process that is used in a wide range of applications. From aerospace applications to the manufacturing of energy systems and medical robots, we see a major reliance on machining. In this project we focus on gaining an improved understanding of the mechanics of machining and the different factors that contribute to part quality. We acquired primary machine shop skills that provided us an opportunity to mill and drill a class of components to specified dimensions and tolerances. For each component, we created a detailed engineering working drawing that helped to shape and construct all the operations and procedures that must be undertaken and controlled to attain component machining without any breakdown or failure. Through hands-on machining, we discovered many different factors involved in milling, drilling, and the effects they exhibited on the tolerance and surface finish of a part. The main relevant factors that we examined were tool selection, speeds, feeds, and material selection. The extent to which these factors can influence machining is presented. The MQP(major qualifying project) project establishes new ways to systematically perform machining in a safe and stable manner without impacting the quality of the surface finish.*

Keywords- Manufacturing, Machining, Surface Finish, Tolerance.

I. INTRODUCTION

In an “NC” (Numerically Controlled) machine, the tool is controlled by a code system that enables it to be operated with minimal supervision and with a great deal of repeatability. “CNC” (computerized Numerical Control) is the same type of operating system, with the exception that a computer monitors the machine tool. The same principles used in operating a manual machine are used in programming an NC or CNC machine. The main difference is that instead of cranking handles to position a slide to a certain point, the dimension is stored in the memory of the machine control once. The control will then move the machine to these positions each time the program is run. The operation of the SL-(Serial port with a computer), 3.5” floppy disk, Ethernet / networking / and USB are all viable ways to transmit and receive programs. In order to operate and program a CNC controlled machine, a basic understanding of machining practices and a working knowledge of math is necessary. At productivity, we have two classes that pertain to Hass turning centers: lathe operator and lathe programming. We have two classes to fill the different needs of our customers as not all people that require training require programming training.

II.PROGRAMMING

The definition of a part program for any CNC consists of movements of the tool and speed changes to the spindle RPM. It also contains auxiliary command functions such as tool changes, coolant on or off commands, or external M codes commands. Tool movements consist of rapid positioning commands, straight line movement of the tool at a controlled speed, and movement along an arc. The Hass lathe has two (2) linear axes named X and Z. the X-axis moves the tool turret toward and away from the spindle center line, while the Z axis moves the tool turret along the spindle axis. The machine zero position is where the tool is at the right corner of the work cell farthest away from the spindle axis. Motion in the X-axis will move the table towards the spindle centerline for negative numbers and away from spindle center for positive numbers. Motion in the Z-axis will move the tool toward the spindle chuck for negative numbers and away from the chuck for the chuck for positive numbers.

A program is written as a set of instructions given in the order they are to be performed.

LINE -1=SELECT CUTTING TOOL.
LINE-2=TURN THE SPINDLE ON AND SELECT THE RPM.
LINE -3=TURN THE COOLANT ON.
LINE-4= RAPID TO THE STARTING POSITION OF THE PART.
LINE-5=CHOOSE THE PROPER FEED RATE AND MAKE THE CUT(S)
LINE-6=TURN OFF THE SPINDLE AND THE COOLANT.
LINE-7=RERURN TOOL TO HOLDING POSITION AND SELECT NEXT TOOL

III. PROGRAMMING FORMAT

There are no positional requirements for a line CNC code. That means the different codes in a program may be in any order on a line of code. However some standard rules are followed so the code is easier has a standard level of organization.

Some standard rules are followed X and Z values are positioned in alphabetical order and grouped together. The G and M codes may be placed anywhere on a line but convention is that the G codes come first and the M codes come at the end of the block. This makes as the last thing to happen on a line is the M-function. The G codes are completed first them the M code is performed on any given line.On Hass machines only one M code is allowed on a block of code. Command codes are first given by a letter then a number. Some codes like X, Z and F require decimal points. Others like S and G require an integer (a number with no fractional part).

IV. STANDARD INSERT SHAPES

V-used for profiling, weakest insert 2 edges per side.
D-it is somewhat stronger, used for profiling when the angle allows it, 2 edges per side.
T-commonly used for turning because it has 3 edges per side.
C-popular insert because the same holder can be used for turning and facing. 2 edges per side.
W- Newest shape. Can turn and face like the C, but it has 3 edges per side.
S-very strong, but it is mostly used for chamfering because it won’t cut a square shoulder. It has 4 edges per side.
R-strongest insert but it is least commonly used.

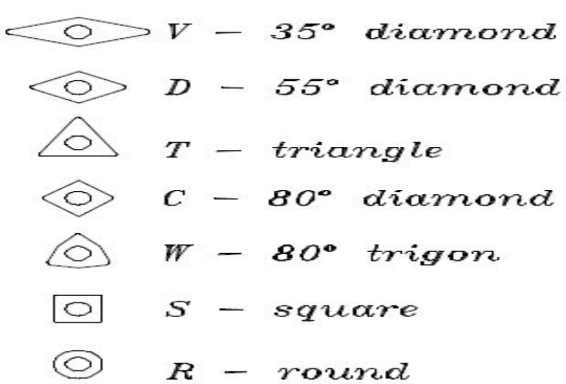

Fig1.System diagram

V. MACHINING OF A COMPONENT

The machining process:
A) RAW MATERIAL CUTTING
B) TURNING
C) MILLING

A.Raw material cutting:

The company can be provided 3050mm length and 32mm diameter rod. The required component total length is 8.8mm but we can take 18mm length cut pieces. The cutting operation is down by using automatic feed cutting machine. In this machine the rod can adjusted automatically. The machine can be setting into the length should be 20mm, because the blade thickness 2mm also considered. We can get 152 pieces by cutting one full length rod, each and every piece can take 1:30sec cycle time (including loading time also).According to cycle calculation we can get 40 pieces per hour, 320 pieces per shift and 960 pieces per day.

