



YASKAWA

Turn Table Indexing Application

Yaskawa's high-performance variable speed ac drive combined with a software package, custom-designed to improve positioning accuracy and replace troublesome limit switches in a complex automotive welding operation, has produced impressive results for a Big Three automaker.

The drive/software combination, developed and installed by Yaskawa, is matched to requirements outlined by a major supplier of technology and assembly equipment to the automotive industry.

As installed, the package functions on one of the most accurate and detailed indexing softwares available, utilizing a quadrature, differential encoder feedback signal from the driven motor to advance and position a turntable during robotic welding operations.

The operation utilizes a Yaskawa General Purpose ac drive and motor package operating in flux vector mode to rotate a turntable that positions and holds an automobile body assembly for robotic welding.

The object is to advance the turntable to a precise position and hold that position while numerous welds are applied to the car body. At the finish of the welding operation, the body is removed and returned to the production line. The empty turntable is then positioned to receive the next body, completing the cycle.

Prior to installation of Yaskawa's drive/motor combination, the motion profile was carried out through a series of troublesome mechanical and proximity limit switches. Movement was initiated by a high-speed run command to move the turntable forward. The turntable would then hit a limit switch, slow down, creep to another switch, and then stop.

Drive, PC Improve Positioning Accuracy

Utilization of sophisticated encoder pulse feedback from the driven motor to advance and position the turntable provides greater accuracy and eliminates most of the potentially troublesome limit switches. The operation is both faster and more accurate.

Turntable positioning is based on actual, real-time encoder feedback from the driven motor. Home position is determined by a proximity switch and the encoder's marker pulse, providing accuracy and consistency. As redesigned, this is the only limit switch in the system.

Keypad Programming

System set up is easily accomplished, as the operator simply programs in the desired position. Accurate, digital feedback is then provided by the motor's encoder. Desired "advance" and "return" positions, as well as acceleration and deceleration ramps are programmed in relative to the "home" position.



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Controlling the motor by counting pulses sent to the drive is extremely accurate. A motor equipped with a magneto-resistant encoder wheel produces a given number of pulses with each rotation.

If a half-turn is required to achieve proper positioning, the drive simply sends a run signal to the motor. When the exact number of pulses necessary to achieve that position have been received by the drive's sensor, the drive sends another signal for the motor to stop.

Rather than deal with individual pulse counts, the operator need only program in the number of full motor revolutions required to achieve a specific objective.

Precision, Accuracy, Digital Repeatability

Instantaneous communication and digital repeatability of run/stop information provides extremely accurate positioning control. In comparison, limit or proximity switches in the same application might not close for more than an inch or more of positioning travel. In fact, a limit switch simply cannot activate at the same position every time, and will virtually always travel past the desired stopping point.

Benefits of Yaskawa's advanced VFD technology to this sophisticated positioning operation have proven to be:

- *Positioning precision through encoder feedback.*
- *Set up ease and accuracy through digital programming.*
- *Increased process reliability through elimination of most limit and proximity switches.*
- *Parameter adjustments and modifications easily carried out through software rather than through expensive adjustments to turntable hardware.*