



# Extension programme for Centurion engines developed by Aeromotive

**DIAMOND** DA42 TwinStar aircraft from Hamilton based international flight trainer CTC Aviation have criss-crossed Waikato skies and beyond since 2007. During that time the fleet of eight DA42 trainers has become the world leader in hours flown for the type equipped with the Centurion 2.0 jet-fuelled engine. Initially the 2.0 litre engine, introduced in late 2006 and derived from the Mercedes Benz A200 CDI, began with an 1100hour TBO. In a comprehensive airline pilot training environment that time is used fairly quickly.

Recently, maintenance provider Aeromotive (using the FADEC data accumulated from the fleet and their service experience) persuaded engine manufacturer Centurion to extend the TBO to 1500 hours. Upon the accumulation of 1500 hours TT and prior to the engine life extension programme, the only option was to return the engine to the manufacturer and accept a new replacement unit.

This achievement was catalyzed in the final quarter of 2011 when the situation arose to carry out an exploratory strip of a pair of time expired engines. Aeromotive engine shop staff found the overall condition to be more than satisfactory. "There were some component issues related to wear in the cam chain drive system and the engine oil pump assembly. These matters were brought to the attention of Centurion engineers who happened to be in Hamilton at the time," said Greg Mundell, Aeromotive Engine Shop Manager. "This necessitated the replacement of cam drive wheels and chain along with a replacement oil pump and associated drive chain, the pump and drive wheel being a non serviceable unit. A further issue related to where high time engines were showing a reluctance to start easily. A compression leak down test revealed low compression in some cylinders. Subsequent removal of the cylinder head showed a number of valves recessed in their seats. While camshaft drive and oil pump issues were satisfactorily dealt with through replacement components, the most cost effective method of dealing with the recessed valves was to replace the cylinder head and associated valves," he said.

A satisfactory test cell run for the reassembled engine saw an approval to return the engine to service. The test cell while set up primarily for air cooled horizontally opposed engines required little modification for the Centurion engine. The test cell control cabin was configured to take advantage of the full FADEC capability of the engine, some shrouds were manufactured to direct airflow

and a mount to enable the unit to be run as a Quick Engine Change unit complete with flight propeller were completed. At this stage Centurion acknowledged the expertise of Aeromotive as a fully approved service centre with a role to supply accumulated data from the CTC fleet to Centurion for on-going analysis. The

approval enables the engine shop to withdraw further CTC engines and inspect these as part of their engine life extension programme. Such engines are not zero timed. The bottom end of the engine remains intact for the inspection process and engines continue to accrue hours. The programme at this stage remains open ended and leading engines in the programme have accumulated in excess of 3000 hours TT.

For CTC a satisfactory engine life extension programme appeals in the reduction of overall costs per flying hour and consequently a more competitive hourly rate for the aircraft. The engine is frugal in fuel requirement and shows very few defects up to TBO. The intention to fly to a 2400 hour TBO has been mooted.

For Aeromotive's engine shop, the opportunity to gain return to service experience with an engine based on automotive technology has been invaluable. The capability of the shop has increased, primarily in the detailed analysis of data collected from the FADEC component and monitoring processes which take on similarities to that of large turbine engines. The engines are also subject to an oil analysis programme through Gough's laboratory in Christchurch.

Aeromotive remains the only workshop world-wide to undertake this engine life extension programme. The OEM, Centurion, doesn't offer the programme to other users of the engine.

The Diamond DA42 is not the only type with the Centurion 2.0 engine installed. The single engine Diamond DA

40 carries the powerplant and an 'S' variant of 150hp is offered as a retrofit option for Cessna C172, Piper PA28 and Robin DR400 types. A larger V8 series, the Centurion 4.0 is available as an option for the Cessna C206 and Cirrus types. Aeromotive are well equipped with knowledge and experience to service these.

## For more information

Aeromotive offer a one-stop shop for aircraft servicing, including all aspects of piston engine overhaul and maintenance. Contact Greg Mundell on 07 843 3199, email: [greg.mundell@aeromotive.co.nz](mailto:greg.mundell@aeromotive.co.nz) or visit [www.aeromotive.co.nz](http://www.aeromotive.co.nz)



*Diamond DA42 Centurion engine*



*Diamond DA42 TwinStar outside CTC's hangar at Hamilton.*



*In the Test Cell at Aeromotive's Hamilton facility.*