FUSION FOR ENERGY

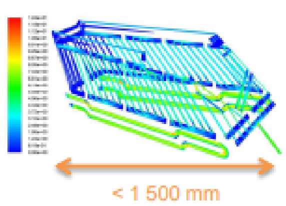
TECHNOLOGY OFFER

Hot Isostatic Pressing Technology for complex metallic component manufacturing

F4E and Alsymex have developed new Hot Isostatic Pressing (HIP) technologies to join similar and dissimilar materials. This qualified process allows to produce efficient and large heat transfer components with outstanding mechanical properties non achievable with conventional manufacturing. Applications in numerous sectors like space, healthcare, electronics or automotive industries are promising.

The Technology

By applying high pressure (~100 MPa) and hot temperature (~1000°C) to compress metals together isotropically, HIP allows materials to be joint at the atomic level thanks to diffusion bonding. ITER Plasma facing components, as First Wall Panels (FWP), Blanket Shield Module (BSM), Test Blanket Module (TBM), Divertor (PFU), are exposed to high temperatures and ultra-high vacuum, for which utmost mechanical and thermal performances are needed.



Efficient heat transfer and remarkable joints mechanical performances within large components

One of the main advantages of HIP technology is its ability to bond dissimilar materials with different melting points, allowing to combine their respective properties. Indeed, along with remarkable mechanical performances at the joints, this process is relevant for parts involved in heat transfer that require thin material interfaces, narrow channel geometries, complex and dense network channels within relatively large component.

A labeled alternative for complex components in many industries

HIP bonding allows to manufacture parts that are impossible to produce (like internal channels) with conventional processes and leads to better performance than additive manufacturing and fusion welding in terms of deformations and surface finish for large dimensions components. Furthermore, the process has been qualified for ITER plasma facing components which have to sustain in severe environments. Thanks to its compatibility with plenty of materials and alloys, as Beryllium, Tungsten, CuCrZr, Eurofer, Inconel, 316L,, CU alloys, and many others, HIP bonding is transferable to many industries such as space, automotive industries, healthcare or electronics, among others.

Collaboration opportunities

The technology is available for direct use, technical adaptation for new applications and other materials or alloys.

Nicolas LOUEE,
Technology Transfer Broker
Phone: +33 6 58 46 7147
Email: Nicolas.louee@inextenso-innovation.fr