

Designing and modification of plate valve dispenser machine

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Abstract: An engineer is always focused on the challenges of bringing ideas and concept to life. Therefore, sophisticated machines and modern techniques have to be constantly developed and implemented for economical manufacturing of products. At the same time, we should take care that there has been no compromise made with quality and accuracy. The dispenser valve is designed to dispense the required quantity of the plate valves. The machine is simple to maintain and easy to operate. The machine consists of a plate valve dispensing cylinder which works on the pneumatic pressure to dispense the plate valves. The aim of the project is to reduce the cycle time required for the assembly of the shock absorber. The machine design is working as per the requirement i.e. rejection decreased by 92.60%. So that productivity is increased. And cycle time reduced.

1. INTRODUCTION

There is a tremendous technological development in the manufacturing industry and manufacturing industries are making a large amount of effort for their mass production with best quality products having higher reliability and economical in cost. Nowadays the hand-operated machines are replaced with the application of automation in automatic or semi-automatic machines which utilize to improve productivity. Dispensing machine is one of the important machines in the shock absorber industry. It is mainly used as the name indicates to dispense the plate valve. On regular enhancement and innovation of their product range. Having offered consistent, an immaculate quality that is as per with industry standard, they have amassed immense clients confidence in their projects and services. With their professional attitude to excel and serve better, they always ensure impeccable quality products, prompt services, humble prices and great product features which differentiate shock absorber and front forks in India. In the industry, before automation, the plate valves which were used in the shock absorber were picked manually by the operator and placed in the shock absorber. This use to lead an increase in the cycle time of the operation which reduces the productivity of the operator. Thus to improve the cycle time the dispensing unit was brought into the process for precise working and reduce in the cycle time. This machine uses to dispense the valves at one time on the dispensing plate, thus the operator had to wait for the plate to be refilled. Thus to reduce this cycle time it was modified with some design for the single working of the dispensing plate. The dispenser machine completely works on the pneumatic pressure. 5/3 DCV is used in pneumatic operated plate valve dispensing machine. Dispensing machine is the new automated technology which has gained vast importance in every field. Dispensing have reduced the need for human for handling the machine. The ease for the operator by reducing the time and improving productivity. Nowadays the use of dispensing machine is in the banks to dispense the cash through the ATMs. It is vastly used in the food industry where the drinks or the food is served with the dispensing machines used. The machine is used in various industries to reduce human work and it has gradually improved the cycle time for the process.

