

# AVIATION WEEK *& SPACE* TECHNOLOGY

A PUBLICATION OF THE MCGRAW-HILL COMPANIES • \$5.00 • OCTOBER 20, 1997

## RUSSIA'S TRANSAERO PIONEERS FREE MARKET COURSE

PAGE 68



## MANNED RECON MAKES A COMEBACK

PAGE 72

## 3D Database For 747 Panels

Edward H. Phillips/Grand Prairie, Tex.

Boeing and Northrop Grumman's Commercial Aircraft Div. are implementing an Accurate Fuselage Assembly program using a three-dimensional, digital database to build fuselage panels for the Boeing 747 that eventually will eliminate "hard" tooling and reduce cycle time and costs.

The \$100-million AFA program, under development since 1994, is projected to reduce production cycle times for the fuselage panels by 50% and production costs by 25%, said James Hoover, Northrop Grumman's vice president and deputy general manager at the Grand Prairie facilities. He estimates that full implementation of AFA will eliminate nearly 100 conventional tooling fixtures, cut skin panel inventory by 50% and decrease floor space required by 75,000 sq. ft.

Integrated product teams (IPTs) of Northrop Grumman and Boeing engineers have almost completed the transfer of 30-year-old 747 drawings into the database, which is being integrated with Northrop Grumman's new tooling and manufacturing processes.

By digitally defining parts for production, minor manufacturing variations from one part to another are eliminated during the automated fabrication process. Northrop Grumman has begun delivering a limited number of AFA-built panels to Boeing, and about 40% have been converted to the process.

The company builds the 153-ft.-long center fuselage segment at its Hawthorne, Calif., facility. The structure extends from behind the cockpit aft to the empennage, and consists of 28 panels, 11 doors, 105 floor beams and 750,000 fasteners. It weighs about 42,000 lb. and is the largest 747 structure subcontracted by Boeing, according to Hoover.

A second phase of the AFA program centers on new tooling and manufacturing processes. Chief among these is the Flexible Skin Trim and Drill Center that features two Cincinnati Mil-

A 10 X 100-ft. platform uses universal holding fixtures that reduce set-up time by two-thirds.

lacion 5-axis, high-speed gantries and a 10 X 100-ft. tool table for trimming and drilling contoured fuselage panels. The machines can produce enough panels to build five 747s each month.

The table essentially eliminates conventional "hard" tooling, and includes universal holding fixtures or "pogos" that reduce set-up time by two-thirds for trimming and drilling more than 100 different parts of the fuselage skin. Two controllers for the pogo fixtures are capable of simultaneous, multiple table configurations to achieve the desired shape of each part. The 747's fuselage has a "unique" profile, especially in the upper, forward deck area, that demands precision conformity, Hoover said.

In addition, the company is installing stringer drilling machines, and is modifying automatic riveters for numerically controlled installation of rivets in the panel assemblies. By automating the riveters, additional tooling normally used to hold and drill each piece is eliminated and panels can be precision-drilled for "snap-together" assembly of large panel sections.

The final phase of AFA will be completed by Boeing's 747 Fuselage Assembly Improvement Team, which uses digitally defined coordination holes to accurately index large, multipanel assemblies with other panels as well as the floor structure.

