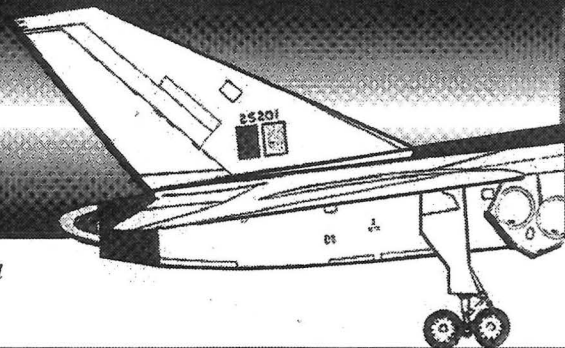


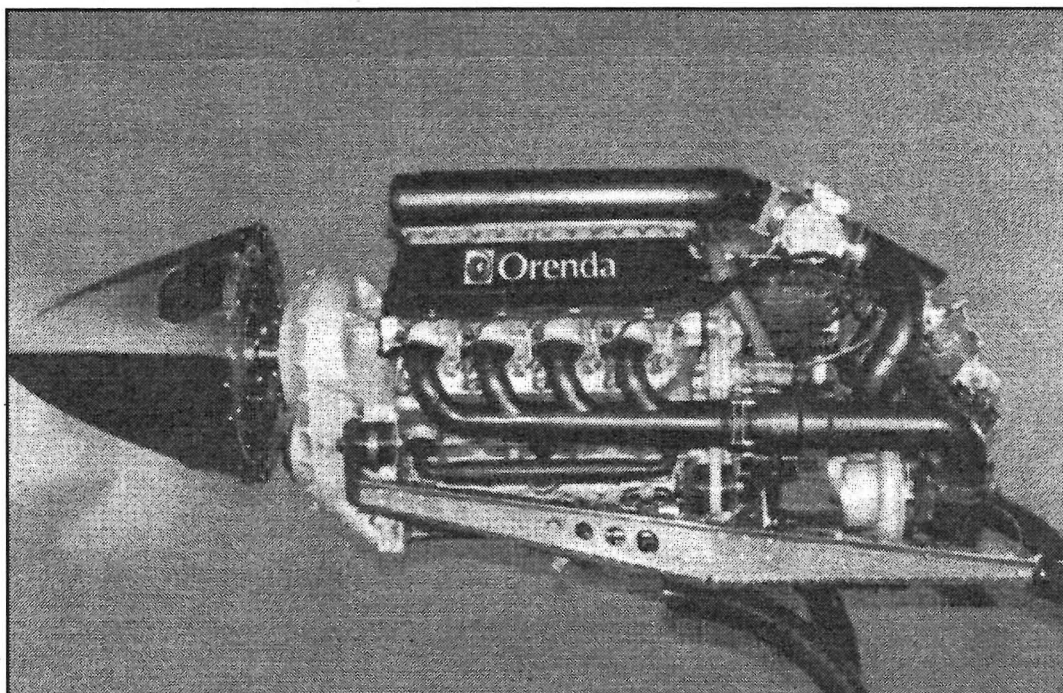
Pre-Flight



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Reciprocating Engine: "Back to the future"

Early in Orenda's history someone remarked that the world had entered the jet age: the piston engine was a thing of the past. The past is now part of Orenda's future. One of the potential growth businesses for Orenda is not in the gas turbine business but rather, in the reciprocating engine field.

This new business was uncovered in 1994 when the company was looking for strategic growth opportunities and recognized a significant void in the power plant market. There were reciprocating engines capable of producing up to 400 horsepower available at an approximate cost of, \$200-230 per horsepower. Above 400 horsepower, the only turboprop engines were available at an average cost of over \$400 per horsepower.

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Aerospace Heritage Foundation of Canada



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President's Message

I would like to advise the membership why the final issue of 2012 the "Orenda Special" is late along with the first issue of 2013, both issues are being prepared and will be in the mail shortly. Both of our Editors, Ted and Nick have been under the weather and they were very busy during the Holiday Season. The Renewal/Donation Form for 2013 will be included in the January - February issue.

Nick advises me our Foundation will be starting on the Memorial for the late Flt/Lt Bruce Warren and Engineering Observer Robert Ostrander who were killed in the crash of CF-100 serial number 18102 near Komoka, Ontario.

