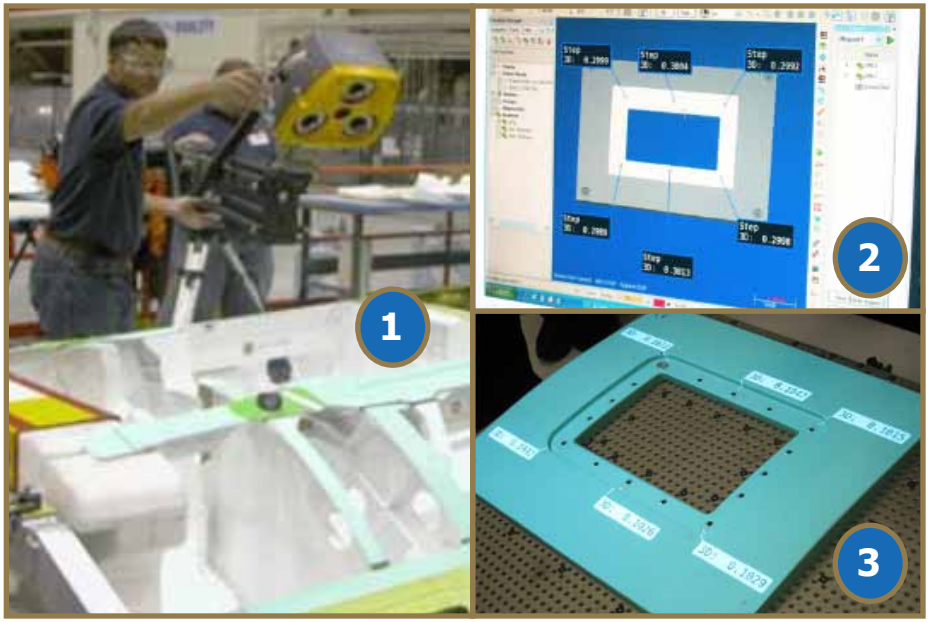
Optical Assembly Control

RAN Science & Technology, LLC
Opening new frontiers in scientific innovation



Concept of Operation (CONOPS)

The non-contact OAC measurement system provides aircraft outer mold line (OML) assembly technicians with the fastest, easiest and most accurate dimensional control of stucture assembly available.

With a pre-programed optical projector directing the operator where to point the white-light metrology measurement "camera" on the frame, he "shoots" the frame thickness and the information appears graphically on a touch-screen computer. The computer software compares the frame measurements with those of the skin to be applied in that position (previously measured using the same system), and calculates the thickness of the shims needed to be inserted between the surfaces to achieve a step diffential to adjacent surfaces of less than 0.0002 in. The computer then relays this information to the projector, which displays the correct shim size identifier adjacent to each frame hole. This cuts assembly time in half while increasing the accuracy of the final surface. The operator has the option of executing this operation on one or multiple sections at a time.

Benefits & Applications

RAN Science & Technology and Hexagon Metrology have together developed and tested a metrology measurement system that will cut the time needed to assemble skins to an aircraft fuselage in half.

The system has been designed to be extremely easy to use and to minimize or eliminate the possiblility of damaging the aircraft in any way. Its measurement accuracy is unsurpased – better than ±0.0002 in. with repeatability better than ±0.0001 in. Thickness data is electronically stored and made available during assembly. Additionally it provides the user with touchscreen control over all OML control functions and archiving of data.

In a Figure of Merit analysis comparing the OAC with eight other technologies (aircraft assembly time saved divided by unit cost, with the additional factors of measurement resolution and ease of use), the OAC significantly outperformed the other technologies.

Another example of RAN opening new frontiers in scientific innovation.

Technology & Innovations

Optigo Stereovision white-light metrology system

The OAC System is comprised of four key components:

1. An Optigo Stereovision white-light, non-contact metrology system to measure the frame and skins
2. A COTS computer system with customized measurement software and touch-screen interface
3. A programmable optical projector directing the user where to point the Optigo and calculate the thickness of the shim for that specific location. It also provides assembly guidance by displaying the correct shim identifier on that location
4. A custom mount and all necessary cabling

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