## **Partners** Contributions

Magnetic Materials Selection and Validation Centro Sviluppo Materiali

Requirements, End Users

Jaguar Land Rover

Test Bench Testing Fundación Cidaut IFP Energies Nouvelle

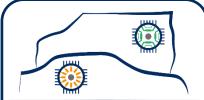
Communication, Quality
European Copper Institute

Induction Machine Design
Motor Design Limited
Fundación Cidaut

SyncRel Machine Design
University of L'Aquila
IFP Energies Nouvelle

Power Electronics Design University of L'Aquila IFP Energies Nouvelle

Manufacturing of IM
Die-Cast Copper Rotor
Breukmann



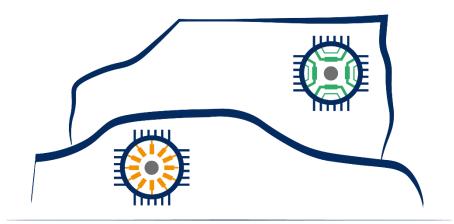
ReFreeDrive

Manufacturing of IM Fabricated Copper Rotor Aurubis Management, Coordination Fundación Cidaut

e-Drive Integration In-Vehicle Demonstration **Privè** 

> Manufacturing of Power Electronics R13 Technology

Manufacturing of SynRel Machines Mavel Powertrain



# ReFreeDrive

Rare Earth Free e-Drives featuring low cost manufacturing

www.refreedrive.eu

# 

















Manufacturing of IM

Flat Wires Windings

**Tecnomatic** 











# **Project Data**

Title: Rare earth free e-Drives featuring low cost manufacturing

Acronym: ReFreeDrive

**Grant Agreement No: 770143** 

**Topic:** GV-04-2017

Project Total Costs: 5,999,131.25€

Total EU Contribution: 5,999,131.25€

Project Coordinator: Fundación Cidaut

Partners: 13 partners from 6 EU Countries





#### **Project Objective**

To develop rare earth-free traction technologies beyond their current state-of-art, with a strong focus on industrial feasibility for mass production, targeting lower costs with higher specific torque and power density.

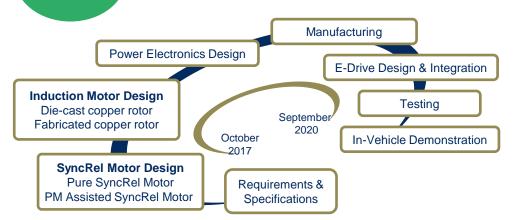


#### **Project** Motivations

The increasing demand of full electric vehicles arises specific challenges in terms of design for manufacturing, low weight, material costs and material supply chain.

To this extent the project aims to investigate motor-drive architectures featuring modular electric powertrain components and reduced use of critical raw materials.

### **Project** Timeline



#### **Project** Highlights

The project investigates the design of Induction Motors (IM) and Synchronous Reluctance Motors (SyncRel) (pure and assisted by Rare Earth Free Permanent Magnet) at different levels including electromagnetic design, materials investigation, power electronics, control algorithm and cooling.

Two meaningful power ranges for electric vehicles (75kW and 200kW) will be designed and prototyped.

#### IM

- Flat Wires:
- Fabricated Copper Rotor;
- Die-Cast Copper Rotor.

#### SyncRel

- Round Wires;
- Pure Reluctance Rotor;
- Rare Earth Free Permanent;
   Magnet Assisted Rotor.

#### **Common Actions**

- Accurate Materials Selection;
- Custom Cooling system;
- Optimization Algorithms;
- Custom Control Algorithms;
- Scalability and Low Cost;
- Integrated electronics.

