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COMMENT

WHAT NOW, ENGINEER?

The unveiling of the Boeing 777 was the signal of a huge engineering triumph — but it might also have marked the apogee of development of conventional large commercial airliners. While the aircraft themselves seem to get ever bigger, the numbers of them under development get ever smaller and the distance by which each new design can move the boundaries of technical feasibility becomes smaller still.

Part of that arises from the increasing capability of the designers to extract more from simpler aircraft. The Boeing 737 is now being developed into an aircraft almost as large and as capable as the 757. The 777 has started life as a replacement for the first-generation widebodies such as the Lockheed L-1011 and the McDonnell Douglas DC-10, but already its manufacturer is talking about stretched versions which could/will replace the first-generation 747s.

At the same time, aircraft manufacturers are looking to far longer production runs of their aircraft: Boeing says that the 777 could be in production for 50 years. Already, the 737 has been in production for 26 years, the 747 for 25. The McDonnell Douglas DC-9, of which today's MD-80 and -90 series are still officially derivatives, first went into service in 1965.

The design of the 777 has involved an unprecedented amount of resource: past designs may have called for greater numbers of man-hours, but none has called for a greater number of calculations.

Many of those calculations were made in establishing parameters which have never been the subject of absolute calculation before. In the past, problems or limitations in the design might not have been discovered until the aircraft was being assembled or (more ominously) was in service.

This time round, the 777's flight-control system has already "flown" many hundreds of hours, during which limits which would never be explored in actual service have already been addressed. Parts were "assembled" on screen and interferences resolved long before metal was cut.

All of these advances have required a huge input of resource. The question is: what does that resource do now? If the application of that resource has been as successful

as Boeing suggests, there will be fewer redesigns and post-first-flight development of its new aircraft than there have ever been before. Theoretically, there should be none, and therefore there should be little work for design and development engineers to do.

Boeing says that the 777 is the last completely new airframe it will build this century. It has already decided that the successor to its enormously successful 737 will be another 737: stretched and re-winged, maybe, but still a 737. All the indications are that the immediate 747 successor will be another, larger, 747, and that the much-discussed 800-1,000-seater is a much more distant, much more tentative project.

Much the same circumstance holds at Airbus Industrie, which, in a relatively short time, has established itself as a competitor in all major airliner-market sectors, except that for 400-seaters. Its oldest designs (the A300/310 family) are younger than those of the Boeing 737 and 747, and of the McDonnell Douglas MD-80/90 and MD-11.

In short, the industry as exemplified by Boeing, refined and developed its design and development capabilities to awesome, probably unparalleled, levels and is running out of things to develop with them. Yes, there is the promise of a future supersonic transport, which is the subject of both joint US/European and independent preliminary studies. That, however, is a long way off and, while a new supersonic transport is likely to be the most complex civil-airliner project ever tackled, its development will not require the full combined resources of Boeing, McDonnell Douglas and Airbus and its constituent partners.

Obviously, there are many derivatives still to come of these major existing designs — Boeing speaks of the initial range of 777 variants not being complete for up to eight years, for instance. With the basic design existing in digital form, the development of even a major derivative will probably be easier in the future than it has ever been.

Boeing president Phil Condit spoke at the 777 unveiling of the company's need to stabilise its workforce. Its very success in mastering the art of aircraft development as far as it has could make that task far more tricky than market swings ever have. □

“Boeing says that the 777 could be in production for 50 years.”

