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Multi model sprocket machine

Muruganantham P
Assistant Professor, Department of Automobile Engineering, PSG College of Technology, Coimbatore-4.
pmm.auto@psgtech.ac.in

Gowtham B
Teaching Assistant, Department of Automobile Engineering, PSG College of Technology, Coimbatore-4.
bgm.auto@psgtech.ac.in

Raj Vijay B
PG Student, Department of Automobile Engineering, PSG College of Technology, Coimbatore-4.
surendar.k987@gmail.com

Abstract –

For connecting the sprocket and sub-assembly, there are a variety of machines. There are no combination machine versions that can do the same procedure for several models. As a result, this study focuses on the design, manufacture, and testing of a machine that can connect chain sprockets and sub-assembly for three different bike models: Himalayan, Twins, and Meteor. Because this is an industrial project, it was carried out in collaboration with Chennai Works, where proper design, material selection, fabrication, and testing were all carried out in their laboratory.

KeyWords: Sprocket, Sub-Assembly, Solid works, stepper motor and HMI devices.

I.INTRODUCTION

In a single machine, there are three sprocket variants with adapter sub assemblies. The machine is simple to use, and the process cycle time is kept to a minimum. The automation of the process is reaching its peak. Only a small portion of the process is semi-automated.

A.Drawbacks in existing machine:

- The majority of the operations are done by hand.
- Errors in the machine
- The machine proved difficult to operate.

B.Fixture:

- In the industrial sector, a fixture is a work holding and support device..
- Fixture is used to firmly place (put in a specified location or orientation) and support the work, guaranteeing that all components produced using the fixture are interchangeable and adhere to specifications.
- The primary objective of a fixture is to provide a stable mounting place for a work piece, allowing for greater accuracy, precision, dependability, and interchangeability in the completed components while in operation.

II. MODEL DESIGN

Initial design have been done in solid works where the necessary each parts have been designed with perfect tollerence value. The 2D model of the instrument is given in Fig. 1 and 3-D model is given in Fig. 2.

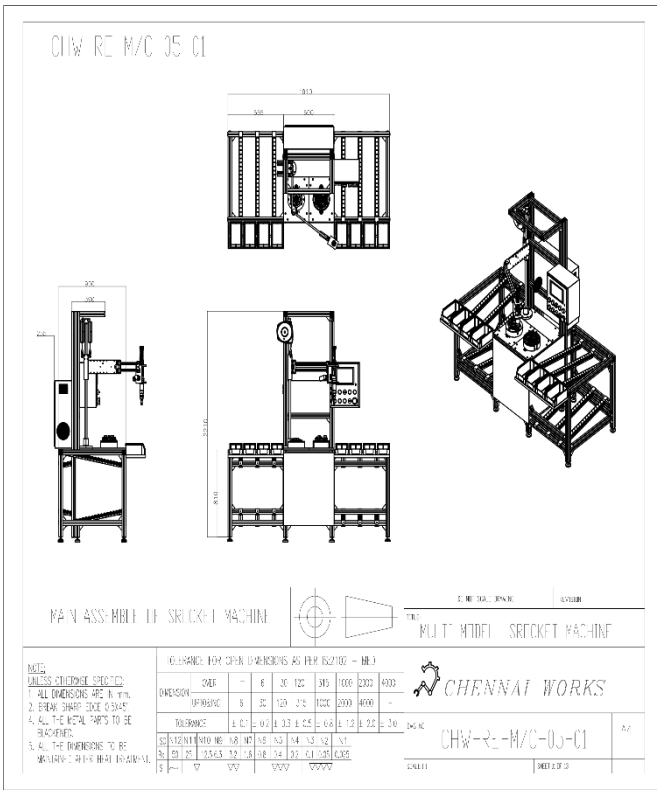

Fig. 1. 2D model in Solid Works

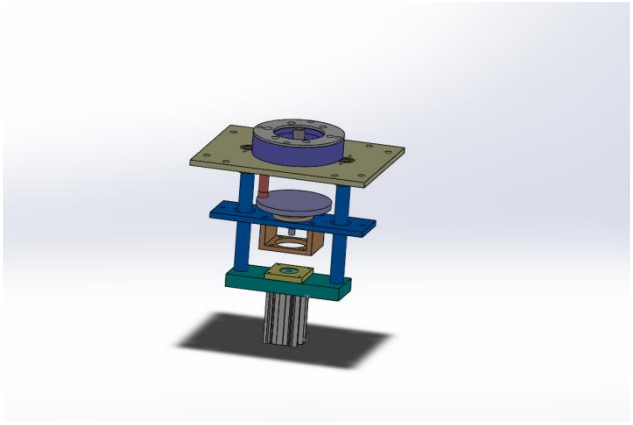

Fig. 2. 3D model in Solid works.

