

Supply Chain's Weak Links

Almost all audited suppliers to U.S. aviation manufacturers were found to have deficiencies.

BY RICK DARBY

Among the 21 major aircraft-component suppliers to U.S. manufacturers audited by the Department of Transportation (DOT) inspector general office, some 67 percent had deficiencies in their oversight of sub-tier — subcontracted — parts vendors, and the same percentage had product records/documentation deficiencies. Various other deficiencies were found at between 10 percent and 62 percent of the suppliers. In all, 20 of the 21 did not fully meet requirements.¹

“Manufacturers are increasingly using domestic and foreign parts and system suppliers to reduce their manufacturing costs and spread risks among multiple partners,” the DOT report said. “For example, Boeing’s risk-sharing partners in Japan, Italy and the United States will build composite structures for the Boeing 787, which will include sub-systems that are already certified, tested and ready for final assembly.”

Figure 1 shows the increasing use of non-U.S. parts on successive Boeing aircraft models. The airframe of the 727, introduced in 1964, was almost

entirely U.S.-built. That of the 787, currently in production, will include parts from Australia, France, Italy, Japan and China.

“Since 1998, FAA [the U.S. Federal Aviation Administration] has worked towards implementing a risk-based oversight system for aviation

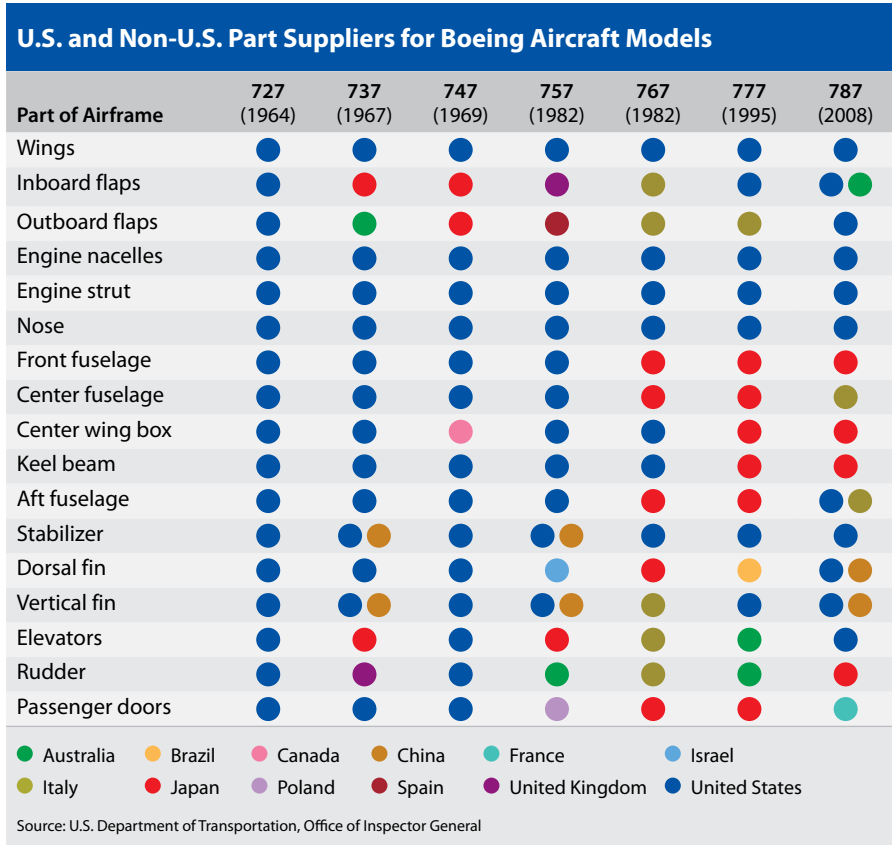


Figure 1

manufacturers,” the report said. “However, this system was implemented in fiscal year 2003 and does not take into account the degree to which manufacturers now use suppliers to make aviation products. FAA based the new system on historical manufacturing business models, in which manufacturers maintain primary control over the production of their aircraft rather than use suppliers to design and manufacture extensive portions of aircraft.”

FAA inspectors perform risk assessments of each manufacturer, and based on those, the agency decides how many supplier control audits it will conduct to test the manufacturer’s quality assurance system, the report said. Supplier control audits are an FAA tool to assess how well aircraft and systems manufacturers’ oversight programs are working. But the number of supplier audits is not correlated with the number of suppliers, the report said.

“To illustrate, based on FAA guidance, a manufacturer that has 2,000 suppliers and is assessed as a high risk will require the same number of supplier audits as a high-risk manufacturer that has only 20 suppliers,” the report said. “Inspectors are only required to perform, at most, *four* supplier audits regardless of the size of the manufacturer, the number of suppliers used or the criticality of the part produced.”

Although manufacturers are required to have an FAA-approved quality control system that makes them responsible for ensuring that their parts are properly produced, three of the five major manufacturers reviewed had not developed requirements to perform regularly scheduled supplier control audits.

