

PRESS RELEASE

An innovative, efficient and sustainable three-wheeled electric vehicle

- *Developing an electric vehicle based on a compact design that is as comfortable and safe as a conventional car*
- *Tekniker has developed an electric motor for the vehicle that uses a technology based on magnetic reluctance instead of permanent magnets. It will be on display in March at the next edition of the Go Mobility trade fair*

[Eibar, March 4 2020] – Pollution and traffic jams have become the two most significant problems in terms quality of life and health in urban settings. Progressive electrification of vehicles, therefore, is not only an efficient alternative but also a challenge.

It is in this context that the **Tekniker** technology centre, member of the Basque Research and Technology Alliance (BRTA), has played the role of coordinator to assemble an innovative prototype for a three-wheeled electric vehicle that offers a compact design and the same degree of comfort as a conventional car and meets all efficiency and sustainability requirements.

The prototype itself, called WEEVIL, features a number of components that have allowed the vehicle to become a landmark in this particular sector as it has been equipped with a **mechanism called PINCER** on the front axle to increase vehicle stability, although without the usual tilt of two-wheeled vehicles and minimise the amount of space it takes up when parked. The prototype also features a **modular system equipped with interchangeable batteries** to extend range and service life, a **lighter and safer chassis** to better manage impacts and, finally, a new **electric motor** concept based on **compactness and efficiency parameters**.

The WEEVIL project is the end result of the work carried out by a consortium of 8 companies and technology centres from different countries operating under the umbrella provided by the

Horizon 2020 programme, whose main aim is to develop a concept for encapsulated electric urban vehicles with two wheels at the front and only one rear wheel.

The role played by Tekniker in this project has focused on three areas, namely, on designing a new compact and efficient electric moto, on participating in the development of PINCER and, finally, on coordinating all the work done by the different partners involved in this initiative.

“As compact as a motorcycle, as safe as a car”

“WEEVIL is a vehicle that will offer the same degree of safety as a car, although it has a compact design similar to that of a motorcycle”, says Imanol Egaña, a Tekniker researcher and project coordinator.

The prototype, with a budget of over 6 million euros, is a 1+1 vehicle, designed for two people to travel simultaneously, a driver and a passenger in the rear seat. The front axle is equipped with the so-called PINCER (ParkINg Cross-distance Adaptator) system. This allows the driver, on the one hand, to increase the gap between both front wheels to achieve the stability required for driving and, on the other, to reduce the width of the axle to take up less space when parked. The vehicle also features a joystick at the back to perform comfortable and effortless parking manoeuvres from outside should there not be enough room to open the door and climb inside.

“Interchangeable” battery technology

Another distinguishing feature of this prototype is related to its modular battery system equipped with standardised interfaces. This solution offers users the possibility of choosing between different types of batteries so the vehicle can be adapted to their specific needs and also incorporate developments to improve range, service life, etc.

As explained by Egaña, “nowadays, battery technologies are evolving and improving year after year. If we use modular battery bundles with standardised interfaces, it will mean that WEEVIL will have no problems whatsoever with regard to incorporating new batteries.

Consequently, this will make it possible to improve range, extend service life, reduce charging times and lessen weight”.

A safer chassis

In terms of safety, this prototype features a chassis that can absorb more impact energy without collapsing. As the cabin is a fully enclosed space, it means that the amount of space available for two passengers inside is similar to what a car offers. The vehicle is equipped with a safety belt and a seat with a backrest. No helmet is required

The chassis is made of glass fibre reinforced polymers (GFRP). This kind of material reduces chassis weight by up to 70% and, compared to metal, can dissipate five times more impact energy. Although composite materials offer a suitable alternative in terms of road safety and energy efficiency, it is an expensive option that involves complex manufacturing processes. Consequently, one of the project’s goals has consisted in finding more economical options to manufacture these composites. The end result has been a more efficient pultrusion process with UV curing that allows profiles to be moulded prior to being hardened. It also uses a smaller and more simple die which also helps to reduce costs.

A more efficient motor without permanent magnets

As regards traction, an efficient electric motor without magnets has been designed that comprises the electric machine, the gearbox and the electronic converter. The technology used for this purpose is based on switched magnetic reluctance technology instead of using permanent rare earth magnets because motors of this kind enhance average performance throughout the entire speed range

Driving tests carried out with this prototype have produced positive results in terms of to comfort and ergonomoy. As the design and components already exist in the market, they meet all European standards and can be obtained through a number of supply chains that are currently available.

The electric motor will be on display at the second edition of the Go Mobility trade fair on March 11-12 to be held at the Ficoba Exhibition Centre in, Irun (Gipuzkoa).

Concerning Tekniker

With nearly 40 years of experience in the field of applied research and knowledge transfer, Tekniker has achieved a high degree of specialisation in four major areas (Advanced manufacturing, surface engineering, product engineering and ICTs) and can now make available its cutting-edge technology to customers to meet their needs. The technology centre is a member of the Basque Research and Technology Alliance (BRTA).

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