

# VINCI ENGINE TURBINES



A new upper stage engine, the Vinci, uses an expander cycle in which hydrogen fuel cools the thrust chamber before driving first the hydrogen turbopump and then the oxygen turbopump. The liquid hydrogen pump is powered by a single-stage axial subsonic high-performance LH2 turbine. The liquid oxygen pump is powered by a single-stage axial subsonic high-performance LOX turbine.

The Vinci turbines constitute a large step towards reduced cost thanks to innovative manufacturing techniques, including brazed-stator manufacturing (patented), and rational blade manufacturing using blisk technology instead of individual blades.

**VOLVO AERO**

# CHARACTERISTICS OF THE VINCI TURBINES



**Stator Vinci LH2** The outer shrouds of the Vinci stators are brazed to the inner ring of radially milled vanes, giving a smooth, strong and ductile joint. Both stators are made in stainless steel (Nitronic 40). Patented manufacturing technique.



**Vinci LOX shaft and blisk** Vinci rotors are shroudless blisks (BLade Integrated diSKs) where the blades are made by radial milling. Depicted is the LOX rotor milled in Inconel 718.

|                         | LH2 turbine | LOX turbine |
|-------------------------|-------------|-------------|
| Power rating            | 2500 kW     | 390 kW      |
| Speed                   | 91 000 rpm  | 18 800 rpm  |
| Inlet pressure          | 190 bar     | 92 bar      |
| Inlet temperature       | 245 K       | 210 K       |
| Blade meanline diameter | 120 mm      | 180 mm      |

## Volvo Aero responsibility

Volvo Aero has been subcontracted by Snecma, France for the LH2 turbine and by Avio, Italy for the LOX turbine. Volvo Aero is responsible for turbine development, manufacture and qualification as well as the entire aero design from

the inlet of the first turbine to the outlet of the second turbine. This includes development of test facilities, materials testing in a hydrogen atmosphere, aerodynamic design, performance testing in air, mechanical design, and advanced measuring techniques.

## Similar assignments

- LOX and LH2 turbines for the Vulcain and Vulcain 2 engines that power the Ariane 5 launcher.
- Turbine blades integrated with the disk (blisk) to drive the turbopumps of the Viking 4, 5 and 6 engines of the Ariane 4 launcher.

## Volvo Aero Corporation

Volvo Aero develops and manufactures components for aircraft and rocket engines with a high technology content in cooperation with the world's leading producers. Service and maintenance are an important part of our operations. The company offers an extensive range of products, including

sales of spare parts for aircraft engines and aircraft, sales and leasing of aircraft engines and aircraft, and overhaul and repair of aircraft engines. Volvo Aero also develops and services gasturbines for propulsion and power generation.

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