2. CATIA MODEL AND COMPONENTS.

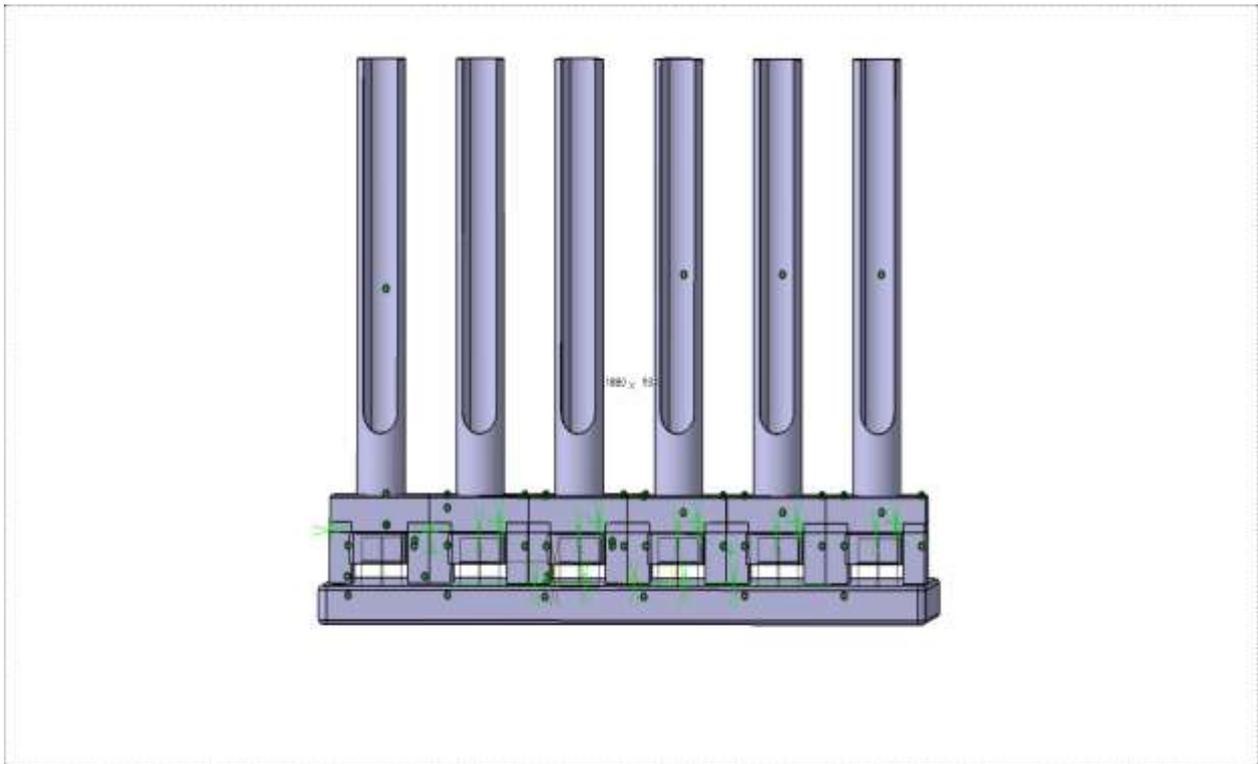


Fig no.1 CATIA 3D model

Base plate

The base plate is supporting member for the whole assembly as all other parts are mounted on it. The material used for the base plate is mild steel which is most reliable and has stress. The different processes used for fabrication of the base plate are detailed in the process sheet with the time required. Most of the important part of the whole design is the base plate. It holds the whole assembly and the support blocks. The material used is OHNS.

Support Block

Support block is the section which supports the top plate and it is placed firmly on the base plate. There are different process used. Support block consists of through holes which are placed on the base plate with the help of bolt mechanism. Support block supports the dispensing plate and also the pneumatic system which helps the dispensing plate to move forward and backward. The material used for the support block is OHNS.

Top plate and Plate valve holder.

The top plate is also a supporting member which supports the plate valve holder. The top plate is placed on the support block with the help of a bolt. It has through holes as shown in the figure. The top plate is drilled in the center for a hole of certain diameter to support the plate valve holder which dispense the plate valve through that hole on the dispensing plate. Plate valve holder is made of a diameter slightly bigger than the diameter of the plate valve. Plate valve holder is a long cylindrical section which holds a largenumber of plate valves. The plate valves are dispensed on the dispensing plate with the help of pneumatic pressure which is maintained at a specific bar, this action takes place with the help piston-cylinder arrangement. The piston is pushed down to dispense the plate valves which are placed in the cylindrical plate valve holder. The top plate is made up of OHNS, while the plate valve holder is made up of EN9.

3. MODIFIED SYSTEM

The modified machine contains separator blocks pneumatic circuit top block rare block support block, etc. In these modifications we search that the length of the material affects the surface finish and the intermolecular structural changes. And as the thickness of the plate valve is very minute i.e. 100 micron we need accuracy so that we cut the dispensing plate into 6 parts for six different stations. The reduced length reduces the inaccuracy during manufacturing. For that, we use the six-cylinder pneumatic circuit with different six sections connected to a single screw compressor of 8 bar capacity. On the top block plate valve holders are there on which the plate valve loader of high weight is placed so that when separator comes, a single plate valve occupies the vacant place on separator block. As we push the button the pneumatic circuit applies the pressure on the piston which is connected to the locating block holder. Due to that pressure locating block moves and pushes the separator block. As the cylinder is double acting at working stroke separator block gets push and in return stroke, the separator block gets pulled by locating holder. In this way the plate valves are dispensed.

