Modification of Serration Machine

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ABSTRACT

The Project Aim in identifying and correcting required parameter which results in undesirable tooth formation of serration machine. Serration machine is a special purpose machine which is built to form serrations or small grooves for gripping purpo se on jaws of chuck jaws. Conventional milling machine requires a lot of time for serration formation which lead to manufacturing of serration machine.

INTRODUCTION

SERRATION MACHINE -

Serration machine is the machine which is used to create serration or create grooves on the Jaws of chuck, for gripping purpose. Compared to conventional milling it completes the job in less than 2 minutes. This increases productivity, and reduces error.

LITERATURE REVIEW

G.MAHEEDHARA REDDY, V.DIWAKAR REDDY (2018) STUDIED THEORETICAL INVESTIGATIONS ON DIMENSIONAL ANALYSIS OF BALL BEARING PARAMETERS BY USING BUCKINGHAM PI THEOREM.

The Dimensional analysis is a very powerful and general tool for use in analysis and understanding problems in engineering and in particular, in mechanics and transport phenomena. The main objective of the present work is to study the characteristics of various bearing parameters under low, medium and high temperatures conditions. Dimensional analysis is useful computing dimensionless parameters and provides answer to what group of parameters that affecting the problem. This Dimensional analysis can be accomplished by using Buckingham π- theorem

CHANG-LI YU, ZHAN-TAO CHEN , CHAO CHEN , YAN-TING CHEN (2011) STUDIED INFLUENCE OF INITIAL IMPERFECTIONS ON ULTIMATE STRENGTH OF SPHERICAL SHELLS-

Comprehensive consideration regarding influence mechanisms of initial imperfections on ultimate strength of spherical shells is taken to satisfy requirement of deep-sea structural design. The feasibility of innovative numerical procedure that combines welding simulation and non-linear buckling analysis is verified by a good agreement to experimental and theoretical results. Spherical shells with a series of wall thicknesses to radius ratios are studied. Residual stress and deformations from welding process are investigated separately.

METHODOLOGY

1) T-TACKLE:

To check the problem of Misalignment of the linear guide ways T-tackle was developed. The misalignment of linear guide ways was the one of the most important problem which led to- the problem of Distorted or undesired teeth profile formation. The T-Tackle was firstly decided to be produced in one piece but in order to reduce material wastage it was developed in parts. It was Basically assemblage of 3 rectangular Plates with Internal tapping at certain places for assembly point. An important hole was also done for mounting of plunger Dial gauge. The Tapping was done of M6X30 Allen screw. The 3 rectangular plates have following dimension.

