Engine Values Book

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Aviation 100 Awards
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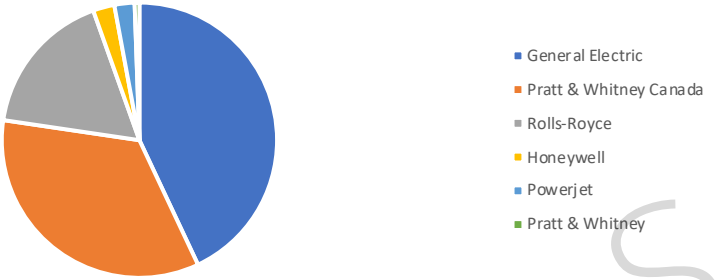
Contents

Sample charts

Worldwide Market Share - Total Installed Population

	Total Installed Population	
CFM International	27,156	40%
General Electric	14,482	21%
Rolls-Royce	8,575	13%
International Aero Engines	6,220	9%
Pratt & Whitney Canada	5,184	8%
Pratt & Whitney	5,598	8%
Honeywell	380	1%
Engine Alliance	516	1%
PowerJet	358	1%
Total	68,469	100%

Regional Jet Engine Marketshare



	Regional Jet Engine Marketshare	
General Electric	6,492	43%
Pratt & Whintey Canada	5,184	34%
Rolls-Royce	2,600	17%
Honeywell	380	3%
Powerjet	358	2%
Pratt & Whitney	84	1%
Total	15,098	100%

Narrow-Body Engine Marketshare

	Narrow-Body Engine Marketshare	
CFM International	26,752	71%
International Aero Engines	6,220	17%
Pratt & Whitney	3,404	9%
Rolls-Royce	1,226	3%
Total	37,602	100%

Rolls-Royce Trent 900

Description: The fourth generation in the Trent family, the Trent 900 program, was launched in 2001 to power the A380 and is the leading engine on the aircraft type. The engine is scaled up 10% from the Trent 500 and features the same three-shaft architecture as the other members of the Trent family. It features a swept fan, 3-D aerodynamics throughout the compressor and turbine sections, and contra-rotation of the high pressure spool. Rolls-Royce claims that the Trent 900 engines generate only 40% of the CO2 per passenger kilometre of an average family car.

The Trent 900 made its maiden flight on 17th May 2004 on Airbus' A340-300 testbed and achieved engine certification in October 2004. The Trent 900 entered service with a thrust rating of 70,000 pounds although it is certificated to up to 80,000 pounds. The Trent 900 engine powered the first scheduled service of a Singapore Airlines' Airbus A380 from Changi Airport, Singapore to London Heathrow on 18th March 2008. In 2018, Singapore Airlines returned their first five Trent 900 powered A380 aircraft, two of which have been retired and scheduled for disassembly while two have entered storage and one has been leased to wet-leasing operator, Hi Fly. In February 2019, following months of speculation, Airbus cancelled the A380 programme. Emirates, who placed an order for 20 aircraft with an option for a further 16 in a year earlier and had struggled to reach an agreement for the engines with Rolls-Royce. This prompted the operator to switch orders from the A380 to the A330neo and A350 platforms, clearing the way for Airbus to cease production by 2021. Since the pandemic outbreak the market for A380 engines has worsened and as such the underlying Base value curves and Market values have experienced a dramatic reduction since last publication. Given the low utilisation rate of these engines, spare demand is set to remain low for the remaining life of the fleet and with operators moving away from the aircraft sooner than expected the availability of engines is set to increase in the near future.

Current Market Value, Base Value, Typical Current Rental Rate (TCCR) & QEC	Trent 970
Market Value (Dressed)	$5,690,000
Base Value (Dressed)	$8,550,000
Typical Current Rental Rate	$145,000
QEC	$600,000

Engine Maintenance Indicators	Trent 970
Life Limited Parts (LLP) Cost	$11,149,000
Average Cost of Overhaul	$8,125,000
Mean Between Overhauls (MTBO)	30,240 FH
Fleet Average Fligth Hour/Cycle Ratio	8.8 FH/Cycles

Engine Type	Engine Model	CMV	2021	2022	2023	2024	2025	2033	2034	2035	2036	2037	2038	2039	2040	2041
Trent 900	Trent 970															
Trent 900	Trent 972															

Airworthiness Derivatives - Trent 900

Issuing Authority				Descripition
EASA	CAA	DGAC	FAA	
2020-0041				Intermediate Pressure Compressor Rotor Shaft - Inspection
2018-0199				Oil Service Pipe Sealing Rings - Replacement
			2018-18-06	LPT Disc Seal Fins & Interstage Seals - Inspection/Replacement/Modification
			2017-08-10	LPT Exhaust Case & Support Assembly - Inspection/Replacement
			2017-08-11	Life Limit Reduction - Prevent Engine Failure
			2015-02-20	IPC Rotor Shaft
			2013-05-04	Inspection of the intermediate pressure compressor rear stub shaft (IPC RSS) piston ring
			2013-02-04	IP turbine seal fins and interstage seals inspection
			2013-02-03	Replacement of the fuel oil exchanger
			2012-12-03	IP turbine shaft rgid coupling splines inspection

Definitions and Assumptions

ISTAT Definitions

All the data contained in this publication is in accordance with ISTAT definitions, which are included below.

