



PRODUCT RANGE – this is what we do



VOLVO AERO

A COMPLETE MATRIX OF RESOURCES

The key to success in any business relationship is customer value.

At Volvo Aero, we have our own ways to ensure it, distilled in the expression 'Combined Resources, Individual Solutions', and fulfilled through the integrated capabilities of our core operations: engine components and engine services.

Our businesses touch practically every aspect of today's aviation and aerospace industries. Concurrently, our capabilities enable us to match our partners' needs with customized solutions that generate maximal returns. Our resources enable us to successfully complete any assignment we undertake

To profit from partnership

Volvo Aero develops, produces and delivers products, services and complete business solutions within distinct market niches, and within clearly defined areas of specialization. We always strive to achieve and maintain a high level of cooperation and synergy in the partnerships we undertake.



We make a difference in practically every segment of the industry.



We are active at a risk-sharing level in practically all aspects of the industry, from engine- and component development, to production and support. We understand the technical and financial factors that drive aviation and aerospace, and we are skilled at identifying potential partnerships and developing holistic solutions incorporating a tailored commercial logic that generates tangible returns for both parts.

Creating superior customer value

Volvo Aero has been an integral part of the aviation and aerospace industries since our founding in 1930, and we enjoy a well-established reputation for safety, quality and reliability amongst engine and aircraft manufacturers, airlines, MROs and military customers alike.

It is our resourcefulness and dedicated presence, and our ambition to be the best partner to the aviation and aerospace industry that ensure real value to each partner that Volvo Aero works with.



VOLVO AERO – BEST PARTNER

Part of the Volvo Group, we provide dedicated specialist expertise and partnership solutions that help our partners to increase their profitability and focus on their core business.

Engine Services

Volvo Aero maintains and provides multi-service solutions for operators of turbo-fan and turbo-prop engines in many of the world's most flown commercial and business aircraft, as well as for a number of industrial gas turbines providing heat and power.

Commercial Engines

Volvo Aero develops and manufactures advanced components for aircraft and aero-derivative engines, and is a partner in several commercial engine programs. Our advanced components (complex structures, housings and rotating parts) are installed in over 90% of all new large aircraft engines.

Military Engines

Volvo Aero develops, assembles and provides integrated logistics support for military jet engines, especially the Volvo RM12 engine for the Gripen fighter.

We develop and produce components for several other military engines, such as the F414 that powers the F18-E/F, and F135 for the Joint Strike Fighter.

Space Propulsion

Volvo Aero is a world leader in the manufacture of rocket nozzles for commercial launch vehicles, and is the European Space Agency's Center of Excellence for rocket engine turbines and nozzles.



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VOLVO AERO PRODUCT RANGE

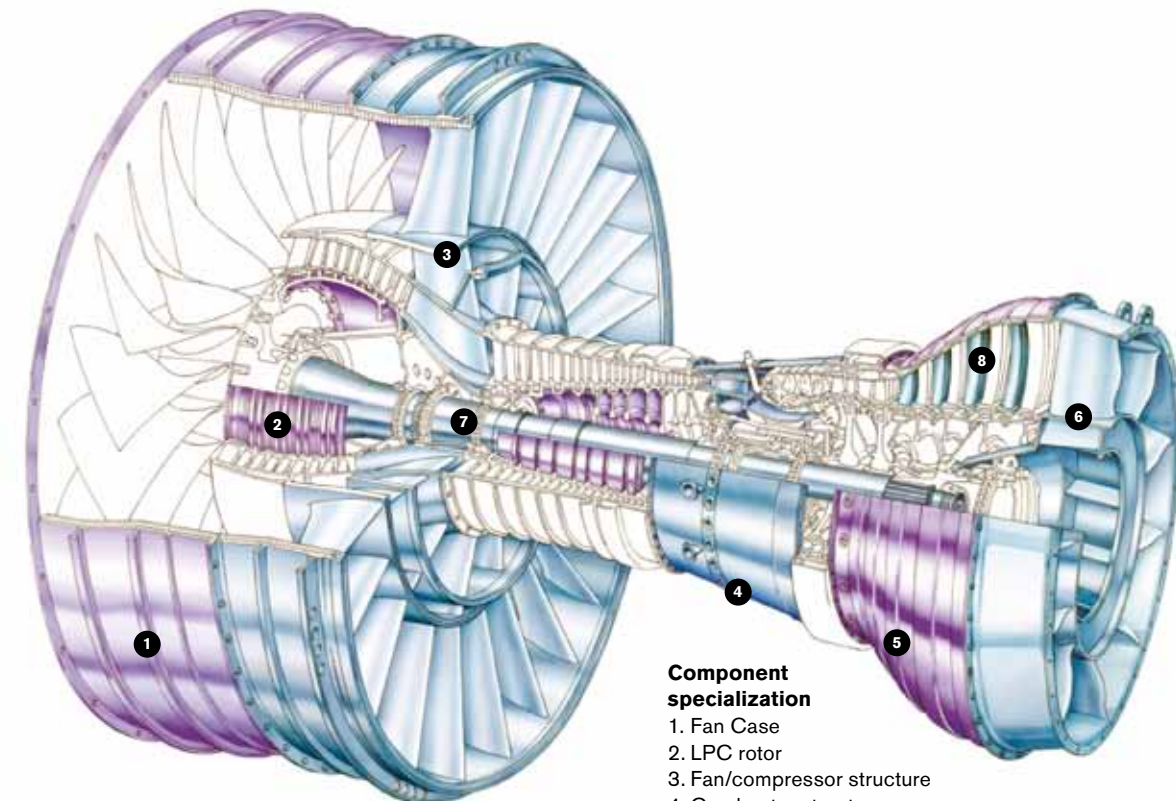
The tables and illustrations on these pages provide you with a brief overview of the precision aerospace components developed, produced, assembled and supported by Volvo Aero, as well as the engines and aircraft they serve.

