

PROJECT

## DEBRA

### Diamond Element Bearings with Air-cooling

**Funding:** European (Horizon 2020)

**Duration:** Nov 2018 - Apr 2021

**Status:** Ongoing

**Total project cost:** €2,481,808

**EU contribution:** €2,481,808



**Call for proposal:** H2020-CS2-CFP07-2017-02

[CORDIS RCN : 221670](#)

#### Objectives:

This proposal is aimed at developing novel, super hard, non-lubricated air-cooled bearings that would give a step change in minimizing the engine oil system and its complexity. An SFC gain of 0.1 to 0.3% is anticipated as a result of this project.

The project aims to achieve this by developing air cooled bearings using synthetic diamond. The novelty is in the surface finish of diamond rolling elements and mating raceways which can be improved substantially relative to today's metallic bearing materials such that heat generation and frictional wear is minimized. Diamond offers superior thermal properties enabling thermal gradients and running clearances to be optimized.

This proposal aims to reduce oil system cost, weight and complexity by exploiting the properties of synthetic diamond material in the design and manufacture of novel bearings. The basic premise is that the surface finish of diamond rolling elements and mating raceways can be improved substantially relative to today's metallic bearing materials such that heat generation and frictional wear is minimized. Diamond's superior thermal properties enable thermal gradients and running clearances to be optimized using air rather than oil as the cooling medium.

The partners have assembled a consortium that has bearings expertise, capability in the manufacture, forming and metrology of synthetic diamond materials, and a proven track record in the design and evaluation of gas turbine air cooling schemes, with test facilities that will allow for friction and integrity proving from technology readiness level (TRL) 2 to 4. The consortium believe that all aspects of demonstration and industrialization can be successfully delivered with the work packages that have been assembled to TRL 4, with a final design complete for TRL 5 endurance tests.

#### Parent Programmes:

[H2020-EU.3.4. - Horizon 2020: Smart, Green and Integrated Transport](#)

**Institute type:** Public institution

**Institute name:** European Commission

**Funding type:** Public (EU)

**Other programmes:** JTI-CS2-2017-CfP07-ENG-03-21 Novel Bearings

#### Lead Organisation:

**The Chancellor Masters And Scholars Of The University Of Oxford**

**Address:**

University Offices, Wellington Square  
OXFORD  
OX1 2JD  
United Kingdom

**Organisation Website:**

<http://www.ox.ac.uk>

**EU Contribution:** €1,841,808

**Partner Organisations:****Dutch Diamond Technologies Bv****Address:**

KOVEL 2  
5431ST CUIJK  
Netherlands

**EU Contribution:** €640,000

**Technologies:**

Air-cooled  
bearings

**Development phase:** Demonstration/prototyping/Pilot Production

**STRIA Roadmaps:** Vehicle design and manufacturing

**Transport mode:** Air transport

**Transport sectors:** Passenger transport, Freight transport

**Transport policies:** Other specified

**Geo-spatial type:** Other