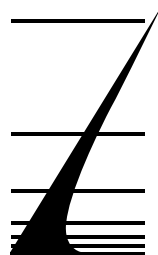


# The Market for Aviation Turboprop Engines

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Product Code #F641

A Special Focused Market Segment Analysis by:



**FORECAST** INTERNATIONAL



# Analysis 3

## The Market for Aviation Turboprop Engines: 2010-2019

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## PROGRAMS

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The following reports are included in this section: (**Note:** a single report may cover several programs.)

Europrop International TP400-D6

General Electric CT7 (Turboprop)

Honeywell TPE331

OMSK Aircraft Engine Bureau Aviation Turboprops

Pratt & Whitney Canada PT6A

Pratt & Whitney Canada PW100 Series

Rolls-Royce AE 2100

Rolls-Royce Model 250 (Turboprop)

Rolls-Royce T56/501



## Introduction

This analysis of the turboprop engine market covers the factors that will affect engine production worldwide over the next 10 years. Included in this discussion are

industry trends that affect the competitive environment, varied market statistics, and individual manufacturers' engine programs.

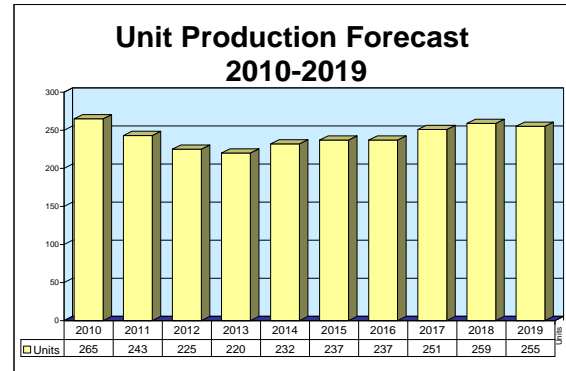




# Pratt & Whitney Canada PW100 Series

## Outlook

- P&WC launches new regional turboprop program
- New PW127M powers ATR 600 series



## Orientation

**Description.** Advanced-design, two-spool, centrifugal-flow, free-turbine turboprop engine generating from 1,500 shp to approximately 5,000 shp (1,118-3,728 kW), with growth potential to 6,000 shp (4,474 kW).

**Sponsor.** Development of the PW100 series was privately sponsored by the prime contractor.

**Power Class.** 1,800-5,000 shp (1,342-3,728 kW).

**Status.** In production for several large regional transport aircraft and some military variants, as well as for the Canadair CL-415 firefighting aircraft.

**Total Produced.** As of September 2010, an estimated 8,694 engines in the PW100 series had been built.

**Application.** Regional airline, utility, and executive transport aircraft; special-purpose aircraft. Current or proposed applications include the following (see also **Variants/Upgrades** section):

Engine Variant	Maximum Takeoff Rating	Application	Engines per Airframe
PW115	1,500 shp (1,118 kW)(a)	Embraer EMB 120 (production completed)	2
PW118/118A	1,800 shp (1,342 kW)	Embraer EMB 120 (production completed)	2
PW119B/C	2,180 shp (1,625 kW)	Dornier/Fairchild-Dornier Do 328-110/120/200 (comp.)	2
PW121	2,150 shp (1,603 kW)	Bombardier Q100/de Havilland DHC-8-100 (comp.)	2
PW121A	2,200 shp (1,417 kW)	Aero International (Regional) ART 42-300/400 (comp.)	2
PW123B	2,500 shp (1,864 kW)	Bombardier Q300	2
PW123C/D	2,150 shp (1,603 kW)	Bombardier Q200	2
PW123AF	2,380 shp (1,774 kW)	Bombardier/Canadair CL-215T, CL-415	2
PW124B	2,400 shp (1,789 kW)	Aero International (Regional) ART 72 (prod. comp.)	2
PW127	2,750 shp (2,051 kW)	Aero International (Regional) ART 72-100 (prod. comp.)	2
PW127E	2,160 shp (1,610 kW)	Aero International (Regional) ART 42-500	2
PW127J	2,750 shp (2,050 kW)	Xi'an Y7-200A/MA60	2
PW127F	2,920 shp (2,177 kW)	Aero International (Regional) ART 72-500	2
		CASA C-295M	2
PW150A	4,580 shp (3,415 kW)	Bombardier Q400	2
	5,000 shp (3,728 kW)(b)	Shaanxi Y-8F600 (in development)	4

(a) For initial aircraft. Engine model has been deleted from Type Certificate.

