

Analysis of Suitable CNC Machine Chuck Pressure by ANSYS

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Abstract - Pneumatic chuck will hold the workpiece(material) with the help of the pressure. That pressure value has a unit of bar. The pressure value will be applied on the surface of the workpiece. Due to that jaws of chuck will hold the workpiece. Basically, jaws are the mating part of the chuck. It was assembled by the help of allen bolt. This project needs three jaw chuck. The pressure value must be the right one. It shouldn't exceed or become below the requirement pressure. Due to that it will cause damages in the workpiece. If the pressure value exceeds the normal range, then more load will be applying on the surface of that workpiece. Due to that it will deform. In case, if the pressure value will go below the normal range, then the workpiece will be disturbed and it will relieve from the jaws. Here ANSYS was used to analyse the pressure to be applied on the workpiece and the various pressure value was analyzed for different workpieces.

Keywords: chuck. Jaws, workpiece, pressure, ANSYS.

1.INTRODUCTION

chuck used to hold an item with spiral balance, particularly a chamber. In drilling, milling machine, it holds the pivoting device while in machines it holds the turning workpiece. On a machine the throw is mounted on the shaft which turns inside the headstock. For example, penetrating an extra throw might be mounted on the non-turning tailstock. Numerous throws have jaws, here and there considered canines that are organized in a radially balanced example like the places of a star. The jaws are straightened out to hold the apparatus or workpiece. Regularly the jaws will be fixed or released with the assistance of a toss key, which is a wrench-like instrument made for the reason. Many jawed hurls, in any case, are of the keyless assortment, and their fixing and slackening by hand power alone. Keyless plans offer the accommodation of snappier and simpler hurling and unchucking, yet have a lower grasping power to hold the apparatus or workpiece, which is possibly all the more an issue with round and hollow than hexagonal shanks. Collet throws, as opposed to having jaws, have collets, which are adaptable collars or sleeves that fit intently around the instrument or workpiece and hold it when crushed. Throws on certain machines have jaws that move freely, permitting them to hold sporadically molded items. Attractive and vacuum tosses are additionally made, with normally level surfaces against which workpieces or apparatuses are immovably held by the pressing factor of their separate power. To chuck an instrument or workpiece is to hold it with a toss, in which case it has been thrown. Hurling singular slugs or spaces on a machine is frequently called tossing work. In bar work or bar feed work the stock juts from the toss, is worked upon, at that point separated off cut off as

opposed to sawn. Programmed machines that have practical experience in tossing work are regularly called chucks.

Main objective of this project is to derive a tabular column with full of chuck pressure values for a different material as well as different sizes of the materials, to reduce the material rejection due to the wrong pressure value.

Function of chuck pressure:

- 1.The jaws are weight less in these chucks.
- 2.Which makes the centrifugal losses low.

2. DESIGN PARAMETERS

2.1 DESIGN

Create a 3D Modelling of Chuck as Well As Workpiece

2.1.1 CHUCK

CNC Lathe Chuck pivots at high velocities, appropriate for present day turning focuses.

Standard sizes accessible (3 jaw) 135mm, 165mm, 200mm, 250mm, 315mm, 400mm and 500mm.

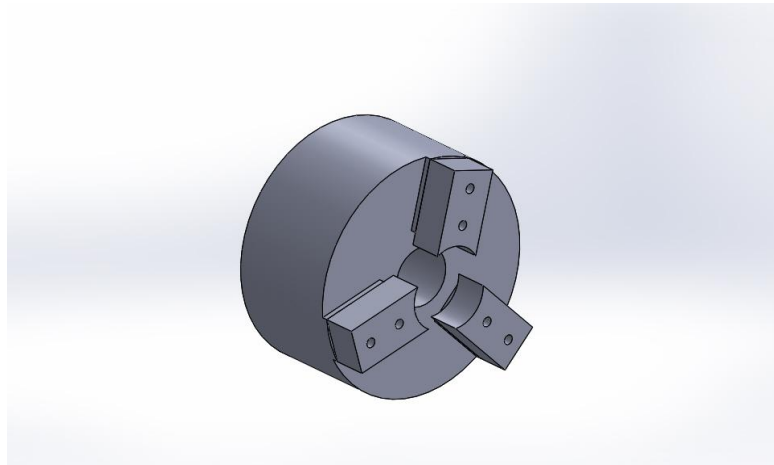


Fig 2.1.1 CHUCK

2.1.2 JAW

There are three chuck jaws:

- base jaws
- hard jaws
- soft jaws

Base, or expert, jaws are connected with the body of the chuck jaw and the segment that the top jaw mounted to. Base chuck jaws move radially towards and away from the work being thrown. These kinds of chuck jaws convey the top jaws with them.

Hard chuck jaws and delicate chuck jaws are too available. Hard jaws are top chuck jaws made to final size from hardened steel. Top jaws clamp the workpiece and are mounted to the base

jaw. Unlike hard jaws, soft top chuck jaws can be machined to specified dimensions. Soft top jaws are usually manufactured from steel, aluminum, or cast iron.

