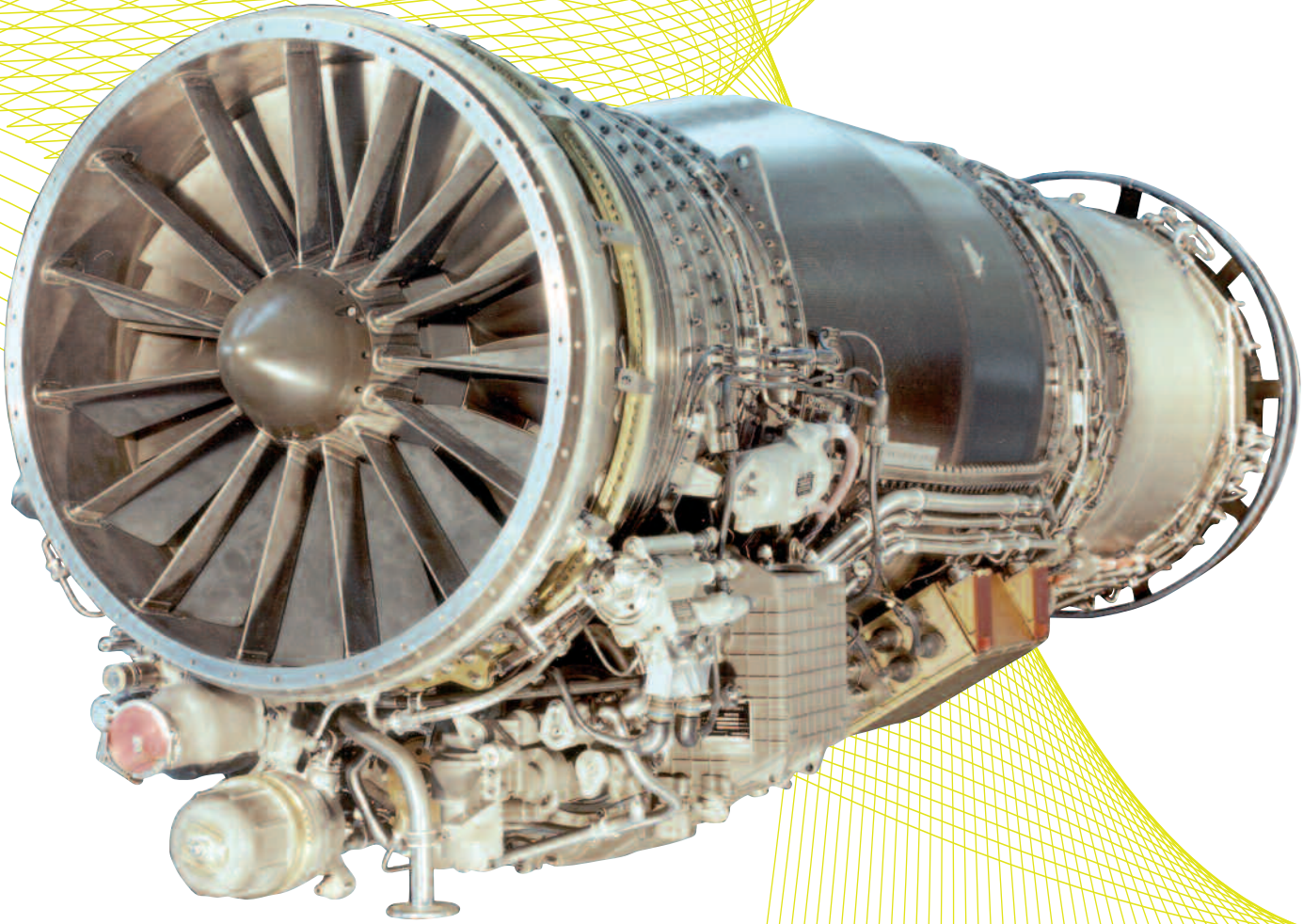
M88-2

MILITARY AIRCRAFT ENGINES



Snecma
SAFRAN Group

M88-2

MILITARY AIRCRAFT ENGINES

The M88-2 engine, designed for the multirole combat aircraft Rafale, is the first in a family of new-generation engines designed to power the combat and advanced training aircraft of the 21st century.

The first production M88-2 engine was delivered in 1996. Today, it powers the various Rafale versions flown by the French air force and navy. It is particularly suited to low-altitude penetration and high-altitude interception missions.

Light and compact, the M88-2 integrates the latest technologies: single-piece bladed compressor disks (blisks), on-polluting combustion chamber, single crystal high-pressure turbine blades, powder metallurgy disks, ceramic coatings, composite materials, etc.

The use of 3D calculation codes has resulted in global optimization of the aerodynamic design of flowpaths and the thermal and mechanical behavior of parts. Thanks to its fully redundant digital control system, the engine displays exceptional controllability and handling characteristics, making it ideal for the multirole missions of air forces.

Its modular design ensures optimum operational availability and great maintenance flexibility. Furthermore, the M88 incorporates the latest maintenance concepts as failure diagnosis aid or high level of aircraft/engine integration.

Snecma continuously invests in Research & Technology to meet its customers' specific requirements, resulting in regular upgrades to the M88-2, for example based on the ECO demonstrator. In 2008 Snecma offered the "TCO Pack" to decrease the engine's total cost of ownership.

Subsequent improvements could increase the M88's thrust to the 20,000 lb class.

ENGINE FEATURE	M88-2	ECO demonstrator
• A/B thrust (lb)	17,000	20,250
• Dry engine thrust (lb)	11,250	13,500
• A/B specific fuel consumption (kg/daN.h)	1.70	1,70
• Dry engine thrust specific fuel consumption (kg/daN.h)	0.80	0.80
• Air flow rate (kg/s)	65	72
• Turbine Inlet Temperature (K)	1,850 (2,871°F)	1,850 (2,871°F)
• Pressure ratio	24.50	27
• Bypass ratio	0.30	0.30
• Length (in)	139	142
• Inlet diameter (in)	27.50	31
• Weight (lb)	1,977.50	2,171.50

DESCRIPTION

- Twin-shaft, bypass turbofan engine
- 3-stage LP compressor with inlet guide vane
- 6-stage HP compressor (3 stages with variable stator vanes)
- Annular combustion chamber
- Single-stage cooled HP turbine
- Single-stage cooled LP turbine
- Radial A/B chamber
- Variable-section convergent flap-type nozzle
- Full authority digital engine control (FADEC)
- Modular on-condition maintenance (21 modules)

Snecma: 10, allée du Brévent - CE1420 Courcouronnes - 91019 Evry Cedex - France
Tel.: 33 (0)1 69 87 09 00 - Fax: 33 (0)1 69 87 09 02
www.snecma.com

Snecma SAFRAN Group

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