

## PRESS RELEASE

# Tekniker contributes with its technology to the European Spallation Source

- *The Tekniker technology centre has manufactured an ultra-high vacuum clamp mechanism for the European Spallation Source (ESS)*
- *This research facility currently under construction in Lund (Sweden), is a joint collaboration by 13 European countries with the aim to provide unique research opportunities within energy, health and the environment*

[Eibar, 15 March 2022] – **The European Spallation Source (ESS)** is an ambitious collaboration project by 13 European countries aiming to build and operate a world-leading neutron source capable of observing materials at an atomic and molecular level, to analyse their structure and dynamics, enabling scientific breakthroughs within a wide range of areas, such as energy, health care and the environment.

ESS is expected to be in steady state operations in 2027. The research infrastructure extends over a total of 10 hectares (equivalent to 14 football pitches) located in Lund (Sweden).

Given the technical features of the project, a number of mechanisms and systems are required to access areas that are difficult to reach. An example of this can be found in a hermetically sealed chamber to be located inside the concrete and steel bunker which will house the neutron beams.

It is in this context that the **Tekniker** technology centre, a member of the Basque Research and Technology Alliance (BRTA), has developed an innovative mechanism that provides a remote clamp system for ultra-high vacuum ducts (hereinafter called UAV) in areas where environmental conditions preclude manual actuation.

The manufacturing process to be followed for this sophisticated mechanism falls under Tekniker's cooperation agreement in its capacity as a technological supplier associated with

the construction of the neutron source ESS, hosted by Sweden and Denmark, that kicked off in 2014.

The technology centre Tekniker's extensive expertise in areas such as precision engineering, tribology, vacuum and coatings has led to the organisation becoming a supplier of reference in recent years to large international science facilities. In this context, ESS represents a new challenge for the centre as it will be necessary to integrate different technologies in only one mechanism.

## Development and manufacture

Prior to developing a full-scale mechanism, Tekniker researchers produced a 1:3 scaled prototype (approximate size 20x20x20 cm) at the technology centre after covering a number of stages in terms of design, mechanical calculus, manufacture, assembly and commissioning.

Tekniker has carried out several studies based on the AMFE methodology (modal analysis of failures and effects) and various tribology and corrosion tests in salt spray chambers to test combinations of different materials (stainless steel or bronze) and coatings and treatments based on gaseous nitrides or DLC (Diamond Like Carbon) to be applied to critical parts on the mechanism itself.

In order to validate the prototype, the ultimate goal of this series of tests and trials (with different iterations in terms of design, mechanical calculus and tribological testing) consisted in obtaining a robust solution that was able to pass the different tests carried out together with ESS and ascertain correct operation.

"One of this project's most significant challenges addressed the issue of designing a locking mechanism in which very high forces can be exerted and whose components are able to cope with very demanding environments in which it is impossible to use conventional lubricants", explain Tekniker sources.

A full-scale mechanism was then manufactured based on the information obtained in several prototype tests and trials.

“As regards full-scale manufacturing, it was specifically underscored that quality and traceability must be guaranteed for all parts. All the materials used for the parts and their most critical dimensions were certified by the suppliers. Any parts directly in contact with the UAV underwent ultrasound cleansing and electropolishing.

Due to UAV requirements, all assemblage work was carried out in a special environmentally controlled area at Tekniker’s facilities in strict compliance with the ESS requirements to monitor behaviour that is as close as possible to real operating conditions prior to being integrated at the research facility in Lund.

Several mechanical, vacuum and overpressure tests were carried out in the technology centre’s bunker to accept the mechanism.

The bunker is a unique installation located at Tekniker whose features (safety insulation provided by a concrete lid and walls, among other things) have made it possible to run all validation tests for the mechanism.

In order to develop this solution, Tekniker has contributed its extensive range of technological capabilities with regard to design, manufacture, assembly, mechatronics, metrology, materials, tribology, surface physics and vacuum with the help of its team of experts. It is also important to note that the technology centre specialises in different technologies that provide the knowledge required to develop integral solutions.

This close cooperation between ESS and Tekniker has been a key element for joint decision making aimed at delivering specific and unique elements and the resulting collaborative action will not only address the project itself, but will also contribute to European technological progress related to research within e.g., energy, health care or the environment.

This project has an impact on SDG ODS 9 - Industry, innovation and infrastructures and contributes towards the economic, social and environmental pillars of sustainable development and, consequently, towards society at large.

## Concerning Tekniker

Tekniker is a technology centre specialised in Advanced Manufacturing, Surface Engineering, Product Engineering and ICTs for production. Its mission is to provide growth and wellbeing for society at large via R&D&I and further the competitiveness of the industrial fabric in a sustainable manner. Tekniker is a member of the Basque Research and Technology Alliance (BRTA).

### Further information:

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