# Press release

## New production concepts for the aeronautical business

- *Development of smart systems to machine airplane turbine shafts*
- *IK4-TEKNIKER and the Basque company GMTK participate in this development that started in 2018*

(Eibar, Basque Country. 30 April 2019).- The aeronautical sector is facing the challenge of delivering smart, ecological and integrated transport. In order to achieve this goal, it is essential to develop innovative technologies that can reduce the sector's environmental impact and achieve goals related to cutting down $CO_2$ and $NO_x$ emissions by 75% and 90%, respectively and noise levels by 65%. Component manufacturers, therefore, need solutions to produce more efficient aviation engines for the aircraft of the future.

Consequently, it will be necessary to develop new jet engine architectures to improve efficiency. This will require significant changes in terms of engine configuration and operation in relation to the technologies currently in use.

**New production concepts**

One of the main changes is to increase the size of the engine fan relative to the engine core dimensions. This will give rise to new requirements with regard to the turbine shaft.

These aspects will result in new needs as regards the shaft itself and pose new challenges for the existing manufacturing technologies, especially for the internal geometry of the shaft.

It is in this scenario that an initiative is being coordinated by the IK4-TEKNIKER technology centre together with a company called GMTK specialised in manufacturing very large machine tools. Both organisations have cooperated to develop an innovative smart tool system to machine

future engine shafts in which a high length-diameter ratio adds complexity to the manufacturing process.

The aim of the project is to develop a smart boring bar to machine hollow shafts on jet engines to control the manufacturing process better and improve the end quality of components.

The development process applied to the tool features several subsystems that allow shaft machining to be performed properly and also incorporates electromechanical drives for motion. It has also been equipped with smart components fitted with sensors that can be used to monitor vibration, surface finish and the shape of chippings. The incorporation of these systems will make it possible to increase manufacturing capabilities and optimise processes. They will also help to develop Industry 4.0 technologies.

In this project, the technology centre has provided its expertise in terms of precision engineering and mechatronics. The centre has developed the different subsystems linked to drives and sensors. Likewise, the organisation will participate in developing drive controls and integrating the final system. In addition to developing the smart tool, IK4-TEKNIKER will also contribute its knowledge in terms of process technology and sensor data analysis to prevent dynamic problems and vibrations, as well as errors related to process precision and problems related to removing chippings.

GMTK has taken on board the responsibility of designing the bar's moving components and integrating the final system on the machine tools used to manufacture the parts themselves.

**A path full of challenges**

The project's main challenges are not only focused on designing the systems required to machine shafts, but also on fitting a smart boring bar on a unit characterised by a number of dimensional requirements with very little volume available.

These factors make it more difficult to achieve the main goal, as the solution must incorporate a large number of subsystems that take into account aspects such as tool motion, the supporting structure, cutting tools, lubrication, chip removal or monitoring.

The initiative, to be extended until 2019, has been awarded a budget of 400,000 euros, forms part of the European Clean Sky 2 initiative designed to meet the objectives established by the European Commission in terms of smart, ecological and integrated transport.

Specifically, Clean Sky provides incentives to develop innovative technologies to reduce the environmental impact of air transport by reducing polluting gas emissions and noise levels.

**Concerning IK4-TEKNIKER**

With more than 35 years of experience in applied technology research that has been be transferred to companies, IK4-TEKNIKER has achieved a high degree of specialisation in four major areas (Advanced Manufacturing, Surface Engineering, Product Engineering and ICTs). This means that its cutting edge know-how has been made available to customers to meet their requirements.

**Concerning GMTK**

GMTK specialises in manufacturing very large machine tools and has an important penetration in complex applications of the aeronautical sector. The company is committed to developing complex, high-added value solutions for the ultimate purpose of always meeting the customer's requirements. GMTK machines offer high levels of precision over time as well as major productivity improvements.

**Further information**

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