Dry lubricated Harmonic Drives for space applications

Fact Sheet

Project Information

HARMLES

Grant agreement ID: 263162

Project website

Project closed

Start date
1 June 2011

End date
28 February 2015

Funded under
Specific Programme "Cooperation": Space

Total cost
€ 1 695 464,60

EU contribution
€ 1 166 833,00

Coordinated by
AC2T RESEARCH GMBH
Austria

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Objective

On spacecrafts reduction of mass and power consumption are a major issue. On the other hand, in case of mechanisms for Solar Arrays or antennas big masses have to be moved and kept in position for long times. Harmonic Drives would fulfil the requirements: high gear ratios enable the use of small actuator motors (low mass and power), they provide high stiffness and high precision even at very low speeds. However, the use is presently limited by the need of grease lubrication. This is linked with risk of outgassing, contamination of other parts and limits the usage in temperatures approx. -50°C to +70°C. The use of solid lubricants typically for bearings may extremely widen the usage to at least -170°C to 300°C.
First trials to apply these technologies for space use based on commercial available coatings (partially used in space bearings) did not lead to success, due to the strongly differing mechanical and contact situation in the Harmonic Drive.
Therefore, project HarmLES will focus on the development of solid lubricant coatings for Harmonic Drives in space. This is seen as an integrated approach between gear design and material adaptation and the application of a suitable coating. It will start with a promising composite coating which has already been tested in space. On the other hand, a huge variety of coatings are available that claim “self-lubricating”, they will be benchmarked for their applicability in space. Besides space related lab-testing, application testing will ensure the proper feedback. The overall, tribosystem will be re-considered on bases of FEM-simulations and alternative material solutions.
An end-user group consisting of several industrial end-users from space will be involved to recommend the research path by defining requirements for later applications. The consortium is small, but it covers the major players and reflects existing expertise in this field to perform the project successfully.

Fields of science (EuroSciVoc)

engineering and technology > mechanical engineering > tribology > **lubrication**

engineering and technology > mechanical engineering > vehicle engineering > aerospace engineering > astronautical engineering > **spacecraft**

engineering and technology > materials engineering > **coating and films**

Programme(s)

FP7-SPACE - Specific Programme "Cooperation": Space

Topic(s)

SPA.2010.2.2-01 - Space technologies

Call for proposal

FP7-SPACE-2010-1
See other projects for this call

Funding Scheme

CP - Collaborative project (generic)

Coordinator

AC2T RESEARCH GMBH

EU contribution

€ 189 072,00

Total cost

No data

Address

VIKTOR KAPLAN STRASSE 2
2700 Wiener Neustadt
Austria

Region

Ostösterreich > Niederösterreich > Niederösterreich-Süd

Activity type

Other

Links

Contact the organisation Website
Participation in EU R&I programmes
HORIZON collaboration network

Participants (3)

HARMONIC DRIVE AG

Germany

EU contribution

€ 344 508,00

Address

HOENBERGSTRASSE 14
65555 LIMBURG

Activity type

Private for-profit entities (excluding Higher or Secondary Education Establishments)

Links

Contact the organisation Website
Participation in EU R&I programmes
HORIZON collaboration network

Total cost

No data

AEROSPACE & ADVANCED COMPOSITES GMBH

Austria

EU contribution

€ 275 502,00

Address

VIKTOR KAPLAN STRASSE 2
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Region

Ostösterreich > Niederösterreich > Niederösterreich-Süd

Activity type

Private for-profit entities (excluding Higher or Secondary Education Establishments)

Links

Contact the organisation Website
Participation in EU R&I programmes
HORIZON collaboration network

Total cost

No data

FUNDACION TECNALIA RESEARCH & INNOVATION

Spain

EU contribution

€ 357 751,00

Address

PARQUE CIENTIFICO Y TECNOLOGICO DE BIZKAIA, ASTONDO BIDEA, EDIFICIO 700
48160 DERIO BIZKAIA

Region

Noreste > País Vasco > Gipuzkoa

Activity type

Research Organisations

Links

Contact the organisation Website
Participation in EU R&I programmes
HORIZON collaboration network

Total cost

No data

Last update: 2 August 2019

Permalink: https://cordis.europa.eu/project/id/263162