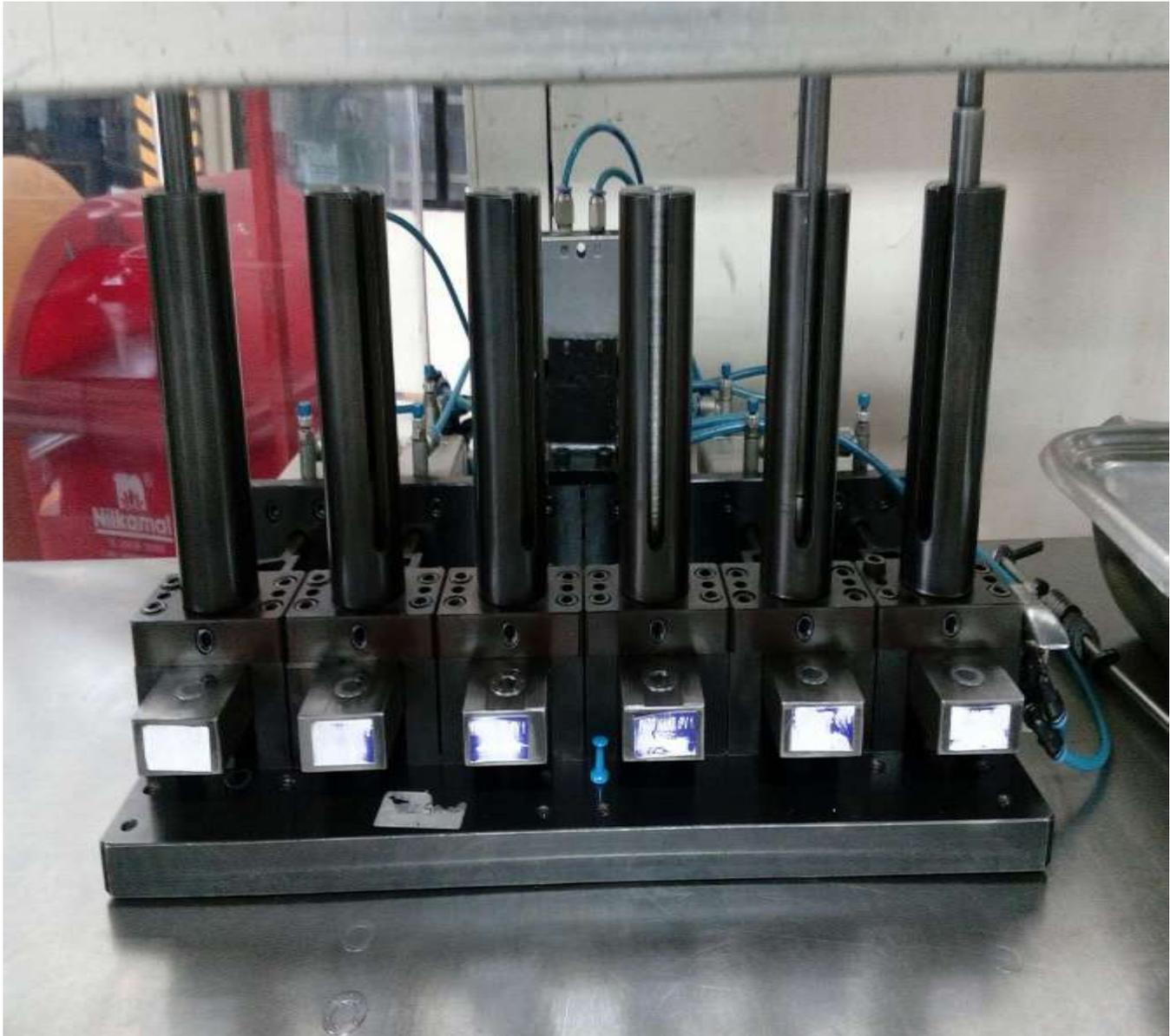
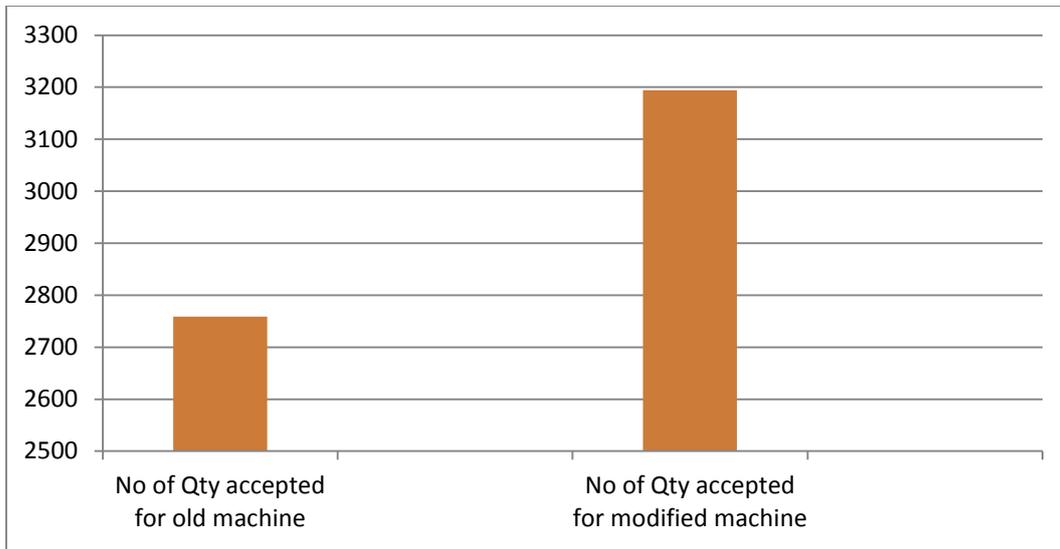