This design is made in Solid works Software. The total image in Fig.2 is an assembled 3-D, diagram. Each part like Motor mounting plate, Allen key holder, Index locator, Multimodel sprocket machine, Index mounting plate, Guide rod etc. were drawn in separate work bench named part design.

Each part was inserted into Assembly workbench by using a command named Insert existing component with positioning. Each component was placed in their respective position by giving certain constraints named surface constraint, coincidence constraint and offset constraint.

After giving constraints the Isometric view is selected so that the actual 3-D view of the machine is displayed. Finally, the screen shot is taken by snipping tool. The major sub parts are discussed below:

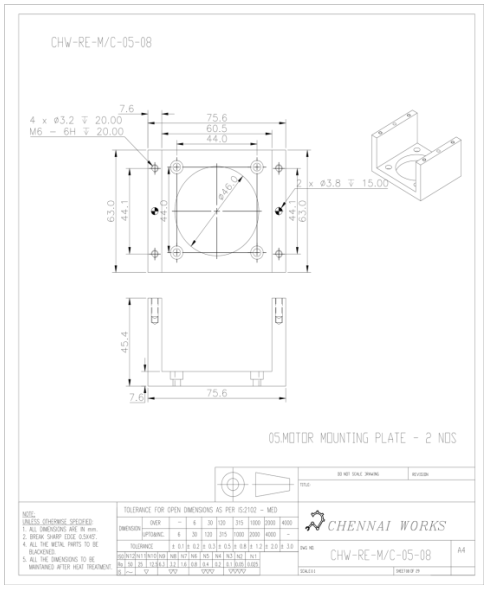

Fig. 3. Motor Mounting plate

A bracket is a decorative element in architecture. It is either a structural or a decorative component. This motor mounting bracket makes it simple and secure to mount motors. Motor mounting brackets are used to mount motors into HVAC units and other systems. The motor is held in place by these brackets, which are attached to (or within) the unit.

The geometry of the motor's frame, which must match particular NEMA criteria, determines the appropriate mounting bracket. DC motor brackets from Active Robots make it simple and secure to mount motors and other components in your projects, whether they're in robotics, electronics, or a bespoke creation. Some of the brackets come with screws and mounting holes, enhancing their versatility and ensuring that the machine is securely mounted.

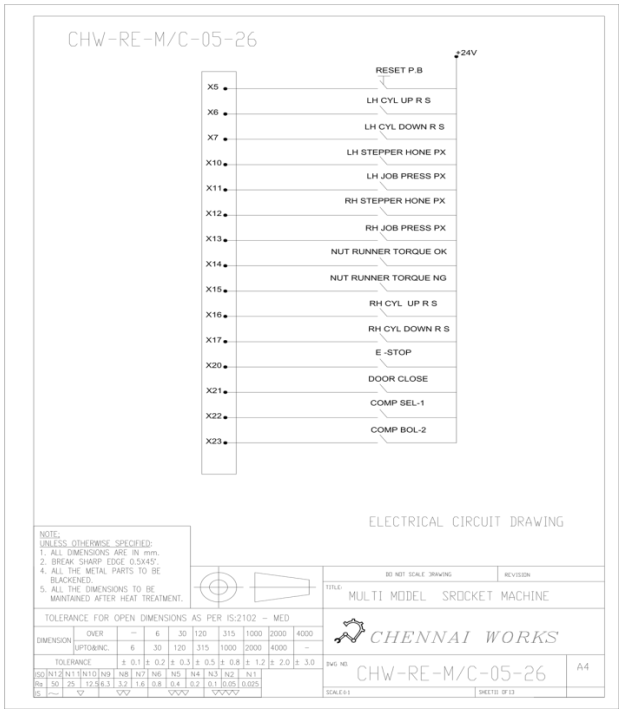

Fig. 5. Detailed electric circuit diagram for Machine

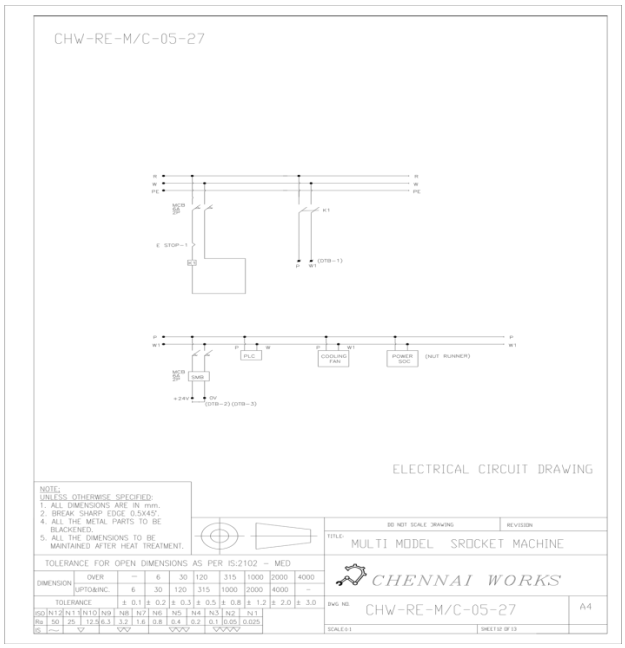

Fig. 6. Overall circuit diagram for the Machine

The overall circuit diagram is illustrated in Fig. 5 and the detailed circuid diagram for stepper motor, nut runner torque, right cylinder up and down emergency stop, door close and comp SEL-1 and 2 are depicted in Fig. 6.