Base Value is IBA's opinion of the underlying economic value of an engine in an open, unrestricted, stable market environment with a reasonable balance of supply and demand, and assumes full consideration of its "highest, best use". An engine's Base Value is founded in the historical trend of values and in the projection of value trends and presumes an arm's-length, cash transaction between willing, able and knowledgeable parties, acting prudently, with an absence of duress and with a reasonable period of time available for marketing.

Market Value is IBA's opinion of the most likely trading price that may be generated for an engine under the market circumstances that are perceived to exist at the time in question. Market Value assumes that the engine is valued for its "highest, best use", that the parties to the hypothetical sale transaction are willing, able, prudent and knowledgeable, under no unusual pressure for a prompt sale, and that the transaction would be negotiated in an open and unrestricted market on an arm's-length basis, for cash or equivalent consideration, and given an adequate amount of time for effective exposure to prospective buyers.

Quick Engine Change (QEC) kit is defined as a collection of components and accessories installed into a bare engine to reduce the time required for installation of the entire powerplant onto an aircraft.

QEC kits can be categorised into three types: basic, neutral & full. A basic QEC includes all prime parts and accessories required for an engine test. A neutral QEC can be considered to comprise the basic kit plus sufficient specialist parts and accessories that will allow installation on an airframe but excludes any items relating to a specific aircraft or application. A full QEC comprises the neutral kit plus those items required for varying aircraft applications. In the case of basic and neutral, neither the thrust reverser nor the nose cowl is included. Each engine type should be considered unique in its QEC configuration and installation.

Values are shown as a range to bracket IBA's view of neutral and full QEC kits and to reflect the different make-up of each kit as the components and accessories vary depending on the type of aircraft the engine will eventually power.

Typical Current Rental Rate (TCRR) is IBA's opinion of the monthly lease rental as it relates to an arm's length transaction between a willing lessor and a willing lessee for a single engine transaction. Values are shown as a range to bracket IBA's view of short-term (18 months) to long-term (5 years) duration of rental.

Maintenance Definitions

Life Limited Part (LLP) Cost refers to IBA's opinion of the basic cost of all of the engine's life-limited parts (LLPs), assuming all-new parts.

Mean Time Between Overhauls (MTBO) represents IBA's opinion of the average time, in flight hours, between major engine shop visits. This does not include unscheduled removals for reasons such as foreign object damage but it does include removals due to exhaust gas temperature (EGT) deterioration or LLP life expiry.

Basic Overhaul Cost is IBA's estimated figure for an average workshop visit carried out under a "time & materials" basis. This includes labour for teardown, inspection, repair costs, material replacement and a degree of LLP replacement.

In most cases, the Base Value of an engine assumes its physical condition is average for an engine of its type and age, and its maintenance time status is at mid-life, mid-time (or benefiting from an above-average maintenance status if it is new or nearly new, as the case may be).

Airworthiness Directive (AD)

Airworthiness Directives (ADs) have been included at the end of each section of the Engine Values Book. Recurring ADs are noted with a bullet and key ADs are further noted by the use of bold, red lettering. Key ADs, as defined by IBA, fall into one or more of the following categories:

ADs resulting from an uncontained failure

ADs that reduce the life of components, LLPs and primary components

ADs requiring a correction of operational problems

ADs requiring piece part inspection programs of LLPs and usually resulting in a restricted operational life and/or driving components out of the engine at shop level

These key ADs are usually associated with high costs in terms of operational disruption, higher material investment, or higher shop visit rates with possible increases in cost of each shop visit.

Disclaimer

IBA Group Limited (IBA) has prepared the enclosed Engine Values Book. The Engine Values Book is subject to the disclaimer below.

IBA has no present interest in the engines being appraised for the purpose of the Engine Values Book. At the date of the Engine Values Book, IBA does not anticipate acquiring any

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65,000
Access to over 65,000 aircraft

35 Million
35 million airline flights tracked per year

120,000
Over 120,000 aircraft events added annually

350+
Managed by a team with over 350+ years of expertise

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