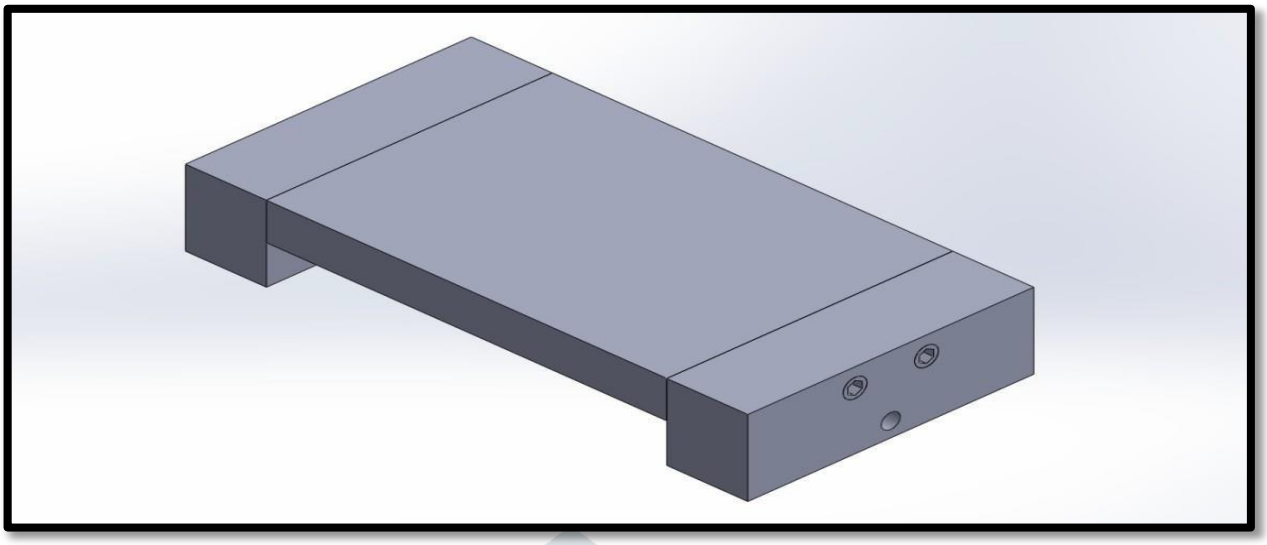

Fig 1 : T Tackle

After components were developed they were assembled. During Trial in was mounted on the Linear guide ways and First the Broach carriage was moved towards bottom. The T tackle was then assembled at the Top and the plunger dial gauge was mounted. With respect to the Left guide way the T Tackle was moved slowly downward and the reading on the dial gauge was noted. Three readings were taken. In the second half the broach carriage was shifted upwards and the same procedure was carried from bottom to top. The error was found to be 0.0X mm which directed us that the Guide ways were tapered.

1.1) TENSER:

After identification of misalignment in the linear guide ways it was needed to be rectified. Therefore T Tensers were as a instrument to fix this. First the broach carriage was slided to bottom and allen screws of the master guide way were loosened and after that using tensers a force was applied opposite to guide way by rotating the tenser screw. Further the same procedure was carried out by holding the broach carriage to top. And then again using T tackle parallelity was checked.

2) STRAINER:

A sieve, or strainer, is a device for separating wanted elements from unwanted material or for characterizing the particle si ze distribution of a sample, typically using a woven screen such as a mesh or net or metal. The word "sift" derives from "sieve". In cooking, a sifter is used to separate and break up clumps in dry ingredients such as flour, as well as to aerate and combine them. A strainer is a form of sieve used to separate solids from liquid.

In our project strainer necessary because formation burr due to material removal during the operation is accumulated.

Fig 2 : Cover Plate

Because of which it accumulates near the working area and remains there.

3) CYLINDER

Next step was to check whether the spindle of the hydraulic actuator was perpendicular to the bed or its axis was perpendicular or not. For this purpose we used dial gauge arrangement. First the dial gauge was needed to be set in a parallel axis so we mounted it on the broach carriage, to avoid friction first we applied some oil on the carriage the we placed the dial gauge and with the help of right angle provide motion in vertical direction only. We moved dial gauge for 45 mm in vertical direction and did same procedure by mounting dial gauge on the either side of the actuator. For three reading it was found that dial gauge showed a reading of 0.1 mm for left side mounting and 0.4 mm for top side mounting . To rectify this problem we used shims the shims were generally of 0.355 mm and 0.9 mm . The shim of 0.9 mm was mounted between the rest and cylinder casing from front side and the other of 0.355 mm from side . The selection of the shim size were done using lever rule because the resting was not of
45mm but is dimension were of 160 x 104 mm. so we used (length of the resting) / (distance moved by dial gauge in vertical direction) * (dial gauge reading).

After this mounting we took the reading again and found the error to be reduced in microns 0.01 mm in left side and 0.005 mm in top side.

4) FIXTURE

During machine idle period the broach tool was sent for resharpning. When it returned the predecessor fixture was not able to function due to variation in its dimension and also previous fixture also had dents on it so we decided to form a new fixture. We did three thing firstly we grinded the base fixture, then we formed a new fixture of 120x88x10 mm base fixture and a L cross- section fixture of the dimension with the L step of 4mm as a upper covering fixture. We also replaced the existing M6x45 allen- cap screw with M6X35mm because the previous were a bit bent. After fixture were developed the base fixture was sent for surface hardening it was of the material 20MnCr5. And upper was sent for grinding . Before doing so the base fixture was needed to be fixed with the base so 4 hole with tapping were made the hole were of M6 with counter sunk on base fixture of 3.5mm counter sunk and M6x15mm on the base.

