

Keywords: 9 = Environment; 19 = Testing/Test Equipment; Gas Chromatography = 9; Air Analysis = 9; Gas Analysis = 9; Instrumentation (Air/Gas) = 19.

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PRATT & WHITNEY CANADA Ltd

Code: PWC

Address: P. O. Box 10
Longueuil, Quebec, Canada J4K 4X9

Contact: Mr. S Monaghan, Chief R&D Support -
(514) 647-7557

History: Established in 1928 as a Canadian center for the overhaul of Pratt & Whitney Aircraft radial piston engines, Pratt & Whitney Canada Ltd (P&WC) took over full responsibility for this function prior to moving into small gas turbine development and production. They are a wholly owned subsidiary of the Pratt & Whitney Aircraft Group, a division of United Technologies Corporation.

Capability: P&WC has the mandate to develop and produce all small gas turbine engines typically for general aviation, commuter and paramilitary use. Their primary business areas are:

- Small gas turbine engine development
- Small gas turbine engine production
- Small gas turbine engine oriented research

The development of gas turbine engines at P&WC started in the late 1950s with the early PT6. This turboprop engine was introduced to the commercial market in 1963. The military designation for this engine is the T74-CP-701. In 1979, the development started on the PW100 turboprop engine. This fuel efficient engine is used primarily in commuter and short-haul aircraft.

The JT15D turbofan engine was introduced in 1967. It is the power plant of the Cessna Citation corporate jet, as well as the Aerospatiale Corvette and the Mitsubishi Diamond 1 aircraft. P&WC has also developed a twin turboshaft engine for helicopter use. These are designated the PT6T-3 and -6 series (military designation is T400-CP-400, -WV-402).

By 1982, the company had delivered 23,000 engines for the world market.

Average Work Force: Company Total - 6,660
R&D Center - 1,840

Gross Sales: 1979 - \$463M
1980 - \$605M
1981 - \$770M

Plant Size: 1,809,640 sq ft (Total area)

Experience: P&WC has had experience with the following organizations:

United States Air Force - (1) Research on High DN Value Roller Bearings - a program to determine the influence of geometric variable etc., on small high speed roller bearings (carried out as a shared development program); and (2) Alternate Fuels Combustion Research - an experimental study of the effects of alternate jet fuels on small gas turbine combustion systems (carried out as a shared development program).

United States Army - (1) Subcontractor in Cooled Radial Turbine Program to Pratt & Whitney, Government Pro-

ducts Division (GPD) (1969-1971). Pratt & Whitney Canada Ltd was responsible for the Aerodynamic design and participated in the structural analysis and mechanical design of the turbine; (2) Consultant to P&W, GPD, on ST9 1500 horsepower demonstrator program for new US Army helicopter engine - first stage was scaled P&WC research rotor and second stage was centrifugal compressor (1966-1969); (3) Consultant to P&W, GPD, for the demonstration of a 10:1 Pressure Ratio single centrifugal compressor - P&WC provided data from previous in-house demonstrations of 10:1 Pressure Ratio Compressors carried in 1967 & 1970 (1970-1972); and (4) P&WC is currently contracted with the US Army at Ft Eustis for an advanced 15:1 Pressure Ratio Single Centrifugal Compressor.

United States Navy - (1) P&WC was a subcontractor to P&W, Commercial Products Division (CPD), on a demonstration of a regenerative, small turboprop engine based on the PT6 - P&W designed the regenerator, while P&WC designed the ducting, organized hardware fabrication, and demonstrated the concept (1964-1966); (2) P&WC won a contract to provide a twinned helicopter engine (T400/402 Twin Pac R) to the US Navy for Bell Aerospace helicopters where 1032 units have been supplied - also 2218 units in a civil version (PT6T3/6) have been produced to date - development of the engine is a continuous process and P&WC are performing component improvements through a US Navy contract (1969); and (3) P&WC has also performed as a subcontractor to P&W, CPD, on a demonstration of single crystal turbine blades for gas turbine operation.

Environmental Protection Agency - (1) P&WC carried out a combustion research program for small, single can, highly loaded combustors for automotive application with good performance and low emissions (1973-1974); (2) P&WC was subcontractor to United Technologies Research Center (UTRC) on a study of the automotive application of gas turbines carried out a series of cycle studies and supported experimental work on combustion (early 1970s); and (3) P&WC also supported the Environmental Protection Agency (EPA) (Triangle Park) on studies of the carcinogenic effect of small gas turbine emissions (1977-1978).

National Aeronautical Space Administration (NASA) - (1) P&WC was subcontractor to P&W, CPD, on a turbofan core noise program at Ames carried out on a NASA owned P&WC JT15D engine - P&WC designed and fabricated an alternate fan core stator to increase the axial spacing between rotor and stator, and the number of stator vanes (1977); (2) P&WC was subcontractor to P&W, CPD, on a program of nose cone telemetry for NASA Lewis Research Center as applied to a NASA JT15D turbofan - P&WC designed a transmitter to operate within the nose of a JT15D to study the difference between ground and flight noise measurements (1978-1980); (3) P&WC was also subcontractor to P&W, CPD, on a program to supply NASA Langley with copies of the telemetry units from item #2 for flight use with stringent manufacturing requirements (1979-1980); and (4) P&WC was also subcontractor to United Technologies Research Center on a Combustor soot program - all combustor hardware was designed and fabricated by P&WC, while United Technologies Research Center assembled the rig and carried out all testing (1980-1981).

Keywords: 1 = Aircraft; 4 = Chemistry; 8 = Energy; 9 = Environment; 19 = Testing/Test Equipment; Small Gas Turbine Engines = 1; Engines = 1; Turbine Engines = 1; Engine Components = 1; Engine Systems = 1; Fuel Systems Research = 1; Repair & Overhaul = 1; Alternate Fuels Research = 1, 4; Roller Bearings = 1; Combustion Research = 1, 4; Fuels Research = 1, 4; Helicopter Systems = 1; Auxiliary Power Units = 8; Engine