(b) Power output yet to be identified. A 5,000-shp output is projected by Forecast International.

## Pratt & Whitney Canada PW100 Series

**Price Range.** PW123, \$800,000. PW127, \$920,000. PW150, \$1.3 million. All estimates are in 2010 U.S. dollars.

**Competition.** The PW100 series of aviation turboprops faces competition from the Honeywell

TPE331-15AW at 1,650 shp (1,230 kW) and the General Electric CT7 at 1,700-2,000 shp (1,268-1,491 kW). The PW150A competes with the Rolls-Royce AE 2100 at 4,000-6,000 shp (2,983-4,474 kW).

## Contractors

### Prime

<b>Pratt &amp; Whitney Canada</b>	<a href="http://www.pwc.ca">http://www.pwc.ca</a> , 1000 Marie-Victorin Blvd, Longueuil, J4G 1A1 Quebec, Canada, Tel: + 1 (450) 677-9411, Fax: + 1 (450) 647-3620, Prime
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### Subcontractor

<b>Aircraft Parts Corp</b>	<a href="http://www.apcmfg.com">http://www.apcmfg.com</a> , 100 Corporate Dr, Holtsville, NY 11742 United States, Tel: + 1 (631) 289-0077, Email: <a href="mailto:esandler@apcmfg.com">esandler@apcmfg.com</a> (Starter-Generator)
<b>Hamilton Sundstrand</b>	<a href="http://www.hamiltonsundstrand.com">http://www.hamiltonsundstrand.com</a> , 4747 Harrison Ave, PO Box 7002, Rockford, IL 61125-7002 United States, Tel: + 1 (815) 226-6000 (Integrated Drive Generator)
<b>Honeywell Aerospace Yeovil</b>	<a href="http://www.honeywell.com/sites/aero/">http://www.honeywell.com/sites/aero/</a> , Bunford Ln, Yeovil, BA20 2YD Somerset, United Kingdom, Tel: + 44 1935 457 181, Fax: + 44 1935 427 600, Email: <a href="mailto:sales.yeovil@honeywell.com">sales.yeovil@honeywell.com</a> (Main Engine Oil Cooler)
<b>Parker Aerospace Gas Turbine Fuel Systems Division</b>	<a href="http://www.parker.com/ag">http://www.parker.com/ag</a> , 9200 Tyler Blvd, Mentor, OH 44060 United States, Tel: + 1 (440) 954-8100, Fax: + 1 (440) 954-8199 (Fluid Management System)

Comprehensive information on Contractors can be found in Forecast International's "International Contractors" series. For a detailed description, go to [www.forecastinternational.com](http://www.forecastinternational.com) (see Products & Samples/Governments & Industries) or call + 1 (203) 426-0800.

Contractors are invited to submit updated information to Editor, International Contractors, Forecast International, 22 Commerce Road, Newtown, CT 06470, USA; [rich.pettibone@forecast1.com](mailto:rich.pettibone@forecast1.com)

## Technical Data

**Design Features.** P&WC PW100 series engines have the following design features:

**Intake.** Integral structural annular intake surrounding output shaft. Intake duct to nacelle located under gearbox.

**Low-Pressure Compressor.** Single-stage LP centrifugal compressor driven by a single axial-flow, low-pressure turbine or gas generator turbine. Impeller is forged/machined titanium. Pressure ratio estimated at 4.3:1.

PW150 has a three-stage, axial-flow LP compressor.