| Complete engines/systems/subsystems | Manufacturing | | | | Product specialization | | | | Product support | | | |
|---------------------------------------|--------------------------------|---------------|-------------------|-----|--------------------------------|---------------|-------------------|-----|--------------------------------|---------------|-------------------|-----|
| | Design/development/improvement | Manufacturing | Technical support | MRO | Design/development/improvement | Manufacturing | Technical support | MRO | Design/development/improvement | Manufacturing | Technical support | MRO |
| Military aero engines | | | | | | | | | | | | |
| RM12 | ▲ | ■ | ▲ | ■ | ▲ | ■ | ▲ | ■ | ▲ | ■ | ▲ | ■ |
| Rocket engines | | | | | | | | | | | | |
| Vulcain/Vulcain 2, turbines & nozzles | ■ | | ▲ | | | | | | | | | |
| Vinci, turbines | | | ▲ | | | | | | | | | |
| RL60, nozzles | | | ▲ | | | | | | | | | |

- ▲ Design/development/improvement
- Manufacturing
- ▼ Technical support
- MRO

Engine components + MRO

| Commercial aero engines | Fan/compressor cases | | Bearing/housings | | Hubs | | Discs | | Spools | | Fan/compressor structures | | Compressor rear frame/Diffuser case | | Combustion chamber/Inlet burner/Inlet cases (LP T's) | | Low pressure turbine | | Turbine structures | | Shafts | | Vaness | | MRO's | | |
|------------------------------|--------------------------------|---------------|--------------------------------|---------------|--------------------------------|---------------|--------------------------------|---------------|--------------------------------|---------------|--------------------------------|---------------|-------------------------------------|---------------|--|---------------|--------------------------------|---------------|--------------------------------|---------------|--------------------------------|---------------|--------------------------------|---------------|--------------------------------|---------------|---|
| | Design/development/improvement | Manufacturing | Design/development/improvement | Manufacturing | Design/development/improvement | Manufacturing | Design/development/improvement | Manufacturing | Design/development/improvement | Manufacturing | Design/development/improvement | Manufacturing | Design/development/improvement | Manufacturing | Design/development/improvement | Manufacturing | Design/development/improvement | Manufacturing | Design/development/improvement | Manufacturing | Design/development/improvement | Manufacturing | Design/development/improvement | Manufacturing | Design/development/improvement | Manufacturing | |
| BR715 | | | | | | | | | | ▲ | ■ | | | | | | | | | | | | | | | | |
| Trent 500 | | | | | | | | | | ▲ | ■ | | | | | | | | | | | | | | | | |
| Trent 700 | | | | | | | | | | ▲ | ■ | | | | | | | | | | | | | | | | |
| Trent 900 | | ■ | | | | | | | | ▲ | ■ | | | | | | | | | | | | | | | | |
| Trent 1000 | | ■ | | | | | | | | ▲ | ■ | | | | | | | | | | | | | | | | |
| Trent XWB | | | | | | | | | | ▲ | ■ | | | | | | | | | | | | | | | | |
| Tay | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| JT8D | | | | | ■ | ■ | | | | ■ | | | | | | | | | | | | | | | | | |
| V2500 | | ■ | | | | | | | | ■ | | | | | | | | | | | | | | | | | |
| PW1000 | | | | | | | | | | | | | | | | | | | | | | | | | | | ● |
| PW2000 | | | | | | | | | | ▲ | ■ | | | | | | | | | | | | | | | | |
| PW4000 | | | | | | | | | | ▲ | ■ | | | | | | | | | | | | | | | | |
| PW6000 | | | | | | | | | | ▲ | ■ | | | | | | | | | | | | | | | | |
| PW1000G | | | | | | | | | | ▲ | ■ | | | | | | | | | | | | | | | | |
| GP7000 | | | | | | | | | | ▲ | ■ | | | | | | | | | | | | | | | | |
| GE90-115B | | | | | | | | | | ▲ | ■ | | | | | | | | | | | | | | | | |
| CFM56 | | | | | | | | | | ▲ | ■ | | | | | | | | | | | | | | | | |
| TFE 731 | | | | | | | | | | | | | | | | | | | | | | | | | | | ● |
| Military aero engines | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| RM12 | ▲ | ■ | | | | | | | | ▲ | ■ | | | | | | | | | | | | | | | | ● |
| F414 | ▲ | ■ | | | | | | | | ▲ | ■ | | | | | | | | | | | | | | | | ● |
| F404 | ▲ | ■ | | | | | | | | ▲ | ■ | | | | | | | | | | | | | | | | ● |
| F100 | | | | | | | | | | ▲ | ■ | | | | | | | | | | | | | | | | ● |
| F110 | | | | | | | | | | ▲ | ■ | | | | | | | | | | | | | | | | ● |
| F135 | | | | | | | | | | ▲ | ■ | | | | | | | | | | | | | | | | ● |
| Gas turbines | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| LM1600 | | | | | | | | | | ▲ | ■ | | | | | | | | | | | | | | | | ● |
| LM2500 | | | | | | | | | | ▲ | ■ | | | | | | | | | | | | | | | | ● |
| LM6000 | | | | | | | | | | ▲ | ■ | | | | | | | | | | | | | | | | ● |
| LMS100 | | | | | | | | | | ▲ | ■ | | | | | | | | | | | | | | | | ● |
| FT8 | | | | | | | | | | ▲ | ■ | | | | | | | | | | | | | | | | ● |
| DR990 | | | | | | | | | | ▲ | ■ | | | | | | | | | | | | | | | | ● |