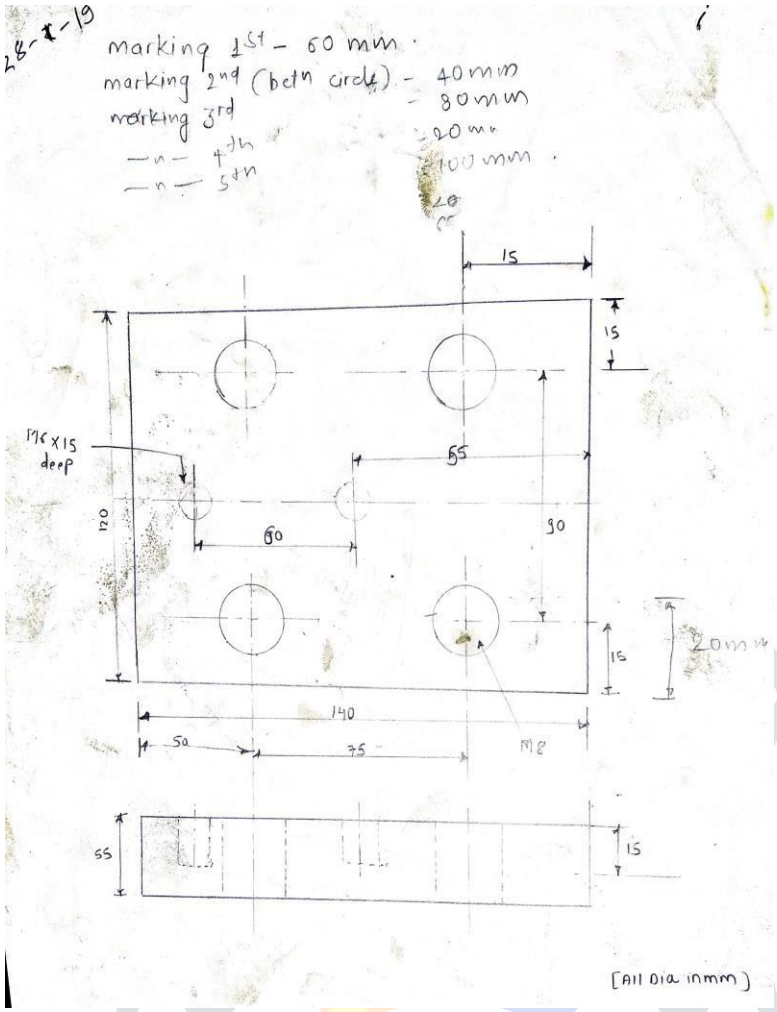

Fig 3 : Fixture Design

5)BROACH POSITION

Every machine when designed it is made sure that the cutting force or the operational force act perpendicular to the base on which the job is mounted . but after too many operation and some of the missed timely maintenance the joints, nut bolts get loosed and the perpendicular phenomenon disappears therefore we decided to check and if present fix them. First we measured broach carriage and job position profile by mounting dial gauge on carriage and dial pointer on job position. For X direction the dial gauge showed 0.05mm deflection and 0.045 mm for Z direction. Next we changed the position and measured the deflection on carriage for down stroke of the machine . we found the deflection were 0.02mm clockwise for 330mm and 0.1mm for 94 mm . Then we mounted the tool on carriage and again measure the tools geometry with jobs position we moved dial gauge in X direction and found the deflection to be 0.02 mm . as all the above reading were in microns it will affect the operation adversely.

CONCLUSION

After implementing the solution on problem to machine following benefits have been noticed.

- The productivity of serration machine has been improved.
- The excess time used in cleaning has been reduced.
- The saved time can be utilized by the operated to do the other productive work.
- Cycle time for producing job is reduced due to broaching principle.
- The improvement in productivity may vary according to different jobs. Following is

the desired and correct profile of job we achieved .

