



## **New vacuum deposition technology dedicated to the deposition of thin films**

*The HEF Group has developed a new vacuum deposition equipment dedicated to thin film deposition for fusion. The solution TSD 2800 R combines magnetron sputtering, Plasma Enhanced Chemical Vapor Deposition (PECVD), and arc deposition sources. Several research and development programs could benefit from this high-capacity machine to develop new deposition processes in the fields: of hydrogen, nuclear, tribology, and energy.*

### **The technology**

For fusion use, HEF Group developed a new equipment, TSD 2800 R, that combines magnetron sputtering, PECVD, and arc deposition sources dedicated to thin film solution of Molybdenum deposit: 3.0  $\mu\text{m}$  on a Chrome undercoat: 0.1  $\mu\text{m}$ .

The TSD 2800 R consists of three chambers, with the following configuration for PVD and PECVD:

- The first chamber, which is adjustable, measures 2.57 m in height and has a rotation diameter of 50 cm, while the overall chamber shares the same height of 2.57 m but has a diameter twice as large.
- The machine can support axial loads of up to three tons, making it unique in its kind.
- The arc is composed of two central cathodes and two additional cathodes at the ends. These characteristics allow for the application of a maximum treatment height of approximately 1.50 m at the center of the machine.



### **The first vacuum deposition machine for industrial world**

The machine is unique at HEF and in the world in terms of its size and the technologies that compose it. This technology is highly productive, making it unique and competitive in the market. Moreover, this process could allow to save raw material, energy and is environmentally friendly.

### **Applications in the field of Hydrogen, Nuclear or Energy**

The solution can find a large application such as hydrogen, nuclear, and energy and can be used for neutron protection, anti-corrosion treatment and more generally for tribology. HEF develops also new coating Ti-N, Cr-N, Ti-Al-N, and Ti-B-N that interest non-fusion industries : forming tools, cutting tools, wear resistance of mechanical parts at high temperatures, wear and adhesion of plastic molds, the problem of wear and sticking of aluminum die-cast molds. More recently, innovative coatings have been applied to large cylindrical tools used in the tire industry.

### **Collaboration opportunities**

Vacuum deposition technology for large parts is now available at the HEF Saint-Étienne plant industrial & innovation, as well as at the 100 sites of HEF's international subsidiaries.

*Fusion for Energy*

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