Component specialization

1. Fan Case
2. LPC rotor
3. Fan/compressor structure
4. Combustor structure
5. Low pressure turbine case
6. Turbine structure
7. Shaft
8. Vanes

Rocket Engines



Vulcain/Vulcain 2
Partners: Snecma, EADS ST, Avio
Thrust: 1138 kN/1275 kN
Rocket: Ariane 5/Ariane 5 ECA
Production: LOX turbine, LH2 turbine, nozzle



Vinci
Partners: Snecma, Avio
Thrust: 180 kN
Rocket: Ariane 5 ECB
Production: LOX turbine, LH2 turbine



RL60
Partners: Pratt & Whitney Rocketdyne
Thrust: 267 kN
Rocket: TBD
Production: Nozzle under development

Gas Turbines



LMS100
Partner: General Electric
Power output: >100 MW
Production: Power turbine case, intermediate turbine frame, compressor rear frame



LM6000
Partner: General Electric
Power output: 40 MW
Production: Compressor rear frame, low pressure turbine case, spool



LM2500
Partner: General Electric
Power output: 25 MW
Production: disc, spool



LM1600
Partner: General Electric
Power output: 15 MW
Production: hub, disc, shafts, vanes
MRO: Full capability



FT8
Partner: Pratt & Whitney
Power output: 25 MW
Production: Compressor structure



DR990
OEM: Volvo Aero
Power output: 4.4 MW
MRO: Full capability

Military Engines



RM12
OEM: Volvo Aero
Partner: General Electric
Aircraft: Gripen
Thrust: 80.5 kN (18,100 lbs) with A/B, 55 kN (12,140 lbs) without A/B
Production: Rotors, structures, A/B liner, final assembly of complete engine
MRO: Full capability



F414
Partner: General Electric
Aircraft: F/A-18 E/F
Thrust: 98.0 kN (22,000 lbs) with A/B, 67 kN (14,756 lbs) without A/B
Production: Fan disc 1, mid frame, compressor case assembly

Commercial Engines



GE90-115B
Partner: General Electric
Aircraft: Boeing 747, 747-8
Thrust: 223-334 kN (50,000-75,000 lbs)
Production: Fan hub frame, turbine rear frame, booster spool, aft fan case, rotating seal



CF6-80
Partner: General Electric
Aircraft: Boeing 747/767, MD-11, Airbus A330/A310/A300
Thrust: 213-334 kN (48,000-75,000 lbs)
Production: LP compressor spool 2-5, HP compressor spool 3-9, compressor rear frame, low pressure turbine case



