YASKAWA

A World of Automation Solutions

ac variable speed drives, with indexing software.

The drive/software combination, developed by Yaskawa, controls indexed loading and unloading of tie rods in a heating and shaping operation for a major automotive manufacturer.

In the application, unfinished 3/4 to one inch diameter bars move from an upstream processing operation and are discharged into a holding area.

The tie rods are then individually picked and transported to one of six heating station positions, where a 10-second induction cycle heats the leading four inches of the bar until it glows bright red.

The programmed sequence begins with an initial operating command provided as a digital PLC output.

Three binary inputs to the Yaskawa ac flux vector drives are used to select positioning options; including the six heating positions and "home."

Utilizing sophisticated encoder feedback from the driven motor and encoder pulse counts programmed into the drive, the motor is directed to move the required number of revolutions to achieve precise placement at a given position.

Four Drives Handle Complex Cycling. As the first tie rod is being heated and pressed into the finished form in Position One, the picker is returning to the "home" position to move a second piece to Position Two and so on, in a continuous cycle through six heating positions.

At the same time, another picker is using the identical software on a second drive to remove finished tie rods and place them back on the line.

The tie rods then move to the next station where two more drives transport parts into their proper positions as the other end is heated and shaped.

Keypad Programming, Digital Repeatability. Set-up for the multiple-cycle operation is accomplished with comparative ease. The operator simply programs in the number of encoder counts required to achieve the desired position. Accurate, digital feedback is then provided by the motor's encoder wheel.

Controlling the motor by counting pulses sent to the drive is extremely precise. A motor equipped with a magneto-resistant encoder wheel produces 1,024 pulses with each rotation.

It is simply necessary then, to determine how many motor turns - or fractions - are required to move the picker from position to position. Once determined, that number - multiplied by 1,024 - is programmed into the drive, with instructions for the drive to run or stop a given motor when that number is reached.

Programmed Relative to "Home" Position. In this application, heating position information is programmed in relative to the "home" position. The PLC tells the drive which tie rod to pick up and where to place it via three binary inputs. The drive accomplishes the horizontal move by monitoring the pre-programmed encoder pulses.

The pulse encoder provides instantaneous communication and digital repeatability of run/stop information for extremely accurate positioning control. Likewise, changeovers and production modifications are easily handled through the drive's digital repeatability.

Precision, Accuracy, Ease of Setup. Since installation, advantages of Yaskawa's advanced drive technology and programming capabilities in this indexing application have been shown to include:

- Consistent precision positioning through extremely accurate pulse monitoring,
- Instantaneous communication and repeatability of run/stop information for precise indexing control.
- Set up Ease and accuracy through digital programming.
- Parameter adjustments easily carried out through software rather than expensive hardware adjustments.