Exsys Case Study

Capturing Specialized Manufacturing Knowledge

Ford Motor Company

Paint booth maintenance is viewed as a constant chore in an auto manufacturing plant. Airflow affects finish quality, transfer efficiency, maintenance, and worker health and safety. The air handling system in the booth is highly complex; more than fifty interrelated factors can contribute to air imbalance, and identifying and correcting these problems requires specialized manufacturing process knowledge that is often understood by only a select few Subject Matter Experts (SME). To put the knowledge of these experts in the hands of plant personnel, who need access to this expertise often and immediately, Ford Advanced Manufacturing Technology Division (AMTD) uses an Exsys Corvid® expert system to identify the causes of booth balance problems. The system, which was piloted only four months after development began, captured ten years of specialized knowledge that otherwise may have been lost when the SME's left the department. Ford's system is designed to not only correct problems when they occur, but to identify areas where maintenance needs to be done before production is interrupted.

In addition to being a powerful diagnostic tool, Ford AMTD's Paint Booth Air Balance Diagnostic and Training Program provides a storehouse of pertinent knowledge and serves as a real-world training instrument. The expert system provides immediate access to reference materials in a user-friendly framework to skilled trades personnel on the plant floor. The system guides plant personnel through a series of easy-to-understand yes or no questions or numerical input prompts; consequently, little up-front training is required. Skilled Trade Workers at Ford describe Corvid as "very easy to use," and commented that the training program was "one of the best we've ever taken." By combining the Corvid expert system with a computerized booth balance simulation, Ford created a training program whose effectiveness far surpasses traditional classroom instruction.

"By using our engineering understanding, experience, and Corvid, we were able to simplify the diagnostic approach because we understood the system's behavior," said Ernest Tong, a member of Ford AMTD who helped to develop the system. "These enabled us to create a simple, robust diagnostic tool because we knew what was important and what could be ignored."

The Paint Booth Air Balance Diagnostic and Training program was piloted at the Ford Michigan Truck Plant. Tong demonstrated the program at the Paint Technology Workshop at the University of Kentucky, where it gained the interest of several other auto manufacturers. The success of Ford's program, coupled with recent data from a plant running an automatic control system that shows a positive link between good air flow and improved quality, has resulted in plans for the software to be installed as a part of several other Ford plants' refurbishment projects.