Control Rotary Assembly Table Systems With SEL Automation Products

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INTRODUCTION

Manufacturers commonly employ rotary assembly tables to automate progressive assembly lines and save production floor space. Using SEL automation and communications products will simplify integration of assembly equipment from various original equipment manufacturers (OEMs) and provide reliable system performance.

ROTARY ASSEMBLY SYSTEM OPERATION

Rotary assembly systems provide a means to automatically manufacture components that require progressive assembly. The table features a number of nests containing in-process parts. The partially assembled components reside in these nests and rotate on the table to manufacturing stations, which are in fixed positions around the table. The stations are quiescent while the table rotates. The parent control system notifies the stations when the table reaches a dwell location, and each station performs its assembly and testing tasks.

All of the stations operate simultaneously while the table dwells in a fixed position. Assembly stations contain a variety of equipment based on the work they perform, including robotic pick-and-place systems, tapping and drilling machines, sonic welders, hydraulic presses, or visual inspection units.

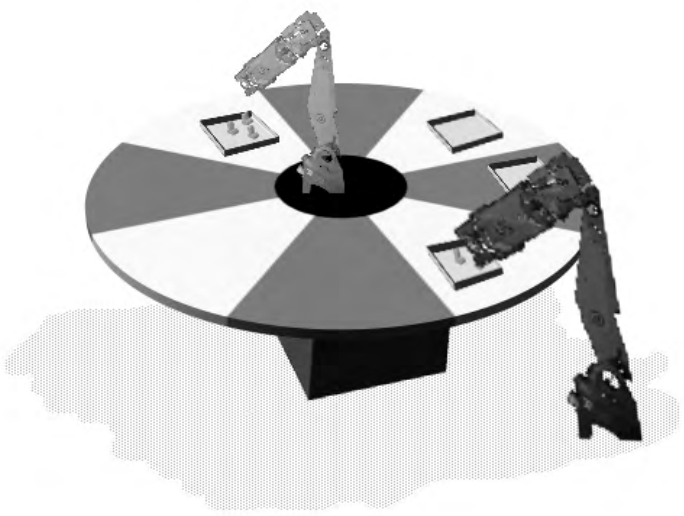

Figure 1 Rotary Assembly System Conceptual View

SEL SOLUTION

Users must integrate a number of different machines in order to achieve the desired performance of a rotary assembly system. Frequently, they design the controls in a parent-child arrangement, with the table controller acting as the parent and each assembly station acting as a child.

Human-Machine Interface (HMI) and Table (Parent) Controller

As shown in Figure 2, the SEL-3354 Embedded Automation Computing Platform operates as a local HMI for the entire assembly system. Operators may manually run any of the stations or jog the table to a specific position. Otherwise, they place the system in automatic mode and use the HMI screen to monitor the system and identify alarms.

The SEL-3530 Real-Time Automation Controller (RTAC) is the parent controller for the system. It recognizes when all of the station assembly equipment are clear and complete and then signals the table drive to index one position forward. When the table drive provides feedback that it is at the next index, the RTAC signals the assembly stations to begin their individual sequences. Assembly stations report alarms or faults to the RTAC so that other interfering motions may be halted. For example, the RTAC will not allow the table to index if there is a fault at one of the assembly stations that creates a mechanical interference. The SEL-2440 Discrete Programmable Automation Controller (DPAC) integrates all of the miscellaneous I/O for the system, which could include operator safety barrier alarms.

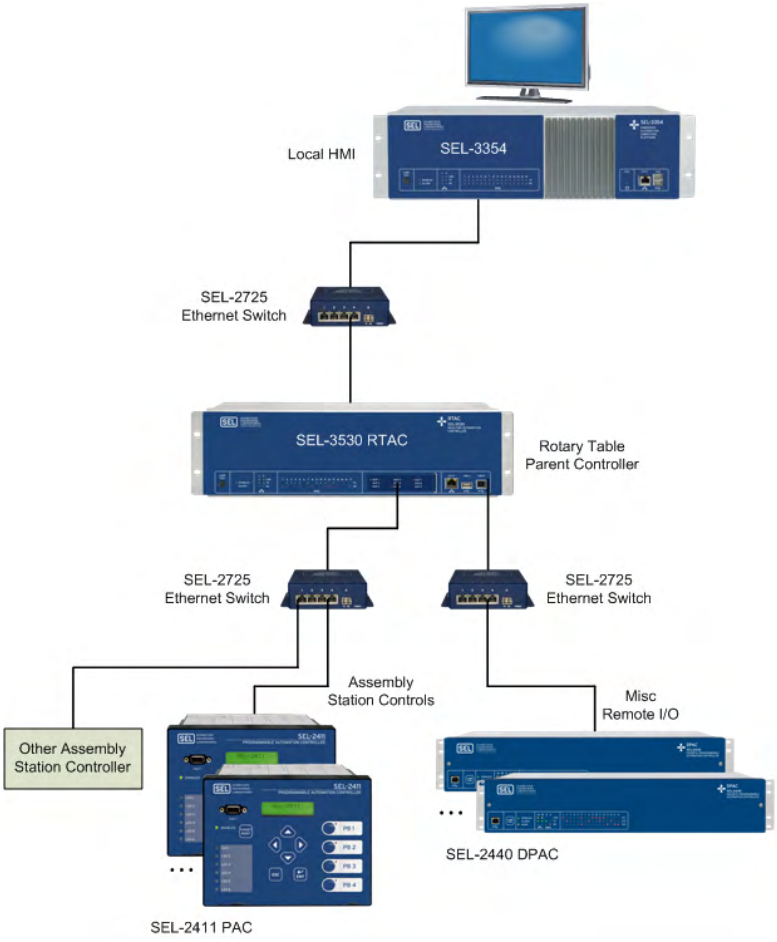

Figure 2 Rotary Assembly System Communications Network

Station (Child) Controllers

Use SEL-2411 Programmable Automation Controllers (PACs) to control individual assembly stations. These may include single-axis hydraulic controls or an interface to a multiaxis robotic system. The PAC acts as a child controller to the rotary table, performing assembly when a command is received from the RTAC. The PAC also monitors needed digital and analog I/O and reports sequence completion to the RTAC so that the table may rotate again.

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