

A FURTHER BOOST TO INNOVATION IN THE FIELD OF SUSTAINABLE MOBILITY, THANKS TO THE INPROVES PROJECT

The project is a response to the challenge of developing a new generation of electric motors and has been set up as part of the 2014-2020 Regional Operative Programme and co-financed by the Lombardy Region with European Union funding.

The **INPROVES** project, which has the patronage of the **Lombardy Mobility Cluster** and sees the participation of the **Politecnico di Milano foundation**, responds to the innovation goals indicated in the European Commission White Paper on Transport (2011), in the Strategic Agenda of the National Cluster for Sustainable Mobility (2015), and in the Work Programme (WP) of the Lombardy Region's strategy for intelligent specialisation (2014).

The challenge for Inproves was to develop a new generation of high-performance electric motors for both vehicle brake and drive systems, in accordance with Industry 4.0 logic, thus taking advantage of product and process computerisation to favour safety and efficiency.

Alongside **Brembo**, which led the project completed on 31 January 2021 following 42 months of hard work, INPROVES also saw the participation of **Marelli Motorsport**, Lombardy Universities, the **Politecnico di Milano** and the **University of Bergamo**, together with the SMEs **MDQuadro**, **e-Novia**, **Peri**, **Mako Shark** and **UTP Vision**.

In the first phase of the project **Brembo** and **Marelli**, with the support of the **Politecnico di Milano**, developed the mechanical and electromagnetic design of the two types of motors for braking and drive systems, assessing a range of construction solutions with thermo-fluid-dynamic analysis tools and multi-objective optimisation.

The project then continued with the creation of functional prototypes of the designed motors:

- **Marelli Motorsport**, with the support of **Mako Shark** and **Peri**, created a new extremely high-performance drive motor;
- **Brembo** began production of prototypes of two motors for brake systems of different sizes, using a new computerised assembly line and collaborating with **e-Novia**, the **enterprises factory specialized in deep technology**, to develop a demo for a new-concept integrated sensor for brake system control. Specifically, e-Novia's task was to design and test a magnetic sensor to measure the absolute position of the rotor in a BLDC-type motor, leading to advantages in terms of assembly and performance.

A new pilot line was therefore set up in the **Brembo** headquarters in Stezzano for creating brake system electric motor prototypes. The line was designed in collaboration with the **University of Bergamo** and with the technical support of **MDQuadro**, **UTP Vision** and **eNovia** for the End-of-Line control stations, in-line visual controls, and supervisor dashboard respectively.

The European goals focus on the need to move towards the elimination of road accidents and toxic emissions from forms of transport as well as a rationalisation of taxes for activities that cause pollution by 2050.

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