Table 1 shows the number of audits of five major manufacturers completed

Number of Supplier Audits Completed by FAA for Five Major U.S. Aircraft Manufacturers						
Manufacturer	Number of Supplier Facilities	Supplier Audits Completed by FAA				Average Percent per FY
		FY 2003	FY 2004	FY 2005	FY 2006	
A	4,012	2	1	7	4	1%
B	2,553	31	26	15	27	1%
C	706	5	4	4	6	1%
D	489	5	3	1	2	1%
E	367	0	2	3	2	1%

FAA = U.S. Federal Aviation Administration; FY = fiscal year
Note: Number of supplier facilities is based on information obtained for 2004. Manufacturer B operates seven separate manufacturing divisions. As a result, the FAA evaluated the seven divisions separately for risk assessment, which resulted in more supplier control audits. A federal fiscal year runs October–September.
 Source: U.S. Department of Transportation, Office of Inspector General

Table 1

by the FAA in four recent fiscal years. “In each of the last four years, FAA has inspected an average of *1 percent* of the total suppliers used by the five manufacturers we reviewed,” the report said. “At FAA’s current surveillance rate, it would take inspectors at least 98 years to audit every supplier once.”

The DOT inspector general, working with an international air transport consulting firm, audited facilities of 21 suppliers, both U.S. and non-U.S., that make components for Airbus, Boeing, Bombardier Learjet, General Electric Aircraft Engines, Pratt & Whitney and Rolls-Royce. All except Airbus have manufacturing facilities in the United States.²

The checklist used to conduct the audits addressed the same areas that FAA inspectors review when conducting supplier control audits. The report said, “Our on-site audits covered the supplier’s quality system — from the contracts with the manufacturer to the actual parts production, parts inspections facility and production line safety, and shipping.”

Figure 2 (p. 52) shows the percentages of suppliers where various categories of deficiencies were found in the DOT audit. “We identified widespread discrepancies at 20 of the 21 suppliers we reviewed, such as suppliers’ inadequate oversight of the part and component suppliers they use (i.e., sub-tier oversight), use of out-of-date tools and equipment, and failure to complete all product testing before shipping parts to the manufacturer,” the report said.

Six of the audited facilities had had little or no oversight by the manufacturer during the 24 months preceding the auditors’ visit. Five of the six had not received any visits from the FAA during the same period.

“For the two years prior to our review, 14 ... did not perform regular, on-site evaluations of their sub-tier suppliers,” the report said. “These suppliers relied on mail-in self-evaluations provided by their sub-tier suppliers or relied on an industry standard quality system certification (e.g., ISO 9001) in place of an on-site audit.”

The report also called attention to the 43 percent of suppliers that lacked



Figure 2

effective tool calibration programs. “Proper tool calibration ensures that equipment used to perform measurements on parts corresponds to universal industry standards, i.e., tools measure accurately,” the report said.

One supplier’s tracking system showed that 94 percent of its tools were past due for calibration. “Some of the tools were out of date for three to four years,” the report said. “There was no procedure to follow up on out-of-date calibrations and no well-defined procedure to address a product that may be inspected or manufactured using improperly calibrated tooling.”

Nine suppliers did not have adequate control over employee training and training records, the report said. DOT auditors also found instances of newly hired, untrained employees involved in manufacturing.

“We identified a failure to follow proper procedures during either the parts in process [inspections] or final parts inspections at eight

... suppliers,” the report said. “We observed one supplier performing unauthorized, undocumented rework of parts. ... At another supplier, a receiving clerk showed us a part that did not conform to specifications but then placed the non-conforming part back into the original box and forwarded it to inspection. The non-conforming part was not documented, segregated, tagged or otherwise communicated to the receiving inspection department.”

Neither manufacturers nor FAA inspectors were systematic enough, the report said. “We found that FAA inspectors individually determine how and what to inspect at each supplier facility,” the report said. “FAA inspectors we observed focused on task-specific items, such as the calibration of one tool, rather than on processes or systems in place at the facility.”

The DOT auditors were also concerned that parts destined for U.S. manufacturers, including doors and engine components, were sourced in

15 countries with which the United States does not have a bilateral agreement. “When entering into a bilateral agreement, the United States agrees to accept the oversight of manufacturers provided by that country’s [civil] aviation authority, among other things,” the report said. “A fundamental consideration in whether or not to enter into a bilateral agreement is the capacity and ability of the foreign civil aviation authority to oversee aviation manufacturing.”

The report cited as an example one U.S. engine manufacturer with eight suppliers in Mexico, despite the lack of a bilateral agreement.

“Therefore, FAA has no assurance that these countries are providing adequate oversight of the operations of suppliers in their countries,” the report said. “Effective oversight of suppliers is essential to ensure that substandard parts do not enter the aviation supply chain. For example, in February 2003, one supplier released approximately 5,000 parts that were not manufactured properly for use on landing gear for large commercial passenger aircraft. At least one of these landing gear parts failed while in service. While FAA became aware of this large-scale breakdown at this supplier in 2003, it has not performed a supplier audit at this facility in the last four years.” ●

Notes

1. “Assessment of FAA’s Risk-Based System for Overseeing Aircraft Manufacturers’ Suppliers.” Report no. AV-2008-026. Feb. 26, 2008. Available via the Internet at <www.oig.dot.gov/item.jsp?id=2246>.
2. The FAA does not have oversight responsibility for Airbus aircraft manufacturing. “However, according to Boeing representatives, 70 percent of the suppliers used by Airbus are also used by Boeing,” the report said.