

COMMERCIAL

Where it all comes together — ‘and *has* to fit’

777 Final Body Join reaps benefits of Hardware Variability Control

By ROBIN REES

Under the glare of overhead lights and noise of heavy machinery, a constant struggle takes place in the Final Body Join area: Employees strive to join large sections of an airplane.

Incredibly small variations in the shape of each section — unnoticed at first — loom large when each section is joined to its neighbor. Employees on the 777 program are waging a successful war on variation in the Sections 43/44 and Sections 44/46 join areas. They credit their success to Hardware Variability Control and Lean Manufacturing.

While Lean Manufacturing works to eliminate waste in the way each airplane is built, Hardware Variability Control focuses on eliminating variation, from detail parts to large assemblies.

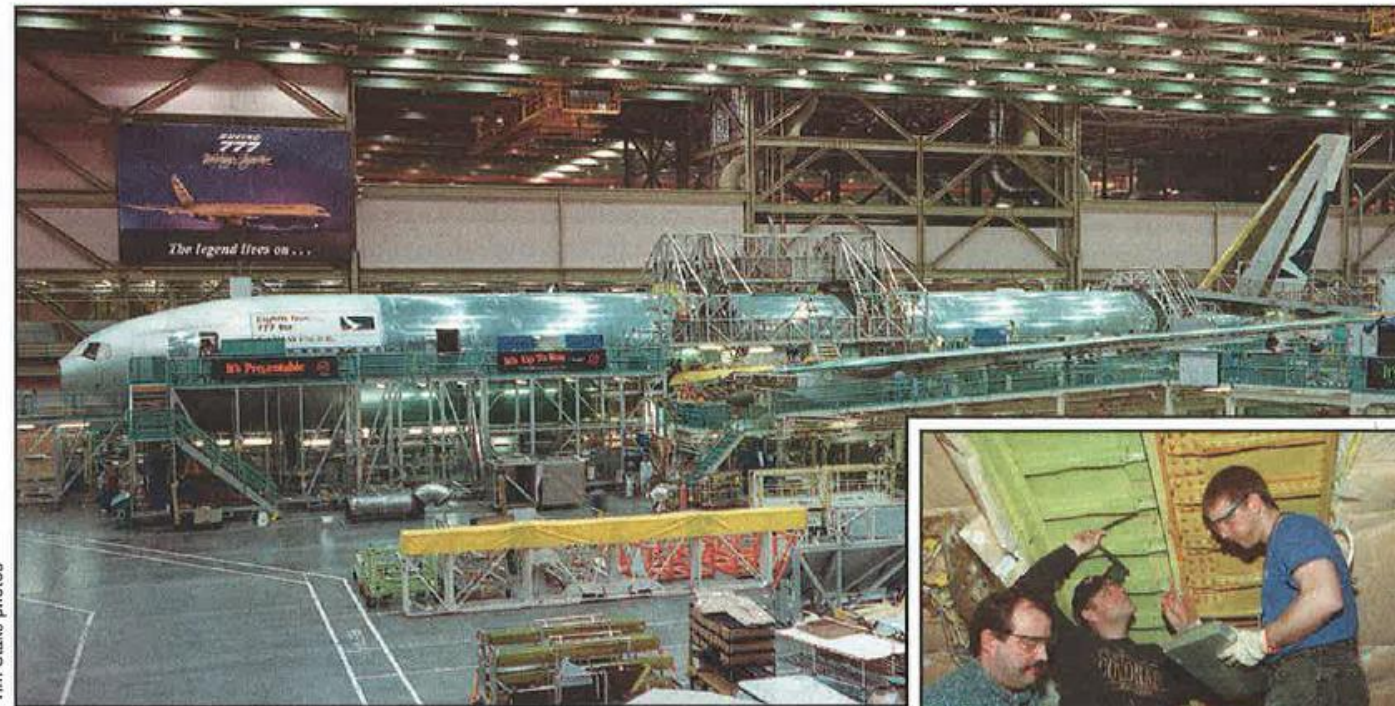


Hardware Variability Control is not new to Boeing. Anyone involved in manufacturing recognizes the need to reduce variation in the shape of each

part of the airplane. If parts aren't produced exactly as designed — even missing by as little as 60-thousandths of an inch — the cumulative result is an airplane that won't come together without a lot of extra time and muscle.

On the 777 program, accelerating the production rate to a three-day build cycle and having only one production line meant they had to come up with a solution — and fast.

“We knew we needed to do something, or we wouldn't make rate,” said Joe Starceovich, supervisor - Final Body Join. “Missing a line move could waste thousands of dollars, disrupt the next airplane and lose unrecover-



Tim Stake photos



systems to chart the variation in these characteristics and then worked with shop floor mechanics in build positions prior to Final Body Join to determine which assembly methods would work best.

Ten airplanes later, people were seeing a difference. Not only did they meet the increased production rate, but variation dramatically declined. Today, nearly 70 percent of all 777s have no rejection tags caused by skin gap variation.

“We like to brag that several joins have been absolutely free of custom fitting,” said Steve Doty, a Hardware Variability Control coach for the 777 program. “Meeting a three-day cycle rate on a single production line is unprecedented in wide-body manufacturing. This is a real feat.”

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Left to right: In the Final Body Join area, Richard Matros, Matthew Atchley and Glenn Brown test the fit of the Sections 44/46 join. The tool Atchley is holding measures the width of a possible gap between the skin panels of each section. As Atchley demonstrates, the tool is too thick to fit between the sections, indicating a perfect fit.

able time.”

Starceovich and his group identified three areas to improve: parts, processes and variation. They worked with engineering teams to redesign some parts and used Accelerated Improvement Workshops to improve their manufacturing processes.

To handle variation, they enlisted a team of experts, led by Richard Matros, a process engineer. “Final Body Join is where the airplane comes together,” said Matros. “And it absolutely has to fit. Our job was to make sure that could happen every time.”

Matros' team identified critical areas of each section, called key characteristics, that were vital to ensuring a perfect fit. They used measurement