

PROJECT

ODIN

Optimized electric Drivetrain by INtegration

Funding: European (7th RTD Framework Programme)

Duration: Jul 2012 - Dec 2016

Status: Complete

Total project cost: €9,389,730

EU contribution: €5,600,000



Call for proposal: FP7-2012-ICT-GC

[CORDIS RCN : 104481](#)

Background & policy context:

The core concept of ODIN is the optimal integration of a high speed electric motor with a multi-speed gear train in a single gearbox/housing, including the power electronics and thermal management unit. The resulting integrated electric drive shall be as compact and lightweight as possible to fit into a sub-compact, compact urban vehicle and must clearly demonstrate a significant cost reduction potential.

High-speed electric motors have significant potential for the reduction of weight and size, but normally have less torque capability. Thus a multi-speed gear-train is needed in order to keep the acceleration performance of the vehicle as high as possible. The lower torque corresponds to lower current for the same power and thus opens new potentials for the design of power electronics and reduction of cost and space. Simulation results of conceptual gear and bearing layouts will be used to determine the respective potential losses, and to address possible issues with the design early in the design cycle.

Objectives:

The ODIN (Optimized electric Drivetrain by INtegration) project aims at developing a compact, efficient, highly integrated electric motor for a typical entry power level urban electric vehicle. The project partners will focus on optimising the integration of mechanical and electrical components into one eDrive-housing. Innovative simulation and optimisation software tools will be used early in the concept phase to assess optimal design variations. The final design will be built as a prototype and tested in a demo car.

One of the primary goals in the development of electric vehicles is to reduce the cost while ensuring performance and meeting automotive quality standards to reach market acceptance. System design of the electric power-train is based on existing components currently in different phases of the development process. Integrating these components into an electric power-train using current designs can only result in a suboptimal solution since components are generally not designed for integration, but rather to optimally fulfill the supplier's requirement specification. It is postulated that the most cost effective and reliable design is a highly integrated solution that reduces interfaces, variations of components and uses synergy effects e. g. common housing/casing wherever possible.

The large design effort for such integration requires sufficiently large number of produced systems and will thus become attractive when the market enters the strong growth phase. This is expected around 2020 or early as 2018.

Optimally integrated solutions are not achieved by simply assembling existing components, but by ensuring that components are designed according to integration aspects of the system requirements and by implementing and testing the complete integration early in the process.

This project aims to develop a compact, efficient, highly integrated electromechanical powertrain, production optimised to deliver key cost reduction goals. The partners will focus on optimising the integrated unit for an entry power level of a typical urban vehicle.

In parallel they will assess scalability potential to meet the performance criteria of other platforms.

Innovative simulation and optimisation software tools will be used early in the concept phase to assess

optimal design variations, the output of which will be a key input into determining how difficult they will be to scale between differing vehicle and system sizes. Built up of prototypes and implementation in demo car is p

Methodology:

WP1: Project management conducted by the Bosch Group
WP2: System Requirements and Concept Development
WP3: Component Development eDrive
WP4: Mecanical Component Development
WP5: System Integration and Performance Evaluation
WP6: Demonstrator Vehicle
WP7: Dissemination of Results (Deliverables and Publications)

Parent Programmes:

[FP7-ICT - Information and Communication Technologies](#)

Institute type: Public institution

Institute name: European Commission

Funding type: Public (EU)

Lead Organisation:

Robert Bosch GmbH

Address:

Robert-Bosch Platz
70839 Gerlingen-Schillerhoehe
Germany

Organisation Website:

<http://www.bosch.com>

EU Contribution: €1,424,131

Partner Organisations:

Gkn Driveline

Address:

Avenue Vanderbilt 100
78955 Carrieres Sous Poissy
France

EU Contribution: €901,673

Renault Represented By Gie Reginov

Address:

Quai Alphonse Le Gallo 13/15
92100 BOULOGNE-BILLANCOURT
France

Organisation Website:

<http://www.renault.com>

EU Contribution: €457,611

Rheinisch-Westfaelische Technische Hochschule Aachen

Address:

Templergraben
52062 Aachen
Germany

Organisation Website:
<http://www.rwth-aachen.de>

EU Contribution: €663,392

Fundacion Cie I+D+I

Address:
Iparragirre 34- 2^odcha
48011 Bilbao
Spain

Organisation Website:
<http://www.cieautomotive.com/>

EU Contribution: €1,012,304

Romax Technology Limited

Address:
Romax Technology Centre University Of Nottingham Innovation
Nottingham
NG7 2TU
United Kingdom

Organisation Website:
<http://www.romaxtech.com>

EU Contribution: €492,557

Robert Bosch France

Address:
32 AVENUE MICHELET
93400 SAINT OUEN
France

EU Contribution: €148,500

Gkn Driveline International GmbH

Address:
HAUPTSTRASSE 130
53797 LOHMAR
Germany

EU Contribution: €151,388

Fuchs Petrolub Ag

Address:
FRIESENHEIMER STRASSE 17
68169 MANNHEIM
Germany

Organisation Website:
<http://www.fuchs-oil.de>

EU Contribution: €348,444

Technologies:

EV support technologies
In-wheel electric motor for electric passenger cars

Development phase: Research/Invention

Documents:

 [Poster \(Final report\)](#)

Transport

STRIA Roadmaps: electrification

Transport mode: Road transport

Transport sectors: Passenger transport, Freight transport

Transport policies: Decarbonisation, Safety/Security, Environmental/Emissions aspects

Geo-spatial type: Other