Fig no 2 Modified machine

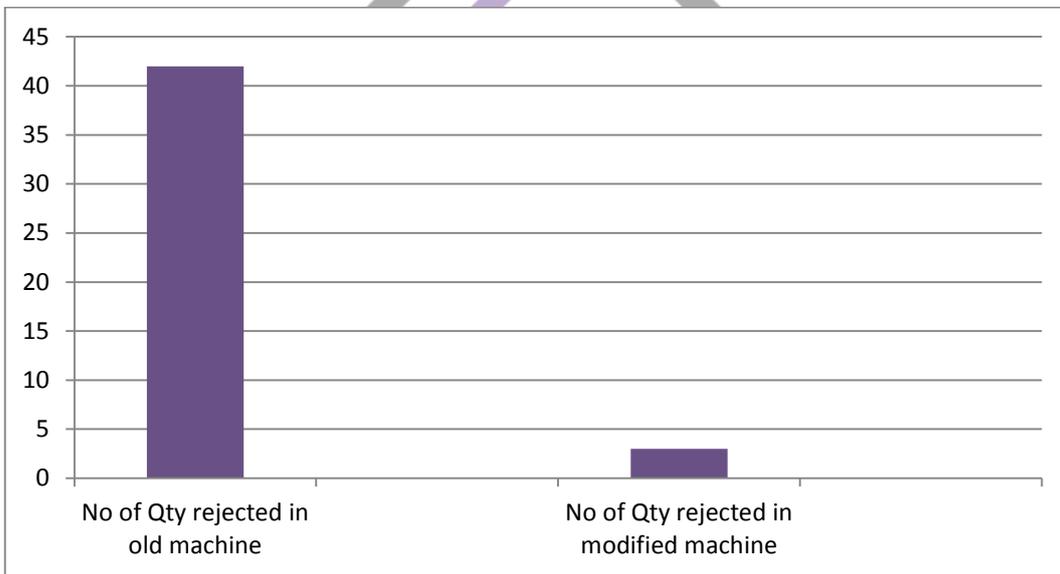
4. RESULTS

The machine tests were carried out for both the single station old model and the new multistation model. The graphs were made on the data collected from the observations. The graphs represent the number of rejected and accepted quantities for both the old and the new modified machine.

This graph shows the number of Qty accepted for the old machine and the new modified machine. The batch size for the old machine was 2800 as the machine was single station which was further increased to 3200 for the new machine. Thus the number of quantity accepted for the new machine was greater than the old machine.



This graph shows the number of Qty rejected for the old machine and the new modified machine. The batch size for the old machine was 2800 which was further increased to 3200 for the new machine. The number of quantities rejected for the new machine was comparatively less because of the modification and automation of machine into multistation.



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