The following was sent to Nick from long time member C. Fred Matthews of Lexington, Ma, USA. Nick, your mention of Bruce Warren in a recent Pre-Flight brought back many fond memories of our all too brief association over 60 years ago, in flight testing, of the prototype CF-100. As I started to recall some of the events we shared, I decided to write them down and I think others would be interested in these memories also.

Frank Harvey

"Back to the future" ... continued

This price structure had several effects in the aviation market. First, a large number of aircraft were underpowered because, to keep total cost down, they used reciprocating engines even when additional power was needed. Second, an equally large number of aircraft are now too expensive to own and operate because they did incorporate the turboprop engine. Third, older aircraft which used out-of-production radial engines need a replacement engine because spare parts are difficult to obtain.

These issues convinced Orenda that there was a significant market for a power plant in the 500-750 horsepower range if it could be produced at a price comparable to existing reciprocating engines. Orenda purchased the assets from such an engine program that had been developed in the 1980's that fit these criteria. The program had been dormant since that time because of funding issues.

Orenda has assembled a development team and has been refining that design for the last two years. Two significant Transport Canada milestones have been completed and final engine Type Approval is expected late this year. In conjunction with the engine activity, programs have been launched to install the engine in the Beechcraft King Air and the deHavilland Beaver. Both aircraft are expected to fly this year.

Interest in the engine program has been tremendous. Almost every aviation publication has written at least one story on the program and Orenda has received over 1000 written inquiries for additional information. That interest has come from a wide variety sources, pilots owners and operators of corporate aircraft, charter aircraft, and utility aircraft. Based on the studies it is estimated that there are over 35,000 aircraft that can benefit from the use of the Orenda series engines.

Such a niche market does not seem to exist anywhere in the turbine

engine market. If it did, development of a new turbine engine would cost close to a billion dollars, well beyond Orenda's capabilities. Consequently, Orenda plans to grow the business by providing new reciprocating engines, utilizing the technology developed during 50 years of turbine engine accomplishments.

Orenda and the PC

Before Summer 1994, many Orenda employees use standalone personal computers with a DOS operating system.

The need for standardized software, shared computer resources such as printers and, most importantly, the need to share information made a Local Area Network (LAN) a requirement for day-to-day operations. A network was installed in early summer 1994 and Orenda's computer age affected many more employees.

At first, the LAN was a single file server for which 50 users were licenced. Since it was first installed, the Orenda network has undergone a dramatic increase in power and capability. For example:

- a) The primary server has been "mirrored." Two main servers duplicate exactly what each other is doing. If one server experiences a hardware failure, for example, the other continues processing.
- b) Storage space for user data has increased more than 700 times on one server, twice that on both servers. User licences have increased from the original 50 to 350.
- c) Six more servers have been added to the network for additional capabilities. These allow Orenda users to transmit faxes from the network, dial into the network from home, access up to eight CDs on the LAN, and most recently, connect to the Internet, send e-mail and "surf the net, anywhere in the world.
- d) A.R. Technologies in Richmond, B.C. and Orenda's A.M.E.S. group in Ottawa are linked to the Orenda network to create a Wide Area Network (WAN). The network is connected to the internal CAD/CAM system and HP3000 business computer for improved information and data sharing on these different hardware platforms.

Orenda has a "Home" Page on the Internet ([www:/Orenda.com](http://www/Orenda.com)), and an internal "home" page on a newly installed "intranet" is under development. The intranet will enable users to share information as it is developed. The intranet may include new orders

received, job postings, telephone extension numbers and any other communications useful to those on the network.

All of this has happened in two years! Looking into the future, videoconferencing may be added to the network. An interface between the company's telephone system and the network will enable employees to "see" one another as they speak.

The benefits gained from the installation of Orenda's network have been well worth the effort and cost. Constant improvements and enhancements to the network will continue to enhance communications with Orenda's employees and valued customers.

Component Manufacturing

Orenda's Component Manufacturing business unit produces compressor discs, nozzles, turbine wheels, drive shafts, torque rings, combustion liners and casings for the world's leading aerospace and industrial engine builders. General Electric, AlliedSignal, Rolls Royce, Pratt & Whitney.

These are complex components. Conventional or advanced materials are worked on computer numerically controlled (CNC) machines to produce components as large as 10 feet in diameter. Manufacturing activity is organized into "flowline cells" to reduce cycle times and improve quality.