**High-Pressure Compressor.** Single-stage centrifugal compressor driven by the Stage 1 gas generator or high-pressure turbine. Pressure ratio estimated at 4.3:1, with a total compressor mass flow of 15 lb/sec for the PW115. Total pressure ratio for the PW115 is 14.3, while larger versions have a greater pressure ratio of up to 17:1. All casings are titanium, with the complex investment cast intercompressor case also composed of titanium.

The PW150 has a single centrifugal HP compressor.

**Combustor.** Single annular, reverse-flow combustor designed for high-temperature operation. Composed of sheet metal liner and outer liners with 14 piloted air-blast atomizing fuel nozzles. PW150 also has a reverse-flow annular combustor.

**High-Pressure Turbine.** Single high-pressure axial-flow turbine is composed of 47 directionally solidified cast MAR-M200 blades. HP nozzle vane segments are investment cast in IN792 Mod 5A material, with the cooling insert for each vane cast in IN625. HP blade has CPW 362A duplex aluminum coating. Interstage turbine duct is investment cast in IN713.

**Low-Pressure Turbine.** Single uncooled LP turbine drives the LP compressor via concentric shafting, and is composed of investment cast IN100 blades and an integrally cast nozzle vane ring of IN792 material (PW124/125A engine has LP stator cooling). Turbine inlet temperature (TIT) estimated in the 2,100-2,300°F

## Pratt &amp; Whitney Canada PW100 Series

(1,149-1,260°C) range, depending upon variant and customer power requirements. The gas generator diffuser is cast and HIPed in IN718. Nozzle is coated with CPW 43 aluminate.

PW150 has a single LP turbine.

**Power Turbine.** Two-stage, axial-flow power turbine drives the propeller gearbox through the third internal shaft. Stage 1-2 blades are cast in IN713LC, while the Stage 1 PT nozzle vane ring is integrally cast in IN713 and the second PT ring is composed of 54 individually cast IN625 vanes.

The PW150 has a single power turbine.

**Propeller Gearbox.** Two-stage reduction unit with a 20,000-rpm-input high-speed double helical and two reduction lay-shafts and gears, which drive the bull gear and propeller shaft at 1,200-1,300 rpm. Casing is cast magnesium. Gearbox ratings are 1,600 and 2,000 shp, respectively, for the PW115 and PW120. Alternate

ratings for the PW115 and PW120 of 1,980 and 2,380 shp, respectively, are offered as well.

**Bearings.** Seven main engine anti-friction bearings; no intershaft bearings.

**Accessories.** Starter and generator are mounted above and just forward of the HP case to the HP spool. The hydromechanical control unit is also HP spool-mounted. Optional alternator, hydraulic pump, and Woodward propeller governor and governor pump are mounted to individual pads. There is a single lubrication system for the gearbox and gas generator, with one pressure pump and two scavenge pumps with associated bypass filters and screens to prevent cross-contamination.

**Controls.** Electronic fuel control connected to a hydromechanical system for maximum economy over the power range. Integrated engine monitoring system to minimize maintenance requirements. The PW150 has a Hamilton Sundstrand dual-channel Full Authority Digital Engine Control (FADEC) system.

**Dimensions.** The approximate dimensions and weights of the P&WC PW100 series (through the PW127G) are as follows:

	<u>Metric Units</u>	<u>U.S. Units</u>
Length	2,134 mm	84 in
Width	863 mm	34 in
Height	620 mm	24.4 in
Diameter (maximum)	636-838 mm	25-33 in
Weight, dry (including essential accessories)		
PW118/118A/118B	401.4 kg	885 lb
PW119B/119C	402.3 kg	887 lb
PW120/120A/121/121A	434.1 kg	957 lb
PW123/123B/123C/123D/123E	453.6 kg	1,000 lb
PW123AF	467.2 kg	1,030 lb
PW124B/125B/126A/127/127E/127F/127G	480.8 kg	1,060 lb

The approximate dimensions and weight of the P&WC PW150 are as follows:

	<u>Metric Units</u>	<u>U.S. Units</u>
Length	2,423 mm	95.4 in
Diameter (maximum)	1,136 mm	44.7 in
Weight, dry	689.9 kg	1,521 lb

## Variants/Upgrades

**PW118A.** The PW118A is an uprated version of the first PW100, the PW115. This engine variant became the initial powerplant for the EMB 120.