A stepper motor is a mechanical device that converts electrical energy into mechanical energy. It's also a brushless, synchronous electric motor with the ability to partition a full rotation into a large number of stages. As long as the motor is properly sized for the application, the position of the motor can be precisely controlled without the use of a feedback device.

Switched reluctance motors are comparable to stepper motors. When a pulse of electricity is applied to the stepper motor, the theory of operation for magnets is used to cause the motor shaft to turn a specific distance. There are eight poles on the stator and six poles on the rotor. To complete one complete rotation, the rotor will require 24 electrical pulses to move the 24 steps. Another way to put it is that for each pulse of power received by the motor, the rotor will rotate precisely 15 degrees..

This motor is used to lock the necessary component of the job or component by supplying the motor proper energy and measuring the angle turned my the motor with a feedback system so that th Stepper motor comes to reat by recognizing that the necessary torque and turning angle have been generated.

III. EXPERIMENTAL SETUP

As ststed earlier the sprockets are to be connected with their adaptor sub-ashy. Initially the power control switch in on. Then the respective model from the 3 model setupo is selected.

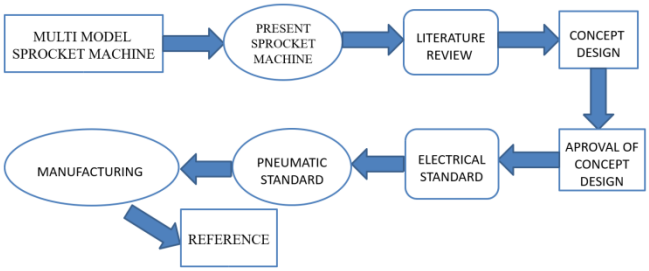

Fig. 3. Flow process of the work

The bolt is located later in order to join the 2 components in an industry with less time consuming process. Along the same time the adapter is also locted. The cyninder below the table in Fig. 4. is moved to ensure that the joining process takes place effectively.

Later the corresponding nuts are located on the sprocket and tightened using a Tight Nut still Achieved Torque to ensure that the proper torque is given to perfectly join the nut and bolt. The corresponding torque value is also indicated on the display dashboard to ensure that there is no error or minimal error is maintained between the set value and output value.

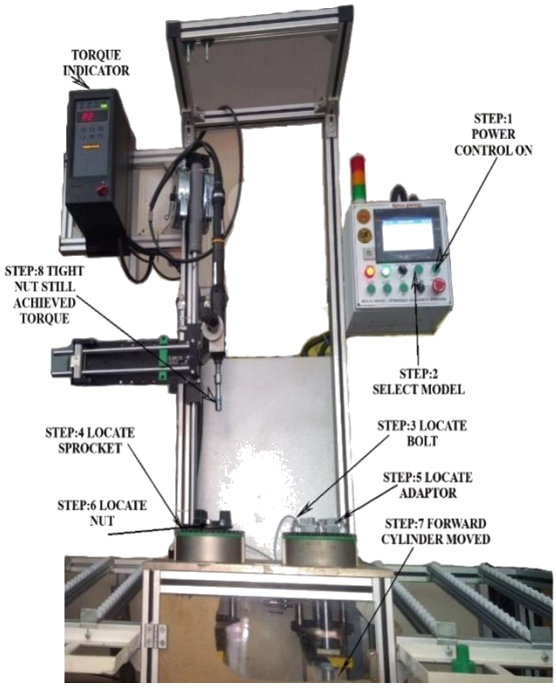

Fig. Experimental Setup

IV. RESULTS AND DISCUSSION

The results came out very well because a single machine is capable of joining 3 model sprocket and sub-ashy. So for service centers and manufacturing plants can adapot this technique to reduce the investment cont for purchasing new equipments and provided that an innovative idea can be created so that these type of equipments can be manufactured in India which is a proud thing to in India rather than purchasing a MNC product to perform a simple operation.

Moreover The HMI display device that was used in this product was very userfriendly to the humans to understand the torque value and other input value to be given to the system to change modelled sprocket and sub-Ashy joining process.

SUMMARY AND CONCLUSIONS

The multi-sprocket machine was successfully designed, built, and installed to combine the mentioned three bike models' sub-ash and sprocket. This will result in time savings, greater performance during the joining process, and finally effective communication with humans via HMI digital display displays and a simple parameter setting process for the next step in the process.

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