

## Controllers guide robot heads over complex curves

It can be tricky to synchronize highspeed moves over irregularly curved surfaces. But controllers from **Delta Tau**, Chatsworth, Calif.

([www.deltatau.com](http://www.deltatau.com)), handle the job with ease.

The computer-controlled automated ultrasonic inspection systems (AUIS) from **Matec Systems**, Northborough, Mass.

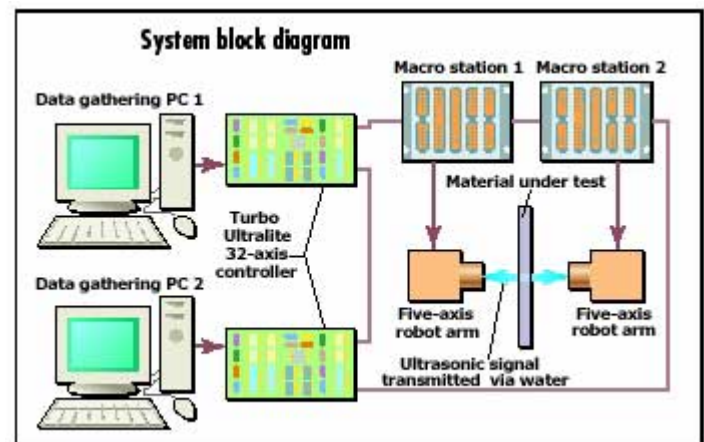
([www.matec.com](http://www.matec.com)), perform nondestructive testing of aerospace components, providing a detailed image of the material under test. Two PMAC2 Ultralite motion controllers handle two five-axis robot heads. The controllers are housed in separate PCs and communicate via a Macro fiber-optic network using Macro reduced wiring between the machine and control room. Macro stations are located 60 ft from the data-acquisition PCs and interface to **Yaskawa** servodrives that power the motion axes. In addition to the 10 axes of robotic material, the controller also handles two axes of material handling. The controllers handle all 12 axes simultaneously while providing position-compare latching data to the data acquisition system to create the material mapping profile.

The two five-axis robotic squirters direct a stream of water on either side of the part. An inverse kinematics feature on the controller synchronizes the water-stream tips which transmit ultrasonic signals from one water stream to the other. Inverse kinematics make joint position calculations on the fly, letting the robot tips be programmed in Cartesian coordinates. Plus, the tool tip velocity is maintained along the path.

The system has a material scanning rate of 1 kHz. A look-ahead feature optimizes the motion path by automatically adjusting motion-profile acceleration and velocity. It also increases throughput by allowing the manipulator to run faster along smoother sections of the path.



The automated ultrasonic inspection system checks aircraft wing sections using water squirters that transmit ultrasonic waves to detect defects.



Two PMAC motion cards control the two five-axis robot heads, letting them run independently or synchronized with one another.