The PW118A is essentially a PW115 with PW124 hot-section components, and it has a higher shp capability for increased hot and high-altitude performance. This engine has been offered as a retrofit engine for the EMB 120.

**PW119.** The PW119 was tailored for the Dornier 328 program by adding compressors from the PW124. The engine was already equipped with the PW124's hot section.

**PW123.** The PW123 was basically designed for the DHC-8-200/300 (now Q200/Q300) series of regional turboprops. The PW123AF is optimized for the demanding operational requirements of the CL-215T/415 firefighting aircraft. Hot section inspection is specified as necessary only "on condition."

## Pratt & Whitney Canada PW100 Series

Time between overhauls is quoted by P&WC as 8,000 hours for all variants except the PW123AF, which has a TBO of 2,500 hours.

**PW127.** The PW127 series is optimized for hot-and-high operation.

The PW127 produces 5-10 percent more power than PW124 variants (the PW124 is no longer produced) in takeoff, climb, and cruise. The engine incorporates a higher mass-flow low-pressure compressor (LPC) of increased temperature capability. The higher temperatures result from use of single-crystal blades in the LPC.

Hot section inspection is specified as necessary only "on condition." TBO is quoted by P&WC as 6,000 hours for all PW127 variants.

**PW130.** The PW130 was proposed as a model that would add another stage to the power turbine along with other gas generator changes to achieve 3,000 shp (2,237 kW), or about 3,150 eshp. The engine was originally expected to be certificated and become available by 1994. The engine model was planned to be mated to a Hamilton Standard (now Hamilton Sundstrand) propfan gearbox and propeller to produce an estimated 7,500-8,000 lbst. Efforts on the PW130 were shelved after a more in-depth assessment of the high end of the large turboprop-powered commuter aircraft marketplace shifted efforts to the PW150, described below.

**PW150.** A major uprating of the PW100 series, the basic design is capable of 6,500-7,500 shp (4,847-5,592 kW). The machine is a three-spool free-turbine engine incorporating three axial low-pressure compressors and one centrifugal high-pressure compressor, each driven by a single axial turbine stage; this model has 75 percent more airflow than other PW100 models. A dual-channel high-performance ignition system is used. The 5,000-shp reduction gearbox used is the helical type found in other PW100s. The engine is equipped with a Hamilton Sundstrand dual-channel FADEC system, an engine health monitoring system, and a functionally integrated PEC (propeller electronic control). The PW150 can fit into the nacelles of other PW100 engines, making retrofit of PW150s into PW100-powered aircraft a possibility.

Pratt & Whitney Canada estimated that it spent CAD250 million (\$183.3 million) to develop the PW150.

The PW150's first application was the Bombardier DHC-8-400, for which it is derated to 4,830 shp (3,600 kW). A total of 12 PW150 engines were used in the engine test program, while another nine were used for the DHC-8-400 certification program. The first production-standard engine was delivered to Bombardier in May 1997.

## Program Review

**Background.** Initially developed as the PT7A (an improved and advanced follow-on to the widely used PT6A series), the since-re-designated United Technologies Pratt & Whitney Canada PW100 series of turboprop engines is the result of extensive design and development efforts under an in-house project designated ADS-604. Among the major factors driving this program, which was officially launched in 1979, were the design limitations of the PT6A series, the availability of advanced metallurgical technology not suitable to the PT6A, and the growing demand for improved specific fuel consumption (SFC) among the operating community. Testing of a demonstrator engine under the ADS-604 effort was initiated in 1979. First testing on P&WC's Viscount testbed was conducted in 1982, leading to certification in 1983. Revenue generating service began in December 1984.

The PW100 engine family has accumulated more than 85 million flying hours, with engines regularly achieving over 10,000 hours on-the-wing without a shop visit.

