

# DRIVE GIVES AERO TEST RIG FLEXIBILITY

The design of a high accuracy rig for the testing of Pratt & Whitney PT6 jet engine starter generators has at its heart a variable speed AC drive from Control Techniques.

Euravia of Kelbrook, near Colne in Lancashire, has a state-of-the-art fully computerised test facility for gas turbine aero engines and Auxiliary Power Units (APUs), including the testing of the PT6, one of the most popular and reliable turboprop aircraft engines in use today.

One of the range of tests concerns the performance of the compact, yet powerful engine starter generators. Its function is to spin up the compressor section of the engine until it reaches the required rpm and the engine is self-sustaining. At this point it becomes a generator to maintain the aircraft's electrical system – fans, pumps, lights and other electrical equipment. APU's provide the same function whilst the aircraft is on the tarmac.

Euravia called in online automation distributor Direct-Industrial.com to look at the requirements for a test rig to undertake a series of tests to check on refurbished starter-generator performance. Direct-Industrial.com and Euravia



pooled technical resources, with Direct-Industrial.com designing the structural aluminium frame and the electrical and electronic system. Euravia designed and manufactured the precision triple mounting heads and the extremely high-speed mechanical bearing system for the final drive shafts. Direct-Industrial.com, an official distributor of AC and DC drives for Control Techniques and a long time user, chose a 15kW Unidrive SP (solutions platform) AC drive for the central



## KEY BENEFITS

- CONSTANT ACCELERATION & DECELERATION
- DYNAMIC & ACCURATE RESPONSE
- HIGH TORQUE & SPEEDS
- HIGH LEVEL PRECISION
- FLEXIBILITY & COMPATIBILITY



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task of testing the generator function. The control of the rig is via a HMI with a bespoke test programme written by Direct-Industrial.com incorporated into a PLC. It was found that the Unidrive SP and the Pixys proved to be the ideal combination, communication being via the standard ModBus built into the drive. The drive responds to constant acceleration and deceleration commands in high torque and speed situations very rapidly and precisely with no overshoot and absolute accuracy.

The rig comprises three sections for three series of tests. On the left, the section tests the ability of the starter to run up to starter speed against defined loads. The central section, driven by the Unidrive SP AC drive, carries out a series of tests at a series of defined speeds; 6,700rpm, 7,800rpm, 12,000rpm and 14,000rpm; with parameters fed back to the PLC. The final test involves the checking of starting torque, with 800 amps being applied to the starter which has a locked shaft – in one test, for instance, looking for a torque level of 20.3Nm (15ft lb).

Readings of shaft torque, temperature, voltage, current, impedance and radial vibration are all recorded during the test sequences and fed back to the PLC, where test results are formulated and automatically compared against preset parameters.

The Unidrive SP AC variable speed drive range spans 0.75kW right up to 1.9MW. Unidrive SP is the world's most advanced 'solutions platform' AC drive, configurable into five operating



modes – open and closed loop, vector, servo and regenerating modes - connectivity to most industry standard networks and accepting most position feedback protocols. "The Unidrive SP is a very flexible drive," says Direct-Industrial.com managing director John Lenehan. "It proved ideal for this application because of its instant compatibility with the PLC and for its dynamic and accurate response to commands."

Euravia is delighted with the finished rig which is now in daily use testing starter generators for a range of PT6 and PT6A aircraft engines. The first PT6 was introduced into commercial service in 1964 by Pratt and Whitney Canada and is still in production today. It is produced in a wide range of models with a power range from 600 to 1940 shaft HP.

Euravia is a modern, independent aviation company offering high quality, cost-effective repair and overhaul services for a wide range of gas turbines, including Pratt and Whitney PT6 engines, Honeywell, Hamilton Sundstrand and TRW APUs, as well as various engine and airframe components and accessories. The company has three facilities in Kelbrook which cater for all aeronautical engine maintenance, repair, overhaul, test and component rework requirements, including fully computerised dynamic balancing.

Euravia's fully JAR-145 approved PT6 programme offers the highest quality repair, hot section inspection, overhaul and test services in accordance with OEM specifications.



For further information please visit  
[www.controltechniques.com](http://www.controltechniques.com)



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