

CUSTOMIZATION OF SWAGING MACHINE

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Abstract - This is a paper on swaging process and customized swaging machine. Swaging machine is basically used to swaged the parts. Swaging means reducing the diameter of rod. It also used for giving specific shape. The paper deals about swaging .its types and development of new machine.

Keywords - Swaging, Tube Swaging, Rotary Swaging, Roller Swaging

I. INTRODUCTION

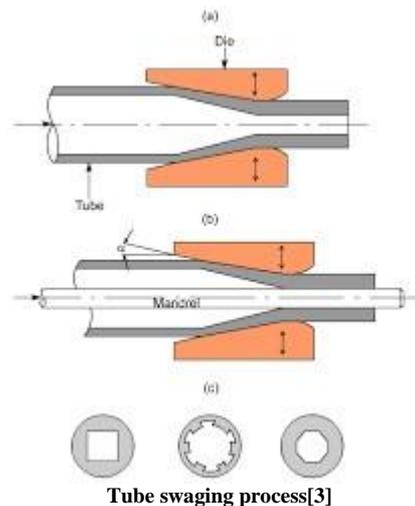
In swaging process, the diameter of a rod or a tube is reduced by forcing it into a confining die. A set of reciprocation dies provides radial blows to cause the metal to flow inward and acquire the form of the die cavity. The die movements may be of in – and – out type or rotary. The latter type is obtained with the help of a set of rollers in a cage, in a similar action as in a roller bearing. The workpiece is held stationary and the dies rotate. The dies strike the work piece at the rate as high as 10 to 20 strokes per second. So, the volume of production or the rate of production using the process of swaging is comparatively high as compared to the other metal working operation. So, 10 to 20 strokes per second can be given in order to change the shape of the raw material into the final product. Now, some of the examples or some of the application areas of swaging are as follows. Now, screwdriver blades soldering iron tips, all of us use screwdriver. So, the screw driver blade we see that they it has been given a flat shape, the one end is circular and circular cross section and the other end is having a flat cross section. The types Of swaging machines are as follows.

II. TYPES

A. Tube swaging:

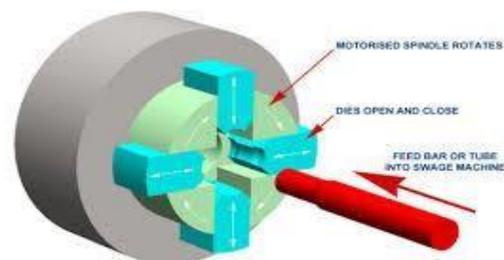
Cold tube swaging machines are commonly used with aluminum, copper, and thin steel. Rotary swaging, also known as radial swaging, is often a cold working process used to reduce tube diameter, produce a tapered end, or to add a point to a round workpiece. This type of swaging machine uses two or four dies that hammer up to 2,000 a minute. Dies are mounted on the machine's spindle, located inside a cage containing rollers, which is rotated by a motor. As the spindle spins inside the rotary swaging machine, the dies push out to ride the cage by centrifugal force. When the dies cross the rollers, they push the dies together due to their large size. Like tube swaging, rotary swaging can also create internal shapes inside

the tube through use of a mandrel, as long as the shape has a constant cross-section.



B. Rotary swaging:

Rotary swaging machines are common in two basic types, standard and butt swaging. Butt swaging machines contain sets of wedges that close the dies onto the workpiece by placing them between the annular rollers and the dies, often by use of a foot pedal. These swaging machines allow the piece to be inserted without the dies closing on it. Common applications for swaging machines include attaching fittings to cables or pipes, pipe flaring, sawmilling, fire arms and ammunition, rubber components, automotive components, aerospace applications, agricultural machinery etc.



Rotary swaging process [3]

Rotary swaging tooling steels and operating conditions:

Tooling is made of either a high speed tool steel or a high carbon low alloy steel with major alloying elements of Chromium, Molybdenum, Tungsten, Vanadium, Cobalt and Nickel. These tooling steels.

