amt
applied manufacturing technologies, inc.

Software Helps Speed Robot Adjustments

Applied Manufacturing Technologies
219 Kay Industrial Drive, Orion, MI 48359
(248) 409-2100 www.appliedmfg.com

2

Changing Paints Doesn't Have to Mean Lots of Down Time

Changing only one component in a robotic production process can be a costly endeavor despite the versatility the technology offers. In the context of painting and dispensing, such changes are not uncommon as new materials requiring process adjustments are developed.

To be sure, the change-over is rarely quick and cheap, and the expense grows with the size of the number of robots as one truck manufacturer discovered.

Applied Manufacturing Technologies, Rochester, MI, a specialist in programming robotic controls for paint and spot weld processing was called in to reprogram a complex robotic paint process to produce a faster and less expensive process to accommodate a new, more viscous, clear coat compound. Clear coat is the final top coating applied over the base paint on a truck or car.

The paint line consisted of 30 Fanuc P155e Robots with RJ controllers and Sames 60 degree bell applicators for the end-of-arm tooling. Sixteen truck body styles (eight bodies with two-tone options for each) are sprayed in the line.

To accommodate the heavier new clear coat, this process required re-calibrating approximately 200 paths per robot, each with up to 60 different robot locations. More than 12,000 target locations had to be reprogrammed.

In handling the paint dispensing application, AMT personnel had to consider fluid flows, the bell's turbine speed and the shaping air, which controls the pattern of the paint when applied to a surface.

AMT estimated that the standard manual process - using teach pendants - would require up to four months, including four weeks of production down-time, an average of 20 scrap trucks, as well as thousands of gallons of paint.

AMT''s challenge was to reprogram this manual process efficiently and cheaply. AMT had been using Technomatix's ROBCAD Computer Aided Production Engineering (CAPE) software tools to create painting programs for auto makers. The company again decided to use ROBCAD/Paint.

AMT uploaded an existing path program from one of the robot controllers, then calibrated the clear module and cell to work with it.

After incorporating the specific truck CAD data supplied by the manufacturer, AMT created and ran a program using ROBCAD/Paint and TDL Controller, a ROBCAD programming language. AMT tweaked the variables until ROBCAD simulated the identical film build the truck maker wanted achieved on the plant floor. These variables included fluid flow, fan pattern, target distance, robot speed, viscosity of fluid, and the densities in wet and dry percentages.

Once this process cell was calibrated, AMT modified the path program with the clear coat parameters. Following testing on the plant floor, AMT uploaded the remaining, existing paint programs from the robot controllers and repeated the process.

After the entire process was simulated and tested off-line, the new paint programs were downloaded to the 30 robots. The process was up and running in 1.5 months with only two weeks of production line downtime and minor manual tweaking.

Minor adjustments were needed. In some instances, the robots' reach had to be changed manually - specifically when reaches hit high and low-axis limits. Cycle time adjustments also were made.

Another tweak involved situations when the robots reached corners or sharp edges of sheet metal. Because it is currently not possible to simulate the effect of electrostatic painting - a technique in which the paint is positively charged to increase its adherence to the grounded truck - AMT used experience and a little guesswork to make the modifications.

Finally, AMT manually adjusted the overlapping of two robots near the center line to achieve maximum accuracy in evenly applying the clear coat.

AMT cut the reprogramming process time in half compared to adjusting all the robots entirely by teach pendant. The company also saved more than 1,000 man hours and substantial expense in scrap trucks and clear coat compared to making the adjustments without the use of software.