**P&WC PW100 Series Applications.** Among the applications for the P&WC PW100 turboprop series of powerplants are the following:

Aero International (Regional) ATR Series. The twin-engine 46-74 seat ART 42/72 is a joint development of Aerospatiale of France and Aeritalia of Italy.

The ART 42/72 series has a maximum T-O weight of 47,400 pounds (21,500 kg) and a maximum range of 1,440 nautical miles (2,666 km). Initially geared toward the 40-49-passenger market, the ART 42 has a high wing and a T-tail, and is powered by PW120 engines rated at 2,000 shp, providing 6 percent improvement in climb rate over the PW115. The PW121A was made available on the ART 42 as an option for hot-and-high applications. The maiden flight of the ART 42 was made in October 1984. U.S. FAA certification was obtained in October 1985.

The ART 42-500, an ART 42 equipped with 2,750-shp PW127Es, became the predominant version of the

## Pratt &amp; Whitney Canada PW100 Series

ART 42 after 1995, the year it was certificated. It has a higher cruising speed (at 305 kt) than the earlier versions.

Aeritalia and Aerospaziale officially launched the ART 72 in 1985. This 66-74 seat stretched version uses the 2,400-shp P&WC PW124/124B engines and made its initial flight in 1988; it was certificated in 1989.

The latest version of the ART 72, the ART 72-500, has lower interior noise levels than its PW124-powered predecessor, and an improved cabin air conditioning system. The ART 72-500, launched as the ART 72 Improved and later called the ART 72-210A, incorporates the 2,920-shp (max takeoff) PW127G engine for improved hot/high, time-to-climb, balanced field length, and one-engine-out performance. French and U.S. FAA certification of this variant were granted in 1992.

de Havilland DHC-8/Bombardier Q Series. The de Havilland DHC-8 series (now Bombardier Q series) is a twin-engine relative of the four-engined DHC-7. The DHC-8-100's first flight occurred in 1983; the model was certificated in 1984. The larger DHC-8-300 was announced in 1985. It is a 50-56 seat aircraft that is powered by the PW123 engine variant.

At the 1992 Farnborough Air Show, de Havilland announced plans to offer "B" models of its DHC-8-100/200/300 aircraft. The Bs offer higher gross weights, longer range, and improved cabin noise levels. For improved overall performance (particularly in hot-and-high conditions), the DHC-8-100B is equipped with more powerful PW121s, while the DHC-8-200B and -300B are equipped with PW123Bs. Most of the B options are retrofittable.

The DHC-8-100, DHC-8-200, and DHC-8-300 are now referred to as the Bombardier Q100, Q200, and Q300, respectively.

The most recent addition to the DHC-8 line is the DHC-8-400, now called the Q400. This DHC-8 growth variant features a 22-foot (6.7-m) fuselage stretch (beyond the DHC-8-300) to accommodate a maximum of 74 passengers. The aircraft also has a new forward baggage door, an aft cargo door, and a strengthened wing/fuselage joint. Cruising speed climbs to 350 knots (650 kmph). Aircraft rollout occurred in 1997, and FAA certification was granted in 1999.

The PW150 was chosen by Bombardier for its maximum commonality with the other PW100-powered DHC-8 variants. The engines are rated at 4,830 shp for this application, driving Dowty six-blade reversible-pitch propellers.

Canadair (Bombardier) CL-215T/CL-415. The twin-engine Canadair CL-215 and CL-415 aircraft are considered the world's most capable water-bombers. The original piston-powered CL-215 can be re-engined with turboprop engines. In 1984, the Canadian firm conducted an engineering study to assess the suitability of a turboprop retrofit for the original P&WC R2800 radial-engined CL-215. In 1986, the PW120 was chosen to power the CL-215T (approximately \$9.5 million for engine conversion). Canadair/Bombardier has since switched to the 2,380-shp (1,774-kW) PW123AF. The turbine engines provide pilots an extra margin of power and safety, while reducing maintenance costs.