Over the past ten years, Orenda has supplied more than 200,000 individual components to OEMs as well as to civil, military and industrial end-users.

Advanced Materials & Energy Systems (AMES)

Orenda's Advanced Materials and Energy Systems (AMES) business unit is a team of highly trained engineering specialists, dedicated to developing unique and practical solutions to the challenges of engine component life usage monitoring, repair and redesign.

Much of the unique work performed by AMES engineers has been in conjunction with the National Research Council of Canada (NRCC). The development of advanced techniques for such tasks as structural analysis of aircraft engine parts and life usage monitoring systems for the Canadian Forces has been a focus over the years. The wealth of knowledge developed through its work in the military sector has enabled the unit to offer its unique services to various customers in the civil aviation industry who need technical expertise in such tasks as determining the structural integrity of parts.

Research conducted at AMES has enabled Orenda to offer remanufacturing services for customers. Applying proprietary coating processes, laser surface treatments and joining/brazing techniques with better bonding properties to parts that were designed in the 50's, 60s and 70s, remanufacturing is often a preferable option to buying new parts.

A current study is the viability of firing gas turbines with fuel derived from wood waste, as an alternative to traditional fossil fuels. This project is aligned with work being done with Mashproekt, Ukraine, on its GT2500 industrial turbine engine. After being modified by Orenda, this engine's combustor will easily accept alternative fuels, which are ordinarily difficult to burn in conventional, commercial systems. When the study is completed by the end of 1996, Orenda will market the GT2500, with its modified-combustor, fuel supply unit and generator, as a standardized, proprietary package. It will be ideal for producing electricity at pulp and paper mills, or at isolated villages in developing nations, where conventional fuels are not readily available.

These projects are among many research studies being conducted by AMES engineers, carrying on the tradition of innovative techniques and products established early in Orenda's history.

Affiliated companies

In its continuing efforts to provide customers with state-of-the-art products and services, Orenda is joined by two smaller companies, A.R. Technologies and Middleton Aerospace.

A.R. Technologies

A.R. Technologies became part of the Orenda group in 1994. At the time, Orenda needed a facility with the capability to tackle the most challenging component repairs especially on smaller engine components.

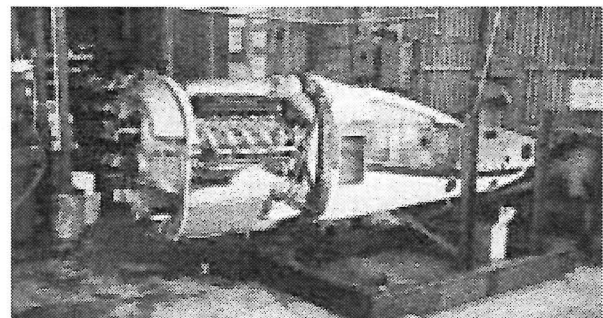
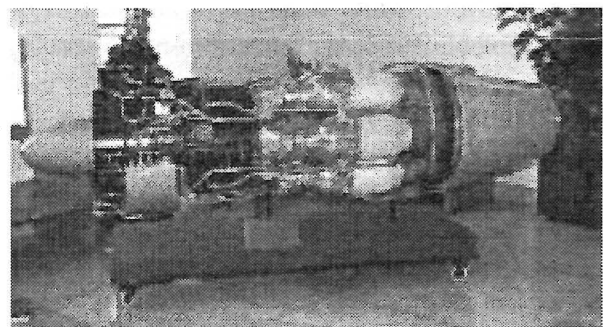
At its modern, well-equipped facilities in Richmond, British Columbia, the company specializes in complex repairs of small, advanced components. Its capabilities include hydrogen, plasma spray, a wide range of welding and brazing techniques, non-destructive testing and air flow calibration, to accomplish even the most complex repairs.

Middleton Aerospace

Middleton Aerospace, located just outside Boston, Massachusetts, was purchased by Orenda in 1990,

when Hawker Siddeley was looking for growth opportunities.

Middleton manufactures critical, prototype and production rotating and non-rotating parts for major engine builders in the United States, as well as for a number of the world's armed forces. Like Orenda, the company uses the latest CAD/CAM technology. Its well equipped facility includes conventional as well as numerically controlled machines, which can turn, mill and grind parts as large as 60 inches in diameter. The company is ISO9002 certified.



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