Figure 11.2b. INDUSTRIAL PROBLEM SOLVING: The Importance of Design

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Communication helps the 777 fly

Airlines work with Boeing to design jet

by Polly Lane
Times business reporter

Most airline passengers have no idea and don't care what aircraft they ride in, as long as it gets there on time.

But Boeing and its customers hope to change that with the new 777.

"We want this aircraft to be remembered", said Gordon McKinzie, United Airlines' 777 program manager. "They (the passengers) will know they are on this one".

The interior will be more comfortable than other planes. And designers hope that the 777 will be more reliable mechanically from the beginning of service. The big two-aisle jet, the development costs for which are estimated at between $4 billion and $5 billion, will be memorable, too, for the way it is being developed.

For one thing, Boeing's customers are playing an important role in the development. Four teams of airline representatives are advising Boeing about the design. United's McKinzie leads one team. Other airlines that set up advisory offices in Renton are British Airways, All Nippon Airways and Japan Air Lines.

Together, Boeing and its customers are seeking ways to cut development and operating costs and improve service.

"This is a fundamental change in the way we do business", said Jeff Peace, Boeing's chief 777 program engineer. In the past, Boeing prepared a design and asked the airlines to evaluate it late in the process, causing expensive changes.

There are other differences, too, for the 375-seat jetliner, which will cost about $120 million and go into service in mid-1995.

Engineers are using computer design instead of traditional paper drawings. They also are using computers to replace the traditional mockup that would be built after all the drawings were prepared. The process is saving Boeing engineers months of time, and they will know if every last weld and electrical line is placed correctly before the plane is even built.

The airline advisory teams are critiquing the design of 132,500 engineered parts. They are looking at everything from the placement of switches and panels in the cockpit to how the seats, galleys and lavatories are arranged. Members of the teams say everything – seat-back entertainment centres, cabin management systems, fuel-filler-pipe locations, cabin-door locks – is being evaluated with an eye toward developing a more comfortable and more reliable plane.

Besides having roomy storage bins, entertainment centres and a wide cabin for passenger comfort, the jet must be easy to maintain, the airline advisory teams insist. It must be ready to fly when scheduled, and repairs need to be done with a minimum of fuss because of the fierce competition in the skies today.

"We need this plane to be highly reliable from the beginning – service ready – with fewer breaks and quicker fixes", said Kenichi Hashimoto, 777 director for All Nippon Airways, the second customer for the plane. All Nippon has ordered 15.

Joining Hashimoto and McKinzie are team leaders James O'Sullivan, 777 chief project engineer for British Airways, and Tadao Sakai, U.S. director of Japan Air Lines' engineering and quality assurance department. BA has ordered 15 of the planes, and JAL has ordered 10.

Boeing also has been getting input from an advisory team of potential customers, including Delta, American, Cathay Pacific and Qantas.

The concern about reliability stems partly from the problems Boeing and its customers had with initial 747-400 models in early 1989. Rushing to accommodate airline demands and get the new jumbo jet into service when promised, despite a 48-day strike, meant excessive parts breakdowns and design problems.

Phil Condit, Boeing Commercial Airplane Group executive vice president, said then that Boeing had learned from the experience. By October 1990, when United launched the 777 with an order for 34, a brief handwritten agreement about the objectives for the plane was signed by Condit, then also 777 division manager; Richard Albrecht, Boeing Commercial executive vice president; and James Guyette, United executive vice president. The agreement said:

"*In order to launch on-time a truly great airplane we have a responsibility to work together to design, produce and introduce an airplane that exceeds the expectations of flight crews, cabin crews, maintenance and support teams and ultimately our passengers and shippers.*"

"*From day one: best dispatch reliability in the industry; greatest customer appeal in the industry and user friendly and everything works.*"

So now they're talking – often in a spirited way as they work out disagreements – and proposed designs are being changed before they are set.

For instance, All Nippon's Hashimoto was concerned about the location of the fuel-filler-pipe on the wing. He said fuel trucks at Japanese airports are different from those in the U.S. and, with the original design, would have bumped the engine cowling in refueling.

And another serious concern, United's McKinzie said, was that even a 6-foot-6-inch tall United mechanic would have trouble getting the nozzle to the hole from a 20-foot stepladder because the wing will be so high off the ground.

A shorter Japanese mechanic, he said, "wouldn't have a chance". The filler pipe was moved closer to the fuselage, lower and away from the engine cowling.

"This was a good example of Boeing designers not having a clue to user needs", McKinzie said. If little things like this slip through, it costs a lot to make changes later, he said.

British Airways' O'Sullivan found serious problems when his airline decided it wanted to made the rear galley smaller so it could get more seats into the aircraft, a major change.

His team worked with Boeing designers on the computer, which shows designs in three dimensions, to see what else would be affected – such as moving supports and systems. They were able to work out a change but it won't be available until BA gets its sixth 777 in 1996.

The advisers also found that a pilot strapped into a seat harness in turbulent weather couldn't reach a microphone switch. It was moved closer.

Previously, even such simple changes involved the exchange of many letters and phone calls by layers of executives.

McKinzie said the airlines are learning how an airplane goes together and why Boeing won't let them change some things that seem simple, but aren't.

In turn, engineer Peace said Boeing has a better insight into airline operation and has made it a habit to listen.

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