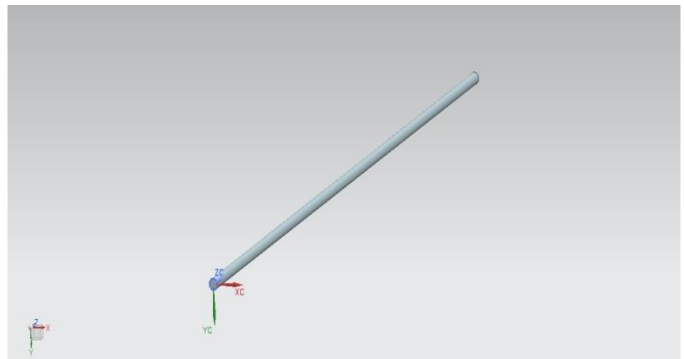

Fig 2. Original Raw material

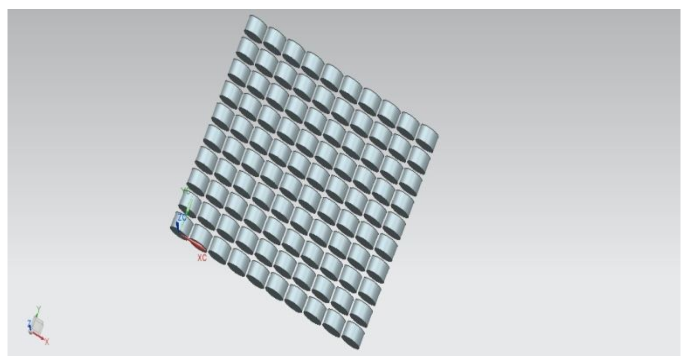

Fig 3. Cutting pieces of raw material

B. Turning

Insert turning machine and description
This machining operation is consists three turning operations.
1)Turning first operation.
2)Turning second operation.
3)Turning third operation.
The first and second turning operations are down before milling operation and third turning operation can down after milling operation.
Turning first operation: In the turning first operation three different operations are down, these are mentioned in the below.

(i)Facing.
(ii)Outer diameter roughing.
(iii)Outer diameter finishing.

Milling:

Fig 4. Milling Machine

The milling operation consists of six operations these are listed in the below.

1. Spotting operation.
2. 3.2 drilling operation.
3. 7mm drilling operation.
4. Profile roughing operation.
5. Profile finishing operation

VI. INCOMING MATERIAL INSPECTION

Incoming material showed be chucked because sometimes the raw material is also in undersize so you can measure the raw material. The incoming material is inspected by every peace and then you can allow the further operations otherwise the raw material is sent back to the company immediately. The incoming material is controlled by following the below given table format and you can easily eliminate the raw material rejections.

Set-up approval report for turning first operation

The set up approval report is used for to control the re-work and rejections from starting. It is written after setting is completed in a machine.The new component is setting in a machine then the first produced 10 components are inspected continually then the required adjustments are down then the production is started.When the first three components can manage the exact dimensions then next components are decides the tool wear, if any tool is not suitable then the dimensions are change continually that time you can change insert and then you can start production.

VII. INPROCESS INSPECTION REPORT

The In process inspection report is used to control the quality in the in-line chucking. The one total operator is completed then the component is chucked. Then the completed components are kept at a place and after 10 numbers completed we can chuck the last doing component then you can know the all dimensions present in that operation weather the component dimensions are right or wrong. Suppose the components are ok then you can keep in a bin otherwise the reveres chucking process is down so any rework or rejections are suppurate in this time only then the alterations are down and the production is continue. If is there any modifications are there with in the 10 numbers you can modify, so you can easily control the quality.

IX. SAMPLE INSPECTION REPORT

Sample inspection report is used for to test the manufactured components in the batch we can take 25 numbers and then inspected. When all components are within the limits then the batch is accepted otherwise one or two components are defective then you can inspect the all components and defective components are suppurated. Then the rework components are corrected and rejected components are placed in scrap. Then the final components are 100% quality components.

X.CONCLUSION

With the current economic conditions and India machining and manufacturing contracts continually being awarded to overseas companies there is an extreme need for talented and knowledgeable individuals to join the manufacturing industry. As the economy of outsourcing manufacturing and assembly of products to Southeast Asia becomes less of an advantage, due to factors such as rising fuel and transportation costs, manufacturing May and has already begun to return to the India. With the advances in technology and advanced processes the idea of the India. becoming the production and manufacturing powerhouse of the world again becomes more of a realization than an idea. This project was a combination of researching the factors that affect a machining operation and how to minimize negative effects on production while trying to personally ascertain skills that will help the manufacturing industry stay on the cutting edge and keep manufacturing in the country.

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