Beech's enterprising Starship

Gestation of the Beech Starship 1 business turboprop took five years. Over that period, the design evolved from a conventional tail-last tractor into a foreplane-foremost pusher in a series of cautious steps taken in quick succession, thanks to the time-saving power of computer-aided design.

The result is an aircraft with, Beech claims, a fuel efficiency at least 25 per cent better than a jet of comparable size, at the cost of a bit less speed, and an aircraft which offers its passengers levels of comfort ahead of any other 400 m.p.h. twin turboprop.

Starship 1 is an eight-to-ten-seat business turboprop aimed at the lower end of the business jet market, cruising at up to 41,000 ft and 405 m.p.h. (although not simultaneously), with a still-air range of 2,250 n.m. (enough to fly non-stop coast-to-coast across the USA), and the ability to operate in and out of airfields too small for jets.

In the late 1970s Beech set out to design a new corporate turboprop to follow the King Air and to meet the demand for a faster, larger aircraft. The primary objective was to produce an aircraft able to fly at near-jet speeds and altitudes with turboprop fuel economy and field performance.

Starting with a conventional design and the basic objective of higher speed, Beech first increased the power. The designers then faced a problem: bigger engines would be noisier, and soundproofing the cabin would add weight, requiring even more power. Moving the wing-mounted turboprops outboard reduced cabin noise, but thrust asymmetry in the event of an engine failure became a problem.

The answer was to move the noise-producing propellers aft and closer to the fuselage to reduce both noise and thrust asymmetry. Beech therefore concentrated on pusher designs.

Cabin noise and thrust asymmetry were still a problem, however. With a conventional tail and wing-mounted engines, the propellers could only go so far aft. Beech tried fuselage-mounted engines instead, moving them progressively aft until they entered the tail, Lear Fan style. This eliminated the asymmetry problem, but created another—safety. Beech was not happy about using a single propeller and combining gearbox, and had reservations about the dual concentric shafts required by contrarotating propellers.

By early 1980 the design had evolved into a canard. Use of a foreplane, rather than a tailplane, enabled the wing-mounted engines to be located well aft and close together to the benefit of both cabin noise and thrust asymmetry. The safety of two independent engines and propellers was regained.

At this point Beech approached canard expert Burt Rutan, inviting him to join the configuration study. Rutan had been...