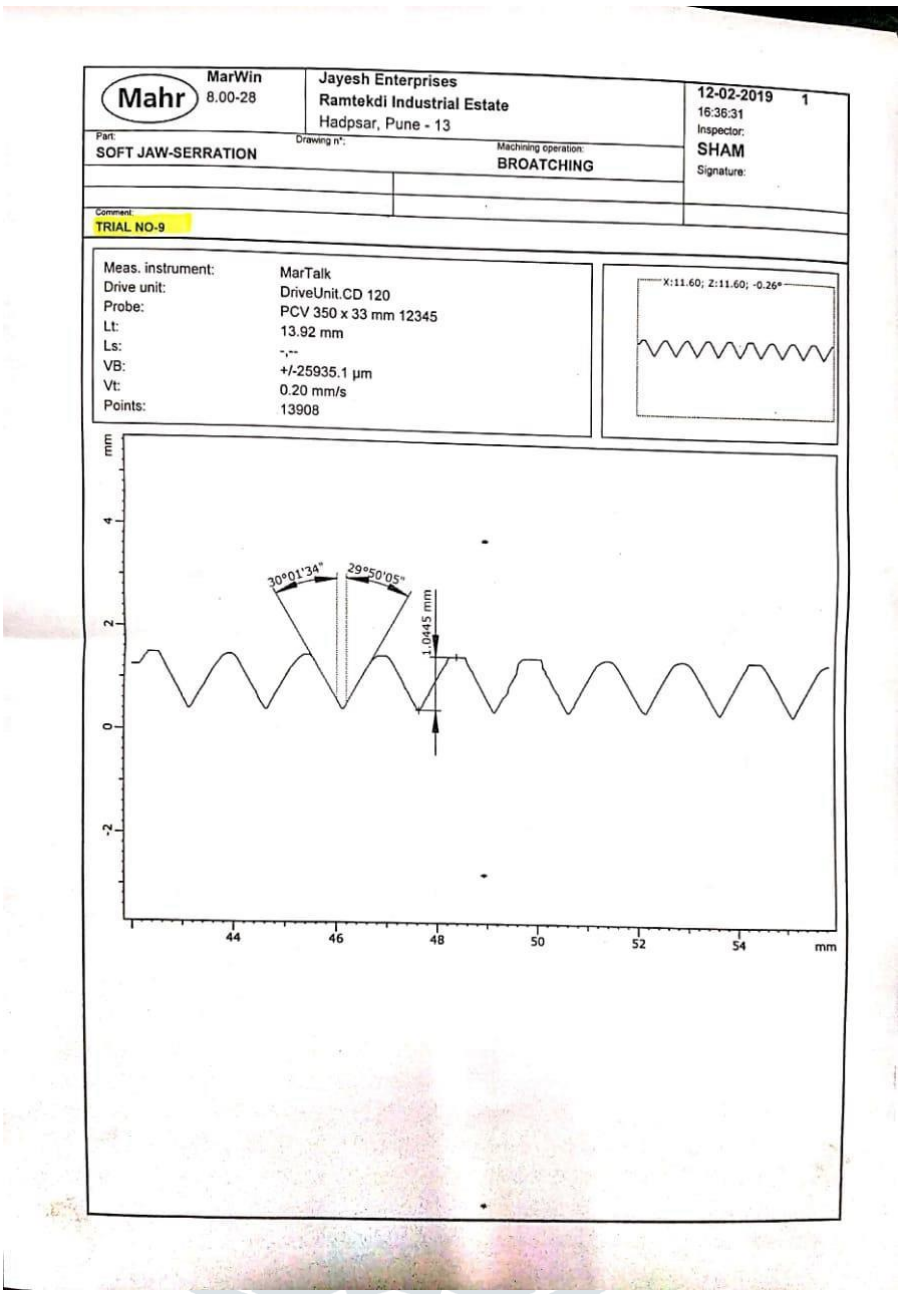

Fig 4 : Profile Projector Image of Job's Tooth Profile

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WEBSITE

Took information about linear guide ways from HIWIN.