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New e-bike technology: a rear swing arm made of nylon

RadiciGroup and Acerbis collaborate on creating a trailblazing product for electric two-wheelers featuring lighter weight and high technical performance. Now used on some Fantic Trail and Enduro e-bike models.

15 May 2023 – Two Bergamo-based manufacturers, **RadiciGroup** and **Acerbis**, have launched an innovative project, an absolute first in the e-bike market, arising from their desire to create high performance design solutions: specifically, a **rear swing arm for electric bikes**, for the first time **made of nylon** rather than aluminium, allowing the rear triangle to better absorb the stress from uneven terrain.

The first company to use this innovative part, the result of painstaking research and development work, is **Fantic**, an Italian manufacturer specializing in the production of motorbikes and electric bikes. Fantic decided to mount the new rear swing arm on several models of its Trail and Enduro lines that were previewed at EICMA 2022 and are now already in production and available for purchase.

"Since we are dealing with a structural component of the bike frame," said **Claudio Ghilardi, CAE analyst of RadiciGroup High Performance Polymers Marketing and Technical Service**, *"we have chosen a polyamide 66-based specialty material reinforced with glass fibre, precisely to ensure that the part can hold up under the continuous high stress it is subjected to. An additional plus is that the mechanical properties of the selected material, such as stiffness and strength, are less affected by moisture absorption. At the same time, great attention has also been paid to aesthetics in formulating the material, so much so that it guarantees excellent surface appearance, is UV-stabilized and withstands weathering over time".*

Using the RadiciGroup compound enables a **10% weight reduction in the part** and eliminates the painting process currently used for the corresponding metal component, thus improving **environmental performance**, as well. RadiciGroup engineering polymers are solution-dyed, that is, they are coloured during the extrusion process. This means that the part is already ready to use at the end of the injection moulding phase with an **excellent surface finish**. Indeed, among the main requirements for the material were excellent surface appearance and the ability to produce complex geometries, in line with the design and style of Fantic products.

Achieving this result was made possible by close collaboration among **RadiciGroup, Acerbis** and **Fantic** through all stages of the project, from the design of the part to the formulation of the material, the creation of the mould and the injection moulding process, down to the testing of the component mounted on an e-bike. This **fast, all Italian supply chain** delivered a product that was able to pass the stringent tests carried out at the customer's laboratories by a ten-fold margin over the initial requirements.

"For us, this partnership among Italian companies," **Guido Acerbis, CEO of Acerbis**, emphasized, *"represents a step towards a new way of thinking about production shared with our partners, which will allow us to accelerate some production reshoring to Europe. The project gave us the opportunity to replace a metal part with a nylon one by re-engineering it and improving its function. Furthermore, by simplifying and shortening production time, we increased the volume of products brought to market in a short time".*

For this project, RadiciGroup deployed its **Engineering Service**, which uses numerical computer simulation (CAE) to predict the behaviour of materials during the moulding process and the mechanical response of parts already in the very early stages of development, so as to make it possible to optimize their geometry and technical performance. This tool also draws on the skills and experience of RadiciGroup specialists to contribute to the success of innovative projects, including **metal replacement** projects.

The advantages of implementing metal replacement include fewer processing steps, less energy-intensive production processes, lighter weight products and lower transport costs, all of which lead to a reduction in overall CO_2 equivalent emissions.

Hence, the new innovative **rear swing arm** contributes to lowering the environmental impact of an e-bike and **can be recovered and mechanically recycled** at the end of its useful life. In fact, this bike part was the result of applying ecodesign principles to fuel a virtuous system of **nylon recycling** towards the realization of a circular economy.

RADICIGROUP – With approximately 3,000 employees, sales of €1.542 billion in 2022, and a network of production units and sales offices spanning Europe, North and South America, and Asia, RadiciGroup today is a worldwide leader in the manufacture of a vast range of specialty chemicals, polyamides, high performance polymers, and advanced textile solutions, including nylon and polyester yarns, recycled yarn, bio yarns from renewable sources, nonwovens, and personal protection equipment for the healthcare and manufacturing sectors. Its products build on advanced chemical know-how and the vertical integration of the polyamide supply chain. They are developed for applications in a wide variety of industry sectors, including the Automotive, Electrical/Electronic, Consumer Goods, Apparel, Furnishings, Building, Home Appliances and Sports sectors. Underpinning the RadiciGroup's strategy is an overriding commitment to innovation, quality, customer satisfaction, and social and environmental sustainability. With its macro business areas – Specialty Chemicals, High Performance Polymers and Advanced Textile Solutions – RadiciGroup is part of a broader industrial group encompassing textile machinery (ITEMA), energy (GEOGREEN) and the hotel business (SAN MARCO).

ACERBIS is a producer of polymers and technical sportswear engaged in experimenting with innovative solutions in sectors such as automotive, sport and racing. The Group is divided into three business units (Motorsport, Sport and OEM) with three distribution sites (Italy, the USA, and the United Kingdom), two production sites (Italy and Czech Republic) and several logistics sites. Acerbis products are distributed in 90 countries and sold directly in Italy, Spain, Portugal, France, Germany, the UK and Austria.

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