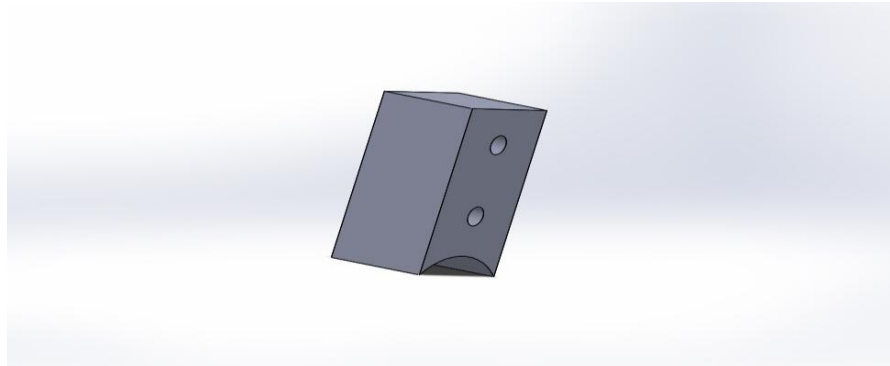


Fig 2.1.2 JAW

3. SPECIFICATION

Table 3.1 Specifications

S.NO,	DESCRIPTION	SPECIFICATION
1	CHUCK TYPE	HYDRALIC TYPE
2	NUMBER OF JAWS	3
3	TYPE OF JAWS	SOFT JAWS
4	CHUCK DIAMETER	200mm
5	JAWS T-NUT WIDTH	17mm

Workpiece specification-for example

Material: steel-mild steel

Outer diameter1: 75.0 mm

Outer diamtere2; 65.0 mm

Inner diameter: 50.0 mm

Total length: 144 mm

4. WORKING PRINCIPLE

First it is a collection of data from the company about the applied chuck pressure. So, to create a 3D modelling of chuck as well as workpiece. The workpiece is imported to the analyse workbench. The workpiece is running to the meshing process. After the meshing process is completed move on the next stage. The next process is to analyse the deformation on the clamping area of the workpiece and analysis process is done. Finally, the chuck pressure for various material is given in the table.

Table 4.1 chuck pressure value

S. No.	component	material	Chuck pressure
1	55x25x10	Mild steel	6 bar
2	55x25x8	Stainless steel	6 bar
3	55x35x8	Stainless steel	6 bar

4	55x40x60	Mild steel	11 bar
5	55x45x80	En8	13 bar
6	60x35x59	Mild steel	15 bar
7	60x40x71	Mild steel	15 bar
8	60x30x68	Mild steel	15 bar
9	60x45x49	Mild steel	14 bar
10	60x35x60	Mild steel	15 bar
11	40x30x70	SAE1018	10 bar
12	105x52x60	Mild steel	18 bar
13	45x25x40	Mild steel	8bar
14	30x114 pin	En8	7bar
15	70x45x72	Mild steel	16 bar
16	75x55x69	Mild steel	16 bar
17	75x55x66	Mild steel	16 bar
18	80x50x94	Mild steel	18 bar
19	105x50x90	Mild steel	19 bar
20	95x65x90	Mild steel	18 bar

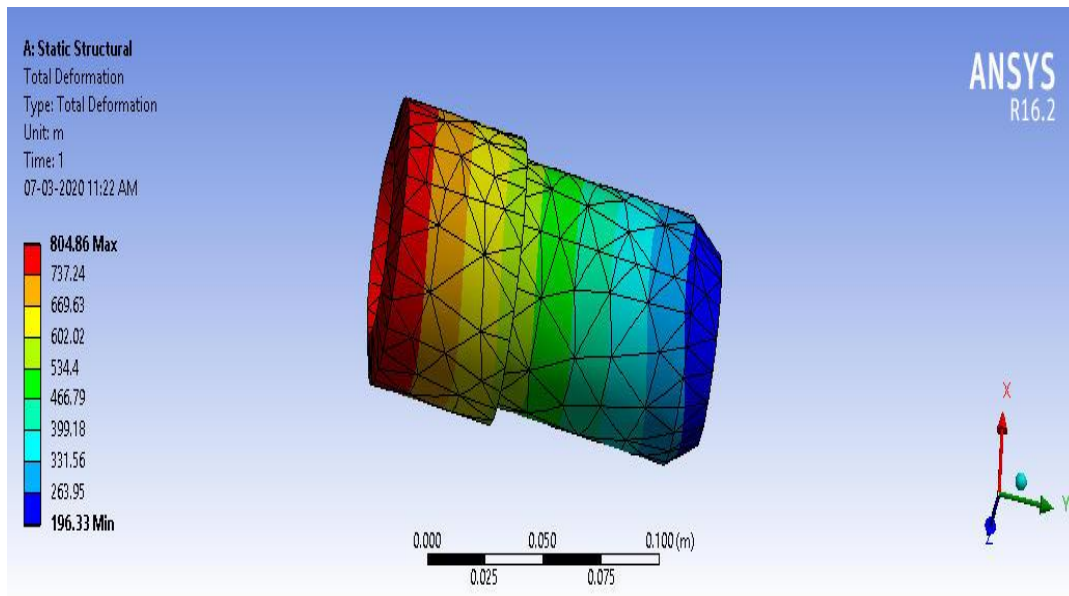


Fig 4.2 Analysing Process

This analyzed chuck pressure value can be used to reduce the rejection of materials. So this type of chuck can be preferable for CNC machine.

5. CONCLUSION

Before this analysis there might be minimum 5 nos of raw material were rejected due to chuck pressure problem. That worth 2800/-. This analysis would help to reduce the number of

rejections of materials. This analyse will also be further elaborated to reduce complete rejection of materials due to chuck pressure problem.

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