CFM56
Partner: Snecma
Aircraft: Boeing 737, Airbus A318/A319/A320/A321/A340
Thrust: 82.3-151.3 kN (18,500-34,000 lbs)
Production: Low pressure turbine case, low pressure turbine vanes, low pressure turbine shaft



GE90-115B
Partner: GE/Snecma/Carlton
Aircraft: Boeing 777-200LR/300ER
Thrust: 513 kN (115,000 lbs)
Production: Fan hub frame, fan case LP turbine case, hub, shroud, seal, impeller



GP7000
Partner: Pratt & Whitney/MTU
Aircraft: Airbus A380
Thrust: 310-370 kN (70,000-84,000 lbs)
Production: Low pressure turbine case turbine exhaust case



JT8D
Partner: Pratt & Whitney
Aircraft: Boeing MD-80/727/737
Thrust: 82.3-96.5 kN (18,500-21,700 lbs)
Production: Compressor hub, compressor discs, intermediate case, shaft



PW1000
OEM: Pratt & Whitney Canada
Aircraft: Fokker 50, ATP, ATR 42/72, Dash 8
Power: 1800-2750 shp
MRO: PW120, 121, 123, 124, 125, 126, 127



PW2000
Partner: Pratt & Whitney
Aircraft: Boeing 757, Boeing C-17, Ilyushin IL-96M
Thrust: 165-191 kN (37,000-43,000 lbs)
Production: Bearing/housing, hub, intermediate case, diffuser case, low pressure turbine case, turbine exhaust case



PW4000
Partner: Pratt & Whitney/MTU
Aircraft: Boeing 747/767/777, MD-11, Airbus A300/A310/A330, 231-454 kN (52,000-102,000 lbs)
Production: Compressor hub, compressor disc, turbine exhaust case, rotating air seals
MRO: PW 4000-94



PW6000
Partner: Pratt & Whitney
Aircraft: Airbus A318
Thrust: 80-107 kN (18,000-24,000 lbs)
Production: LP shaft



PW1000G
Partner: Pratt & Whitney
Aircraft: Mitsubishi RJ, Bombardier C-series
Thrust: 65-100 kN (14,000-23,000 lbs)
Production: turbine exhaust case, intermediate case, LP shaft



V2500
Partner: Pratt & Whitney
Aircraft: Boeing MD-90, Airbus A319/A320/A321
Thrust: 97.9-156 kN (22,000-35,000 lbs)
Production: Bearing/housing/bearing support, low pressure turbine case, turbine exhaust case



Tay
Partner: Rolls-Royce
Aircraft: Fokker 70/100, Boeing 727, Gulfstream IV
Thrust: 62-68 kN (13,850-15,400 lbs)
Production: Combustion chambers



BR715
Partner: Rolls-Royce
Aircraft: Boeing 717
Thrust: 75.6-97.9 kN (17,000-22,000 lbs)
Production: Intermediate case



Trent 500
Partner: Rolls-Royce
Aircraft: Airbus A340-500/-600,
Thrust: 250 kN (56,000 lbs)
Production: Intermediate case



Trent 700
Partner: Rolls-Royce
Aircraft: Airbus A330
Thrust: 317 kN (71,100 lbs)
Production: Intermediate case



Trent 900
Partner: Rolls-Royce
Aircraft: Airbus A380
Thrust: 302-356 kN, (68,000-80,000 lbs)
Production: Fan case, intermediate case



Trent 1000
Partner: Carlton
Aircraft: Boeing 787
Thrust: 223-334 kN (50,000-75,000 lbs)
Production: Fan case



Trent XWB
Partner: Rolls-Royce
Aircraft: Airbus A350 XWB
Thrust: 350-400 kN (80,000-90,000 lbs)
Production: Intermediate case



TFE731
OEM: Honeywell
Aircraft: Falcon, Learjet, Cessna Citation, Hawker
Thrust: 15-22 kN (3,500-5,000 lbs)
MRO: TFE731-2, 3, 4, 5, 20, 40, 60

AIRCRAFT GUIDE

Aircraft in which Volvo Aero is involved, as engine or engine component manufacturer, or MRO supplier



Airbus A380
GP7000, Trent 900



Airbus A340
CFM56, Trent 500



Airbus A330
CF6-80, PW4000, Trent 700



Airbus A300
CF6-80, PW4000



Airbus A321
CFM56, V2500



Airbus A320
CFM56, V2500



Airbus A319
CFM56, V2500



Airbus A318
CFM56, PW6000



Airbus A350
Trent XWB



Boeing 747
GE90, CF6-80, PW4000



Boeing 777
GE90-115B, PW4000



Boeing 787
GE90, Trent 1000



Boeing 767
CF6-80