

PROJECT

ReFreeDrive

Rare Earth Free e-Drives featuring low cost manufacturing

Funding: European (Horizon 2020)

Duration: Oct 2017 - Mar 2021

Status: Complete

Total project cost: €5,999,131

EU contribution: €5,999,131



Call for proposal: H2020-GV-2017

[CORDIS RCN : 211742](#)

Objectives:

The ReFreeDrive project is focused on contributing to avoid the use of rare earth magnets through the development of a next generation of electric drivetrains, ensuring the industrial feasibility for mass production while focusing on the low cost of the manufacturing technologies.

This proposal intends to study and develop simultaneously two solutions for the power traction system of electrical vehicles. Both solutions are brushless AC electrical machines: induction machine with fabricated and copper die-cast rotor (IM) and synchronous reluctance (SynRel) machine. Through their configurations these machines not only are rare-earth magnet free, but also share common features that can be exploited during the design step, as well in the manufacturing process. These common features lead to a complex synergy between the two technologies, which justify the development of different topologies of electric machines in just one project.

The design of the ReFreeDrive motors will take as a premise the reduction of use of materials, as more than half of the final price is formed by raw materials cost. Also, a minimization of manufacturing costs will be ensured by an early involvement of manufacturers, from the design stage. ReFreeDrive motor topologies have good room for cost reduction by off-setting permanent magnet use. However, it is not feasible to change the commodity prices for copper and steel. Therefore, one of the key avenues for cost reduction is the reduction of size through different techniques (outer rotor, higher rotational speed, compact winding...). An optimized use of copper on the project provides technical design with a higher efficiency due to lower losses regards other alternatives, and more efficient heat management.

Beyond the motor design, ReFreeDrive also consider an integrated design of the power train that allows the optimization of the electric connections, the cooling systems and the housing.

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)

Lead Organisation:

Fundacion Cidaut

Address:

PLAZA VICENTE ALEIXANDRE CAMPOS 2 PQ TECNOLOGICO DE BOECILLO 209
47151 VALLADOLID
Spain

Organisation Website:

<http://www.cidaut.es>

EU Contribution: €448,125

Partner Organisations:

Metallgiesserei Breuckmann Gmbh & Co Kg

Address:

DIESELSTRASSE 28
42579 HEILIGENHAUS
Germany

Organisation Website:

<http://www.metall-breuckmann.de>

EU Contribution: €245,000

Aurubis Belgium

Address:

RUE DU MARAIS 31
1000 BRUSSELS
Belgium

Organisation Website:

<http://www.aurubis.com>

EU Contribution: €72,625

Prive' Srl

Address:

Via Martiri Di Marzabotto 9
60044 Fabriano An
Italy

EU Contribution: €705,625

European Copper Institute

Address:

Grovelands Business Centre 5 - Boundary Way
HEMEL HEMPSTEAD
HP2 7TE
United Kingdom

EU Contribution: €97,950

Tecnomatic Spa

Address:

VIA DELLE CASERME 85
65127 PESCARA
Italy

EU Contribution: €431,250

Jaguar Land Rover Limited

Address:

Abbey Road
Coventry
CV3 4LF

United Kingdom

Organisation Website:

<http://www.jaguar.com>

EU Contribution: €473,125

R13 Technology Srl

Address:

VIA GIOVANNI GRONCHI 18 LOCALITA CAMPO DI PILE
67100 L'AQUILA
Italy

EU Contribution: €460,000

Università Degli Studi - L'aquila

Address:

Piazza Vincenzo Rivera, 1
67100 L'AQUILA
Italy

Organisation Website:

<http://www.univaq.it>

EU Contribution: €788,750

Mavel Srl

Address:

VIA GRESSONEY 29
11026 PONT-SAINT-MARTIN
Italy

EU Contribution: €451,850

Ifp Energies Nouvelles

Address:

1et 4 avenue de Bois-Préau
92500 RUEIL MALMAISON
France

Organisation Website:

<http://www.ifp.fr>

EU Contribution: €867,736

Rina Consulting - Centro Sviluppo Materiali Spa

Address:

VIA DI CASTEL ROMANO 100
00128 ROMA
Italy

Organisation Website:

<http://www.c-s-m.it>

EU Contribution: €363,770

Motor Design Ltd

Address:

Scotland Street 4
Ellesmere
SY12 OEG
United Kingdom

Organisation Website:

<http://www.motor-design.com>

EU Contribution: €593,325

Technologies:

Electric road vehicles
Rare-earth magnet free brushless AC electrical motor

Development phase: Research/Invention

Transport

STRIA Roadmaps: electrification

Transport mode: Road transport

Transport sectors: Passenger transport, Freight transport

Transport policies: Societal/Economic issues

Geo-spatial type: Other