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European Clean Sky 2 program: NTN's feedback

For the past 3 years, NTN, a leading precision mechanics company and partner to some of the world's leading aeronautics companies for more than 50 years, has been working alongside GE Avio as part of the Clean Sky 2 program. Partly funded by the European Commission, this project, code-named HEROe (High Efficiency ROLLER Bearing), has now been completed. And it is now time for NTN to review the success of this partnership.

Clean Sky 2 is Europe's largest aeronautics research program involving both industry and the public sector. The aim is to increase the sector's competitive edge, support innovation, and reduce its environmental impact by developing new solutions. As part of the High Efficiency ROLLER Bearing project, NTN was selected to develop and produce a new hybrid roller bearing. Intended for helicopters such as the Racer, Airbus' high-speed demonstrator, and any other aircraft, this bearing reduces fuel consumption while improving aircraft performance in all operating conditions.



A positive result

As this project, which began in March 2018, comes to a close, NTN is proud to announce that its teams have accomplished their mission.

By developing a hybrid bearing with ceramic tapered rollers, they have reduced the overall weight of the bearing by 15%, as well contact friction, which limits aircraft fuel consumption. In addition to the environmental benefits, this type of roller bearing improves aircraft performance, reliability and safety. This technology also guarantees superior resistance to damage. For example, in the event of a lubrication failure, the transmission will run longer, increasing the chances of the aircraft landing in the best possible conditions.

After 3 years of research and development, the

company has proven that it is able to offer innovative bearings for the aerospace market. Thanks to NTN Europe's activities and the support of European suppliers, the demonstration phase was a great success. The next step is to produce prototypes to be installed in the transmission of a helicopter.



Although this solution was developed for helicopters' engine & transmission, it can also be used in aircraft engines and the rest of the aviation market like eDrive for aircraft, with a level of maturity that will enable production to begin within the next 3 years.

Approval of hybrid bearings

During this project, one of the problems encountered by the teams was the question of obtaining approval for hybrid bearings under the usual processes for all-steel bearings. The need to develop new approval methods for hybrid bearings could have prevented them from being introduced to the market. However, after numerous tests, it has been proven that ceramic rollers respond in the same way as steel rollers and can therefore be subject to the same approval methods.

It was also found that existing in-flight failure monitoring tools are also applicable and relevant to hybrid roller bearings. Therefore, these innovative ceramic solutions can be installed on aircraft without having to modify the existing systems. In addition to saving time, this is a direct response to market expectations, particularly those of GE Avio, NTN's partner in this project.

These findings, which are real technological developments, will make it possible to offer economically viable solutions and to rapidly develop the aerospace market with innovative, high-performance bearings in the years to come.



A promising european program...

By bringing together industrial partners who understand the needs of the market, European projects are challenging and fast-paced, but also innovative and exciting. This project, which was partially funded by the European Commission under the HEROe Bearing program, has progressed very quickly, especially considering the health crisis that has been affecting the world for the past 2 years. For NTN, HEROe Bearing was an opportunity to strengthen its ties with Airbus Helicopters, the group's leading customer in the helicopter sector, and to establish a strong, trust-based relationship with GE Avio.

... That has been beneficial for NTN Europe

From a technical perspective, this project has provided NTN with new expertise in the development and manufacture of ceramic roller bearings, as well as a better understanding of the parameters that must be met for the bearings to perform optimally when installed on aircraft. Today, this means that the company can offer all of its bearing types (balls and rollers) in a hybrid version (steel structure with ceramic rollers) that meets all expectations in terms of reliability and safety.

To achieve this goal, NTN has set up new in-house testing facilities, including 8,200 hours of testing for the HEROe Bearing project. This has allowed NTN to assess the thermal behaviour of the bearings and develop new models based on the results. Due to the change in the thermal equilibrium of the bearings caused by the addition of ceramics, the modelling of the bearings had to be revised. Building on this experience, NTN is now working to create a new international standard for defects in ceramic rollers, with the aim of creating a new standard that will then serve as a reference for all customers and competitors who use these components.

"While these European projects are always challenging and fast-paced for the partners, they are also unique opportunities that open up a whole new range of possibilities. This is the second time NTN has been selected for the Clean Sky program and we look forward to the opportunity to continue our aeronautical research in other projects supported by the European Commission. The new skills acquired throughout the HEROe Bearing project have enabled NTN to strengthen and assert its position as a trusted partner for its existing and future customers in the field of hybrid bearings," explains Olivier Blanchin, NTN Product Innovation Manager.

Press contacts:

- MIDNIGHT PURPLE

Emilie DESLANDES

edeslandes@midnightpurple.fr

+33 (0) 6 71 24 17 01

Camille HUZE

chuze@midnightpurple.fr

+33 (0)1 53 20 49 03

- NTN

Marie BASSON

marie.basson@ntn-snr.fr

+33 (0) 04 50 65 99 07