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been introduced, either to wring more power out of the engine, or to suit new applications.

The PT6's length changed several times. Its width, however, has always remained the same, a philosophy which has paid off time and again as manufacturers demand more power without changing nacelle dimensions.

When introduced a quarter of a century ago, the 550shp (405kW) PT6-6 consisted of a single-sided centrifugal compressor, a three-stage axial compressor, an annular, reverse-flow combustor and single-stage high- and low-pressure turbines. An annular air intake at the rear feeds the compressor, the turbines exhausting at the front through twin ports on the horizontal central line.

Power growth followed a well-defined pattern: wring the most out of the existing machine before introducing new components, and always work for higher reliability. Thus, the A20 series saw the advent of pipe diffusers behind the compressor for higher airflow (later adopted for the PW100 series).

With the PT6A-27 (1967 certification) came a wider-diameter compressor, while the -30 Series (1971) bought in a cooled first-stage vane ring, allowing the engine to run at higher temperatures, and taking power output to 750shp (550kW). Throughout, changes were introduced to materials, fuel controls and other components.

With the arrival of the 700shp-1,198shp (880kW) PT6A-40 series in 1984 came a second stage to the power turbine. "That allowed us to take the full amount of power out of the compressor," says Tedstone. The engine was lengthened as a result, but the mounting arrangement stayed the same, "... so that Beech—our main customer—could fit the engine with minimal tear up."

The -40 series had a much-improved exhaust system, made possible because the new turbine removed most of the swirl from the exhaust flow. "It became a lot easier to design the exhaust for efficiency," says Tedstone. Another important change, first seen in the -45, came with a new 1,700rpm reduction gearbox, better suited for the slower turning propellers required for commuters.

The next major configuration change came with the PT6A-65, in which a fourth compressor stage was added. "This was our first definitive commuter engine for Beech and Shorts," says PT6A-67 project controller, John Towler.

Next came the A-67 series, with a 'bored out' compressor giving 10% more airflow. P&WC also redesigned both turbines for more efficiency. "In the -65, we'd used the -40 power turbine," says Towler, "and put on a new compressor. We'd reached the limit."

The basic PT6A-67 becomes the -67A or -67B, according to the temperature limits imposed—which depends on the application. "A commuter engine needs lower temperature limits than, for example, the engine we sell to Beech for the Starship, because, for a commuter operation, you need to run cooler to maintain durability. You can run at higher temperatures with a corporate engine, which operates long cycles," says Towler.

The Beech Starship requirement essentially drove PT6A-67 development, the higher-power engine being needed to replace the original -41 as the aircraft's weight increased. "Even though the -67 kicked off with a corporate application," says Towler, "we knew that it would have commuter roles as well and that Shorts would eventually pick it up." Sure enough, in came Shorts with the 360-300, still the only revenue-earning application of the engine. There will soon be more and, following PT6 tradition, some are for unusual applications.

The -67 has been sold to Beech for the RC-12K, a military version of the King Air. The special-purpose -67AF (with the 1,424shp (1,050kW) reserve rating available for everyday use) is also being used to re-engine the Grumman S-2 Tracker for aerial fire-fighting and other military uses.

In the most interesting role for the engine, about 30 -67Rs have gone to Wisconsin-based Basler Aviation to re-engine DC-3s. Certification of the aircraft is "due any day," says Towler. Basler, which holds all US rights to DC-3 overhaul and has "fingers in the pie all over the world," may prove a major customer for the latest PT6.

Towler points out: "Ninety per cent of the overhaul costs of a DC-3 are its piston engines." Powered by PT6s, the infinite-life DC-3 airframe is set to leave another generation of aviation enthusiasts behind—albeit quietly, lacking the distinctive roar of the original Pratt & Whitney pistons.

PILATUS POWER

Yet another application, for the 1,300shp (955kW) PT6A-67B, is the single-engined Pilatus PC-12 utility/passenger aircraft. The PC-12 has yet to be launched, but several companies have placed options. With further improvements in the turbine and compressor, the -67B is optimised for low-altitude operation, and is nominally 5% more powerful than the -67.

The rear-engined Piaggio Avanti provides a "beautiful installation" for the PT6A-66, says Towler. "We had to work very closely with Piaggio to get the installation right... but it really works." The -66 is identical to the -67, says Towler, with a 2,000rpm gearbox.

Socata has used the -64, which is the -66 flat-rated to 700shp (515kW), for its TBM.700. The rating gives the six-seat TBM.700 a 300kt (550km/h) cruising speed up to 28,000ft (8,500m), and a 2,300ft/min (12m/s) climb rate—unheard of performance for a production single.

Justifying the PT6 in single-engined applications is its almost legendary reliability. The unscheduled removal rate for mature engines is running at once every 56,500 flight-hours, while time between inflight shutdowns is an astonishing 387,800 flight-hours.

After 30 years, the PT6 is still winning applications across the board, and looks set to do so for the foreseeable future.