Quebec had retrofitted all 19 of its piston-powered CL-215s by the end of 1995, in addition to Spain's order for 15 retrofit kits for its fleet of water bombers. Also, France ordered 12 CL-415s; Quebec, 8 CL-415s; and Italy, 4 CL-415s.

New-build PW123AF-powered aircraft are designated CL-415s. Compared to the CL-215s or CL-215Ts, the new-build aircraft add fully powered flight controls, a new cockpit with electronic flight instrument systems, and 15 percent more water capacity. The first CL-415 was delivered in 1994. The following countries have CL-215Ts and/or CL-415s in their inventory: Canada, 23; Croatia, 6; France, 11; Greece, 10; Italy, 14; and Spain, 15. There are about 70 piston-powered CL-215s in operation. They are all candidates for turbine conversions.

CASA/IPTN C-295. In 1995, CASA announced plans to further develop the CN-235, and the stretched (by 3 m) variant that emerged is designated the C-295. Launched by CASA in mid-1997 and first flown at the end of that year, this stretched derivative is powered by P&WC PW127G engines and, compared with the CN-235, offers a 3.7 percent payload increase, a 15-knot cruise speed increase, and a 70-nautical-mile range increase.

The C-295's maximum takeoff weight is 51,272 pounds (23,200 kg); its maximum payload is 21,360 pounds (9,700 kg).

The Spanish Air Force launched C-295 sales with an order for nine aircraft in 1999. The air arms of Spain (nine aircraft), Poland (eight units), and Jordan (two) have ordered the C-295, while a long-pending United Arab Emirates four-unit contract does not appear to have been signed yet. Brazil announced in 2002 that it planned to procure 12 aircraft, but orders have not followed. The South African Air Force reportedly has a firm requirement for as many as 14 aircraft.

## Pratt & Whitney Canada PW100 Series

**Xi'an Y7/MA60.** The Xi'an Aircraft Company (Xi'an, Shaanxi, People's Republic of China) is a twin-turboprop derivative of the Ukrainian Antonov An-24 (NATO code: Coke). While the Y-7/Y7-100 aircraft use twin Dongan Engine Manufacturing Company (DEMC) WJ-5A I turboprops rated at approximately 2,790 shp (2,080 kW) at T-O, the Y7-200A uses PW127C engines rated at 2,750 shp (2,050 kW). Only about five have been built.

Xi'an has developed a new version of the Y7, designated the MA60. Powered by two 2,750-shp PW127Js, it weighs approximately 48,000 pounds (21,800 kg, max takeoff) and has a maximum range of approximately 860 nautical miles (1,600 km). The MA60 can accommodate 56-60 passengers. VIP, freighter, and mixed cargo/passenger configurations are also available.

**Antonov An-140.** Ukrainian aircraft builder Antonov has developed a 46-52 seat regional transport. The aircraft's standard engine is the 2,465-shp TV3-117 turboprop, while the 2,500-shp PW127A is being offered as an option. The aircraft's estimated range in the 52-seat configuration is 1,133 nautical miles (2,100 km) with the TV3, or 1,349 nautical miles

(2,500 km) with the PW127. The aircraft first flew (with the TV3-117MA) in 1997. There is a license agreement with Iran for production (with the TV3) by HESA at Isfahan.

Reims Aviation in France has held talks with Antonov about collaborating in the development of a Westernized version of the -140, using PW127 engines and, most likely, new avionics and an improved cabin interior. Russia's Aeroflot airlines has held talks with Antonov and Aviakor for up to 50 P&WC-powered -140s. Nothing has gone forward on the PW127-powered version, however.

**Shaanxi Y-8F600.** Shaanxi Aircraft Company in China has manufactured its four-engine Y-8 medium-range turboprop transport aircraft series since 1986, including civil transport, drone carrier, and livestock carrier versions. The aircraft are powered by South Aero-Engine Company WJ-6/6A turboprop engines developing 4,250-4,500 shp (3,169-3,355 kW). In 1999, P&WC concluded a Memorandum of Understanding (MoU) with the China Aviation Industry Corp to supply PW150s for the Y-8F600. Production has not yet gone forward, however.

