

DeltaHawk Granted 1.2 Million Loan... From Their City Council

Hi-Tech Jobs For WI — Racine Invests In Building A Promising Business

The Racine City Council on Wednesday approved a \$1.2 million low-interest loan for DeltaHawk Engines, Inc., which plans to manufacture a family of 2-12 cylinder engines for the general aviation industry. The two-percent loan will be provided in \$400,000 increments over three years, and is tied to facility improvements on DeltaHawk's future manufacturing plant in Racine. The Racine Redevelopment Authority unanimously approved the loan last Thursday, paving the way for the Council vote this past week.



"We're excited that the City of Racine has taken the initiative to help us grow our operation and create new jobs in the community," said Dennis Webb, President of DeltaHawk Engines, Inc.

After several years of research and advanced development, Delta Hawk is excited about the next chapter in their development as a company.

"The financial support of the City of Racine, Racine County, Racine County Economic Development Corporation and the State of Wisconsin puts us on the path to be a global leader in the development and manufacturing of diesel engines for the aviation industry," said Webb.




This announcement comes on the heels of the State of Wisconsin's announcement last week that it is also making an investment in the company through the Wisconsin Department of Commerce by providing a \$720,000 low-interest loan. As it expands operations and ramps up manufacturing, DeltaHawk expects to create more than 100 jobs over the next three years.

Founded in 1996, DeltaHawk Engines, Inc. is a manufacturer of innovative, lightweight, fuel-efficient engines for the commercial and general aviation industry.

FMI: www.deltahawkengines.com

V-4 Aviation Turbo Diesel Specifications:

	upright, inverted, or vertical 90 degree V-4, turbocharged, direct drive, two-stroke diesel with oil pump and external air-oil separator/sump
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CONFIGURATION	<ul style="list-style-type: none"> <input type="checkbox"/> top profile is 3.5 inches higher at the cylinder tops than an IO-360 Lycoming, referenced from the crankshaft <input type="checkbox"/> engine width under 24 inches
COOLING	<ul style="list-style-type: none"> <input type="checkbox"/> liquid cooled
FUEL	<ul style="list-style-type: none"> <input type="checkbox"/> jet-A, jet-A1,JP-5, JP-8, Diesel #1, Diesel #2, bio-diesel
ELECTRICAL	<ul style="list-style-type: none"> <input type="checkbox"/> 60, 100, or 200 A Alternator <input type="checkbox"/> 28 Volt Starter
POWER	<ul style="list-style-type: none"> <input type="checkbox"/> 160, 180 and 200 hp models, at 2,700 rpm <input type="checkbox"/> possible higher horsepower V-4 version
FUEL CONSUMPTION	<ul style="list-style-type: none"> <input type="checkbox"/> BSFC = .39 lb/hp/hr <input type="checkbox"/> for a 1,000 nm trip in a Velocity at 65% power, it translates to: <ul style="list-style-type: none"> <input type="checkbox"/> 40.9 gal Jet A for the V-4, versus <input type="checkbox"/> 57.3 gal 100LL for Lycoming IO-360
WEIGHT	<ul style="list-style-type: none"> <input type="checkbox"/> currently about 327 lbs including starter, oil pump, fuel pump, water pump, turbocharger, all internal lines and internal exhaust system
RELIABILITY	<ul style="list-style-type: none"> <input type="checkbox"/> lower part count and fewer potential leakage points than the current 4-cylinder gasoline-powered aircraft engines: <ul style="list-style-type: none"> <input type="checkbox"/> no cam shaft or valve train <input type="checkbox"/> no head gaskets to blow and no head bolts <input type="checkbox"/> fully doweled, four bolt main construction (12 studs) <input type="checkbox"/> inherently stout block and compact V-4 design <input type="checkbox"/> no ignition system
	<ul style="list-style-type: none"> <input type="checkbox"/> single-lever power control

OTHER DESIGN CHARACTERISTICS	<input type="checkbox"/>	configured for fixed or variable pitch propellers (propeller governor pad provided)
	<input type="checkbox"/>	vacuum pump pad provided
	<input type="checkbox"/>	limited operation at reduced power without coolant
	<input type="checkbox"/>	limp-home capability without turbocharger, supplying approximately 100 hp with backup air
	<input type="checkbox"/>	no electromagnetic interference at normal operating altitudes
	<input type="checkbox"/>	provisions for cold weather starting
	<input type="checkbox"/>	TBO of 2,000 hours (estimated)

FAA Certification Progress

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DeltaHawk is well on its way to type certification of the DH-180A4 engine (180 HP). An FAA Designated Engineering Representative consulting group, The DERs Group, has been engaged to manage and direct the process. Current estimates are to achieve Type Certification (TC) as early as the beginning of 2011. The remaining engine model variants will be quickly certified afterward as amendments to the initial TC.

DeltaHawk's Project Specific Certification Plan (PSCP) was signed by the FAA Chicago Aircraft Certification Office (ACO) and DeltaHawk on August 14, 2008. The PSCP is the guiding document for achieving DeltaHawk's initial Type Certificate (TC) for the DH-180A4 engine.

We are in the conformity phase, which includes submitting the final drawings and specifications of the engine and manufacturing components for the FAA to examine and approve as conforming to those specifications.

Maintenance, operating and service manuals are also being prepared for FAA review. A 270-hour FAA engine acceptance test is projected to take place in the fourth quarter of 2010.

In addition to aiding with the TC process, the FAA's Minneapolis Manufacturing Inspection District Office (MIDO) is working in coordination with the DERs Group to promptly obtain manufacturing authority (a Production Certificate) for the engine following award of the Type

Certificate. An MRP (Materials and Resource Planning) system and the required FAA quality and process control procedures are being established and reviewed.

The progress to date towards our Type Certificate and Production Certificate is a significant milestone in the history of DeltaHawk.

Decisions made over 10 years ago have stood the test of time and will lead to an innovative new power plant for aviation worldwide.

Among those innovations are:

- Lightweight construction using modern materials
- Two-stroke technology for high power density
- Liquid cooling for precise thermal management
- Ease of service with external components
- Multiple orientations and reverse rotation from one basic platform
- Multiple levels of redundancy in key systems
 - Dual independent air supply systems (turbo & supercharger)
 - Continued operation at reduced power with total loss of coolant
 - Four independent high-pressure fuel pumps
- A critical altitude in excess of 18,000 feet
- Mechanical fuel injection for proven, safe and reliable fuel management
 - No electronics to fail
 - No reliance on aircraft electrical power

With fuels such as jet, diesel, and bio-diesel poised to become the worldwide fuels of choice, DeltaHawk customers can face the future confident they will be able to continue flying safely and economically.

Additionally, DeltaHawk is working with the US Navy to expand the current military Technical Readiness Level (TRL) via a formal testing program beginning fourth quarter 2010.