The main function of the swaging lubricant is to carry out the swaging debris and to transport heat away from contact zone. Swaging operation requires friction between dies and the part. However, tooling surface integrity and durability requires low friction and oil film in the contact zone of tooling. This makes the selection of a swaging lubricant a very challenging task[10]

III. CUSTOMISED SWAGING MACHINE (ROLLER TYPE)

These types of swaging machines are used for high production rate and quite reliable. Some companies used also a customized swaging machine which are preferable for specific work which is beneficial for company instead of using conventional machine. Roller swaging machine is one of that kind .It is generally used for drawing MI(mineral insulated) cables which are used for making thermocouples.



Customized Roller Swaging Machine
(Me. Thermal Instruments PVT Ltd) [4]

Parts of roller swaging machine:

- 1) Rigid frame support
- 2) Contoured rollers
- 3) Electrical unit
- 4) Power transmission unit

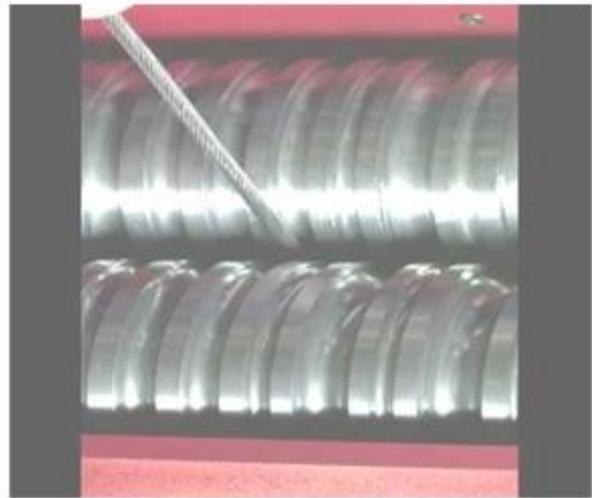
A. Rigid frame:

- Every machine needs rigid frame support to ensure proper working of it.
- Lack of good support induces a vibrations ultimately reduces life and working efficiency of machine.

- Rigid frame is generally made of cast iron and grounded by means of foundation bolts.

B. Contoured rollers:

- The pair of cylindrical rollers are used having such a contour that their meeting surfaces form a die cavity .
- The system is such flexible that the die cavity size along its length is variable.
- The roller shafts have spur gears on its one end and two shafts meshed with main shaft by another gear.



Swaging rollers [4]

C. Electrical unit:

- This unit includes a motor, governing switch to forward motion of rollers.
- The motor has power rating of 5 to 10 hp. The motor has 3-phase power supply.
- The governing switch is as same as the switch which is used for operating pump motor.

D. Power transmission unit:

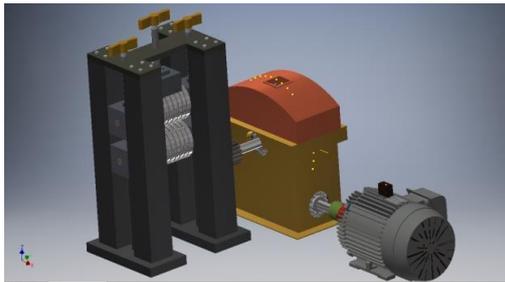
- The rpm of motor is about 1500 to 2000 rpm and that much is not useful for proper machining.so to achieve a working speed gearbox is used.
- Gearbox reduces the speed considerably upto 100200 rpm.
- The power is transmitted to the rollers by means of chain drive. The main shaft of machine is coupled with gearbox by chain.
- The roller shafts are meshed by using spur gears.

IV. NEW PROPOSED MODEL OF SWAGING MACHINE

- 1) The main drawback in that conventional machine is that it required more floor space area.

- 2) Only forward motion is provided to the rollers so for retrieval of the MI-cable(Mineral Insulated Cable) we need both directional switch.
- 3) Also the belt drive is used for transmitting power from motor to gearbox and chain drive is used for transmitting power from gearbox to the main shaft of machine and then to the rollers so there is chances of slipping.
- 4) Mechanism is complicated and requires space.

So to eliminate this drawback, we proposed new model of swaging machine by analyzing the process completely.



New proposed model of swaging machine

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