## Timetable

<u>Month</u>	<u>Year</u>	<u>Major Development</u>
Jun	1979	Design initiated
Dec	1980	First gas generator run
Mar	1981	First full engine test
Feb	1982	First test flight
Dec	1983	PW115/PW120 certificated (PW115 dropped Nov 1984)
Jan	1984	Initial deliveries of engines
Feb	1984	First run of the PW124
Dec	1984	PW100 enters revenue service: PW120A on DHC-8-100
Nov	1985	PW124 certification; initial deliveries
Aug	1986	PW118 certificated
Nov	1987	PW118A certificated
Nov	1989	PW126A certificated
Feb	1990	PW124B certificated
Mid-	1991	PW130 effort put on hold pending market reassessment
May	1993	PW123AF-powered CL-415 receives FAA certification
Dec	1993	Xi'an Y7-200A first flight with PW127
Sep	1995	ART 42-500 with PW127Es certificated
Mid-	1996	PW150 enters testing
Mar	1997	First flight-test of PW150 on Boeing 720 testbed
June	1998	First PW150 engines shipped to Bombardier for Dash 8Q-400
Mid-	1999	P&WC MoU with China regarding Y-8F600
May	1999	FAA certification of de Havilland DHC-8-400
	2007	Xi'an was reportedly to increase production of MA60
Thru	2016	Continued production of PW100 turboprop series

## Pratt &amp; Whitney Canada PW100 Series

## Worldwide Distribution/Inventories

As of September 2010, an estimated 8,694 PW100 engines had been built, powering more than 2,000 aircraft in service with 344 operators in 107 countries. The largest concentrations are in North America and Europe.

## Forecast Rationale

Pratt & Whitney Canada's PW100 series maintains its domination of the regional transport engine segment, as it powers the two most popular aircraft from ATR and Bombardier. The ATR 42/72 and Bombardier Q Series have been the prominent aircraft in the regional turboprop segment for many years, and updates to these aircraft, along with the inherent efficiency of turboprops overall, will keep them relevant for the foreseeable future.

***New ATR Series Flies Upgraded PW127M***

ATR's new 600 series aircraft is set to enter service in 2011, and will be the launch platform for the PW127M. This new variant will offer 5 percent greater power at takeoff and maximum continuous power settings, allowing for improved performance in hot-and-high operations. ATR is considering a new family of turboprops that would include variants seating up to 90 passengers.

Of the original Q Series, Bombardier's Q400 is the only type still in production. The market has dictated that bigger is better, leading to the end of the smaller aircraft in the series. Bombardier has been considering a stretched Q400 version for several years but has not announced a decision.

***New Regional Turboprop Program***

In June 2010, Pratt Canada announced the launch of a demonstrator program for a new regional turboprop engine. Pratt said the engine is an all-new advanced design intended to provide a double-digit reduction in fuel burn and environmental emissions. The company has completed the study phase and is moving on to the demonstrator program. This is somewhat coincidental with Embraer's exploration of a 100-passenger turboprop, as the engine would provide the efficiency gains the manufacturer said it needs to make the new aircraft viable economically.

***Military PW100 Applications***

The PW100 has several military transport applications – essentially the same MA60/MA600 built by Xi'an Aircraft Industry in China and the C-295 built by EADS CASA. The market for twin-engine military transports is relatively small, but the engines powering these aircraft will account for over 20 percent of total PW100 production.

Overall, we estimate PW100 production at 2,424 engines during the 10-year forecast period.

