



*Application Story: Daimler Chrysler*

## COMMON CONTROL SCHEME ACHIEVES UNCOMMON RESULTS AT CHRYSLER GROUP TRANSMISSION PLANT...PRACTICALLY SPEAKING

With over 250 pieces of machine tool, material handling, transfer line and other equipment, development of the new Indiana Transmission Plant II (hereinafter ITP2) was a real challenge, according to Julian Joe, DaimlerChrysler Advance Manufacturing Engineering (hereinafter AME) controls/plant engineering manager.

Different machine tools and other equipment were to be constructed in various countries worldwide for this plant.

Chrysler Group operates three transmission plants in Kokomo, Indiana, with ITP2 producing the W5A580, a rear-wheel drive transmission designated for use in the various vehicles including the Chrysler 300, Dodge Magnum and Jeep® Grand Cherokee.

Initial production at ITP2 only began in June, 2003 and production goals were quickly reached.

During the design phase of the ITP2 facility, over 40 machine tool suppliers were issued a comprehensive set of performance and data transfer requirements. For each machining operation, there were specific targets to be achieved.

At the other two existing Chrysler Group transmission plants in Kokomo, a majority of the machine tools had resident (non-network) CNC or PLC controls onboard. Based on input from these other plants, AME drafted a white paper on the control technology, previous experience with suppliers, the need for operator interface commonality, the quality control system and the connectivity requirements for ITP2. Siemens was able to incorporate Chrysler Group's requirements into its TRANSLINE System Solution. The result was a system-wide solution for the ITP2 plant that leveraged the global standards of TRANSLINE along with Chrysler Group's plant-specific requirements.

Simultaneously, the core strengths of existing hardware at NAG1 were evaluated by the AME team, following visits there. As Kulraj Randhawu, AME controls engineer, pointed out, "For our purposes at ITP2, everyone agreed connectivity was key, plus we were beginning to realize the need for a common PC front end on all the controls. This conclusion was driven by our personnel allocation strategies and flexibility requirements, more so than either NAG1's protocols or even our own experience at the other Kokomo plants."

Approximately 160 CNC and 400 ancillary PLC devices were required for the plant's various machine tools, transfer lines, robots and other materials handling devices.

One of the essentials in assigning the controls specifications, according to Julian Joe, was "to develop an overall framework of operations which was as comprehensive as possible, to determine if the machine builders might utilize common display language and screens."

In a massive time project, AME isolated all the specifications and functionalities for ITP2 and arrived at a commonality for all operator interfaces.

Every machine builder was then given the option to choose a control provider. As Joe observed, "The more we came back to the notion of common control schemes, the more we favored Siemens and their TRANSLINE system solution. However, we did not mandate a control to any machine builder, at any time during this process," he emphasized.

Siemens offered its web-based SITESCAPE technology to facilitate better transfer of all information, especially changes, to all the builders whose machines would ultimately communicate on the factory floor at ITP2.

**Above left:** Cinetic Automation provided this first stage of clutch front carrier assembly equipment. All operator screens are identical, using the Siemens TRANSLINE system. All process data run to an intermediate zone controller, via PROFIBUS. 18 zone controllers are located throughout ITP2.

**Above center:** Siemens SINUMERIK 840D with HT6 handheld pendant on a VILO unloading gantry system. As the transmissions are completed, each pallet is scanned and identified by vehicle destination before final packaging and shipment.

**Above right:** Heller transfer lines feature Siemens 840D CNCs on all machines, as well as the TECH-TRAK asynchronous pallet transfer system from Westech Automation. Three (3) zone controllers and a master control operate this massive system.



made it easier to transition from machine to machine. Ironically, he pointed out, the programming flexibility of the Siemens control and its open architecture create myriad possibilities for combining different language protocols within the same programming block. Some challenges do occur when merging source code files, especially if changes have been made.

Laubsch echoed this assessment. He'd not previously worked with Siemens controls, having come to ITP2 from ITP1, where he worked primarily with other manufacturers. He especially cited the direct integration of Siemens PLC, CNC and PROFIBUS field bus. "Because of the simplicity of the PROFIBUS system, there are far fewer hardware I/O issues." He further noted the common TRANSLINE HMI screens work extremely well in terms of operator identification and troubleshooting.

Laubsch did mention one particular challenge his team faced, as the machines began to arrive from the builders. "Ladder logic had been specified for all the machine tools. Our electricians had some trouble understanding what they were seeing," though he noted replacements were sent immediately.

"Our operators respond very positively to the TRANSLINE system solution, as there are nearly 100 machines and ancillary equipment in our area and all but a few are on the system." Siemens also provided the drive and motor packages for most of the machine tools, rotary indexers and heat treat equipment in this department.

Dean Bazata approaches TRANSLINE from a somewhat different angle, as his focus is tooling at ITP2. He had extensive experience on GE Fanuc and Allen-Bradley controls, but little on Siemens.

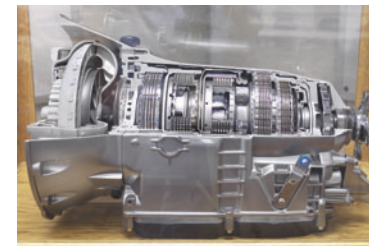


"What we noticed from the outset was the training time reduction. The common screens gave our operator great flexibility in-plant, as most of them can run several different machines with ease."

He described the process for tool changes. "Chrysler Group design will take suggestions from us for cost improvements or their engineers will develop better durability solutions. The changes then pass through manufacturing engineering and come to me. We review the changes and, if we agree, a change is implemented. These changes can involve materials, speeds, feed rates, tooling styles, even programming tool orientations. The PC-based front end and especially the Siemens HMI are very easy to navigate and that makes changes much easier to execute." ■

Magdeburg slant bed lathe and two indexing turrets with 840D and HT6 pendant control, used for clutch retainer machining. The machine features Siemens Moore gaging, using PCU50 controls for the gaging, probes and data storage. All are linked on TRANSLINE system. The handheld pendant here is used to teach the gantry its control functionality.

Friction and separator plate build-up for the clutch housing on the W5A580 rear-wheel drive transmission. A Siemens SIMATIC PLC and SIMODRIVE 611U drives manipulate the Nachi robot. The robot stacks four plates, a camera checks the sequence and a scanner reads the RF tag on the pallet.



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