

# M88



- > POWERS ALL VERSIONS OF THE RAFALE FIGHTER, BOTH NAVAL AND AIR FORCE
- > SUITED TO ALL MISSIONS ASSIGNED TO TODAY'S ARMED FORCES
- > EXCEPTIONALLY CAREFREE HANDLING
- > REDUCED TOTAL COST OF OWNERSHIP



The high-performance M88 engine is designed for advanced combat and training aircraft, and powers the Rafale multirole fighter. At the cutting edge of technology, it offers exceptionally carefree handling, making it perfectly suited to the wide range of missions assigned to today's armed forces.

### THE RAFALE POWERPLANT

Snecma has teamed up with leading aircraft manufacturer Dassault Aviation for a number of decades, and currently supplies the M88 jet engine that powers all Rafale fighters. Particularly suited to low-altitude penetration and high-altitude interception missions, the M88 has shown outstanding operability over the 250,000 flight-hours logged since entering service<sup>1</sup>.

### CUTTING-EDGE TECHNOLOGY

Wholly designed, developed and built by Snecma, the M88 is a light, compact military engine featuring the latest technologies: compressor blisks (integrally-bladed disks), low-emissions combustor, single-crystal high-pressure turbine blades, powder-metallurgy disks, ceramic coatings, composite materials and more. Overall performance has been improved through the use of 3D computation codes to simulate the engine's aerodynamic, mechanical and thermal environments. The M88 also features a redundant full-authority digital engine control (FADEC) for exceptionally carefree handling, enabling it to adapt to the full range of missions assigned to today's armed forces.

### MAXIMUM DISPATCH RELIABILITY

The M88's modular design facilitates all maintenance operations for maximum dispatch reliability. In fact, the M88 is the only combat engine of its generation that can be serviced and put back into operation without having to be recalibrated on a test cell.

### THE NEW STANDARD: M88-4E

Snecma is now shipping an upgraded version, the M88-4E, qualified in 2012. Culminating a major program to reduce total cost of ownership, this new version includes changes to the engine core. It significantly reduces the engine's operating costs, while maintaining its exceptional performance.

Engine modules are interchangeable, which means that the M88-2 version can easily be upgraded to the M88-4E standard. Snecma has also developed a technology demonstrator, dubbed ECO, confirming the engine's ability to be updated to the 20,000 lb thrust class.

(1) as of December 31, 2012

### THE M88 AT A GLANCE

- Turbofan engine
- 3-stage low-pressure compressor with variable inlet guide vanes
- 6-stage high-pressure compressor, including 3 with variable stator vanes
- Annular combustor
- Single-stage cooled low-pressure and high-pressure turbines
- Radial afterburner chamber
- Variable-section convergent flap-type nozzle
- Redundant full authority digital engine control (FADEC)
- Modular, on-condition maintenance (21 modules)

### CHARACTERISTICS

	M88-4E	ECO demonstrator
Thrust with afterburner (kN)	75	90
Thrust without afterburner (kN)	50	60
Specific fuel consumption with afterburner (kg/daN.h)	1.70	1.70
Specific fuel consumption without afterburner (kg/daN.h)	0.80	0.80
Airflow (kg/s)	65	72
Turbine inlet temperature (K)	1,850 (1,577°C)	1,850 (1,577°C)
Compression ratio	24.5	27
Bypass ratio	0.30	0.30
Length (mm)	3,538	3,618
Inlet diameter (mm)	696	790
Weight (kg)	897	985