## Ten-Year Outlook

ESTIMATED CALENDAR YEAR UNIT PRODUCTION												
Designation or Program	High Confidence					Good Confidence			Speculative			Total
	Thru 2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	
<b>Pratt &amp; Whitney Canada</b>												
<b>PW123 AF &lt;=&gt; 415</b>												
	160	6	4	5	7	8	6	5	6	4	4	55
<b>PW127 &lt;=&gt; ATR-42 -500</b>												
	257	7	0	0	0	0	0	0	0	0	0	7
<b>PW127 &lt;=&gt; ATR-72 -500</b>												
	598	87	42	12	0	0	0	0	0	0	0	141
<b>PW127 &lt;=&gt; MA600</b>												
	4	5	8	10	7	10	12	16	18	19	17	122
<b>PW127 &lt;=&gt; Y-7/MA60</b>												
	84	13	14	18	22	19	14	5	0	0	0	105

## Pratt &amp; Whitney Canada PW100 Series

ESTIMATED CALENDAR YEAR UNIT PRODUCTION												
Designation or Program	High Confidence					Good Confidence			Speculative			
	Thru 2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Total
<b>PW127 Military &lt;&gt; C-295</b>												
	139	21	24	27	26	25	26	25	27	26	25	252
<b>PW127 Military &lt;&gt; MA60</b>												
	8	5	9	6	4	4	4	2	0	0	0	34
<b>PW127 Military &lt;&gt; MA600</b>												
	0	0	0	0	0	1	2	1	3	4	3	14
<b>PW127 M &lt;&gt; ATR-42 -600</b>												
	1	4	9	9	7	10	11	11	14	15	10	100
<b>PW127 M &lt;&gt; ATR-72 -600</b>												
	0	11	49	65	69	73	76	83	90	96	101	713
<b>PW150 &lt;&gt; Q400</b>												
	646	106	84	73	78	82	86	89	93	95	95	881
<b>Subtotal</b>	1,897	265	243	225	220	232	237	237	251	259	255	2,424
<b>Total</b>	1,897	265	243	225	220	232	237	237	251	259	255	2,424



# FORECAST INTERNATIONAL

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Cardholder Name \_\_\_\_\_

Card# \_\_\_\_\_ Exp. \_\_\_\_\_ csc# \_\_\_\_\_

Billing Address (if different from above) \_\_\_\_\_

- Check Enclosed  
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(Purchase Order # and Signature Required)  
 Quotation Requested  
 VISA   MasterCard   
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Name of Product/Service	Code	E-Mail Address	Qty.	Price

Please include your e-mail address to receive twice-weekly E-Market Alert Newsletters.



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 Shipping \_\_\_\_\_  
 In Connecticut add 6% sales tax \_\_\_\_\_  
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	U.S.	World		U.S.	World		U.S.	World
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Binder	\$45	\$85	<b>Complete Library</b>			Binder	\$540	\$1,020
DVD	\$50	\$95	<b>(Civil/Commercial &amp; Military)</b>			DVD	\$50	\$95
Binder & DVD	\$95	\$180	Binder	\$1,575	\$2,975	<b>International Military Markets</b>		
Binder & RT	\$45	\$85	DVD	\$50	\$95	<b>(A Subset of G&amp;I above)</b>		
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<b>Aerospace Systems</b>			Binder	\$1,440	\$2,720	DVD	\$50	\$95
CD	\$50	\$95	DVD	\$50	\$95	<b>Naval</b>		
<b>Weapons Systems</b>			<b>Civil/Commercial Library</b>			Binder	\$90	\$170
Hard Copy	\$45	\$85	Binder	\$360	\$680	DVD	\$50	\$95
CD	\$50	\$95	DVD	\$50	\$95	<b>Power</b>		
<b>Power Systems</b>			<b>Market Intelligence</b>			Binder	\$90	\$170
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<b>Focused Market</b>			<b>Aerospace</b>			<b>Weapons</b>		
<b>Segment Analyses</b>			Binder	\$360	\$680	Binder	\$180	\$340
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			<b>Electronics</b>			NOTE: No charge for Real-Time format.		
			Binder	\$360	\$680	<b>2011 Historic Art Calendar</b>		
			DVD	\$50	\$95	\$5.95	\$12.95	

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Fax: (44) 1608 641159

E-Mail: [support@hawkinformation.com](mailto:support@hawkinformation.com)

Website: [www.hawkinformation.com](http://www.hawkinformation.com)

Contact: Mr. Michael Hobbs

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