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Market & Technology Insights from R3-Mydas: Remanufacturing Shaping Europe's Future

Europe's manufacturing landscape is transforming rapidly, driven by sustainability ambitions, circular economy initiatives, and advanced technologies. At the forefront of this evolution is the R3-Mydas project, which recently assessed market dynamics and technology trends shaping remanufacturing practices in three pivotal sectors: Oil & Gas, Electric Vehicles (EVs), and Wind Energy, alongside an innovative digital marketplace.

In the Oil & Gas sector, remanufacturing of crankshafts is experiencing a notable shift from traditional welding and thermal spraying methods to advanced laser cladding. This trend is driven by the industry's need for solutions that minimise downtime, extend component life, and cut maintenance costs. The adoption of laser cladding technology represents a major leap forward: it precisely restores damaged crankshafts by applying high-performance materials, significantly reducing thermal stress and enhancing durability. R3-Mydas has enhanced this further, integrating cutting-edge automation, 3D scanning, and real-time quality control. Early evaluations show promising results, positioning laser cladding as a preferred solution for sustainability-driven industries seeking high precision, efficient, and environmentally friendly remanufacturing practices.

Similarly, in the rapidly growing EV market, effective management of End-of-Life batteries has emerged as a critical challenge, given their complex compositions and significant environmental impacts. Europe's booming EV sales have intensified demand for efficient remanufacturing processes to reduce costs, energy consumption, and carbon emissions. To tackle this, the industry is shifting away from manual battery handling towards highly automated and AI-driven systems. R3-Mydas has spearheaded innovative developments in battery diagnostics and robotic disassembly, introducing collaborative robotics like the SD35 screwdriver and sophisticated Graph Deviation Network (GDN)-based anomaly detection. These innovations not only streamline battery remanufacturing but significantly boost reliability and lifecycle performance, marking a transformative step forward in EV battery sustainability.

In wind energy, gearbox remanufacturing is rapidly gaining prominence due to the high operational stresses and costly downtime associated with conventional maintenance approaches. Traditional gearbox repairs often fail to prevent recurring issues, highlighting the need for more robust, precise solutions. To meet these demands, additive manufacturing (AM) combined with targeted induction hardening has emerged as a breakthrough. AM technology allows highly customised repairs with superior durability, directly addressing underlying wear issues like gear tooth fractures. The R3-Mydas project's

pioneering use of AM technology ensures significantly improved performance, reducing maintenance frequency and costs while elevating sustainability standards within the wind sector.

Complementing these sector-specific advancements, R3-Mydas has recognized the growing strategic importance of digital marketplaces in enabling the circular economy. Digital platforms have evolved significantly, driven by European regulations such as the European Green Deal and Circular Economy Action Plan, promoting transparency and traceability in remanufacturing practices. The R3-Mydas marketplace is taking these capabilities to a new level by incorporating blockchain and Digital Product Passports (DPP). This integration fosters consumer trust, provides unparalleled product lifecycle transparency, and positions remanufacturing firmly within Europe's sustainability agenda.

Overall, the R3-Mydas market and technology analysis highlights a clear shift towards automated, digitally enabled, and sustainable remanufacturing solutions. From laser cladding and robotic battery diagnostics to additive gearbox repairs and blockchain-enhanced digital marketplaces, Europe's remanufacturing industry stands at a transformative crossroads, with R3-Mydas driving innovation and setting new benchmarks for sustainability, efficiency, and market competitiveness.