

State-of-the-art remanufacturing technologies for high torque density journal bearing gearboxes

Flender has over 40 years of experience in developing wind turbine drivetrain solutions and technology. In **R3-MYDAS**, a specific dynamic journal bearing tester was used for validating load cases, which were intended to confirm the remanufactured or coated journal bearing behaviour against the seizure-critical operational modes.

One goal of the project was also to examine the potential of new “**remanufacture**” service processes and methodologies – providing cost and environmental benefits to the industry.

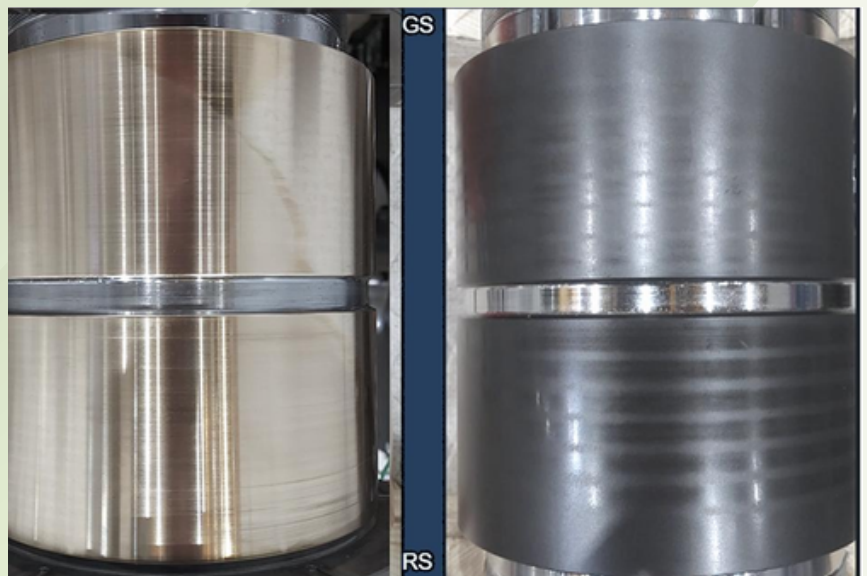
In a previous newsletter from 2025, it was mentioned that testing of generation 1 and 2 journal bearings in the dynamic journal bearing tester started in 2024, was successfully implemented, and phase 3, demanding loading conditions and Stribeck curve investigations, was planned. Moreover, remanufacturing of the journal bearing was briefly outlined, and basic principles were introduced.

Remanufacturing test was successfully done on a serial sample successfully by replacing the damaged layer and applying a new layer on top.

This was validated internally as a suitable repair method, and further developments of the method were already drafted.

On prevention of failures from **single blade installation (SBI)** to turbines. Different approaches to failure-prevention coating materials were tested and used as a benchmark.

A specific test plan was made to match the demanding loads during blade installation in a wind turbine. There was found technologies, which passed the demanding tests and were proven to work in an acceptable way.



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Competence Shift & Ethical AI: Two Pillars for the Next-Gen Remanufacturing

The manufacturing transition toward Industry 4.0 and 5.0 has expanded the scope of required workforce competencies beyond traditional technical expertise [1][2].

These skills are broadly classified into distinct but interrelated domains:

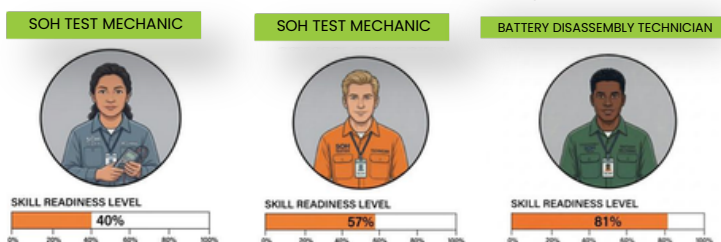
- **Technical and operational:** These cover the fundamental knowledge, techniques, and capabilities required to execute production tasks. They include mastery of manufacturing processes, equipment operation, and the ability to address production anomalies [3].
- **Digital:** As factories become software-intense businesses, proficiency in cloud computing, Internet of Things (IoT), artificial intelligence (AI), big data, and cyber-physical systems is essential [2]. This domain involves understanding the integration of intelligent resources and digital process management [1][5].
- **Interpersonal and managerial:** Often categorized as soft skills, these include communication, emotional intelligence, leadership, and people management. These are critical for managing human-machine collaboration and empowering employees [6][4].
- **Sustainability and ethical:** Industry 5.0 emphasizes human-centricity and ecological resilience. Competencies here focus on circular economy principles, social responsibility, and sustainable production practices [1][7].

Analysing skills and work profile for the future re-manufacturing industry

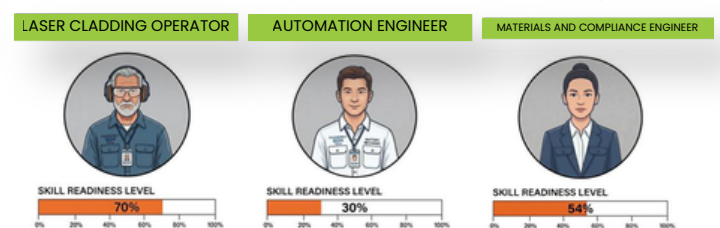
Within the R3-MYDAS project, a comparative analysis was conducted between the current workforce skill set (AS-IS state) and the future competencies required by the project (TO-BE state). This comparison highlights how job profiles and skills will evolve with the introduction of the new technologies developed in the project.

The main outputs of this analysis include a set of personas, scenarios, and skill transformation maps that show the change. The following images display the key profiles identified, along with their skill readiness scores to face the innovations introduced by **R3-MYDAS**, in the **three different Demo Cases of the project**.

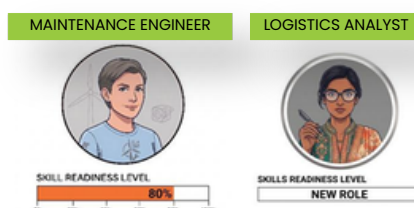
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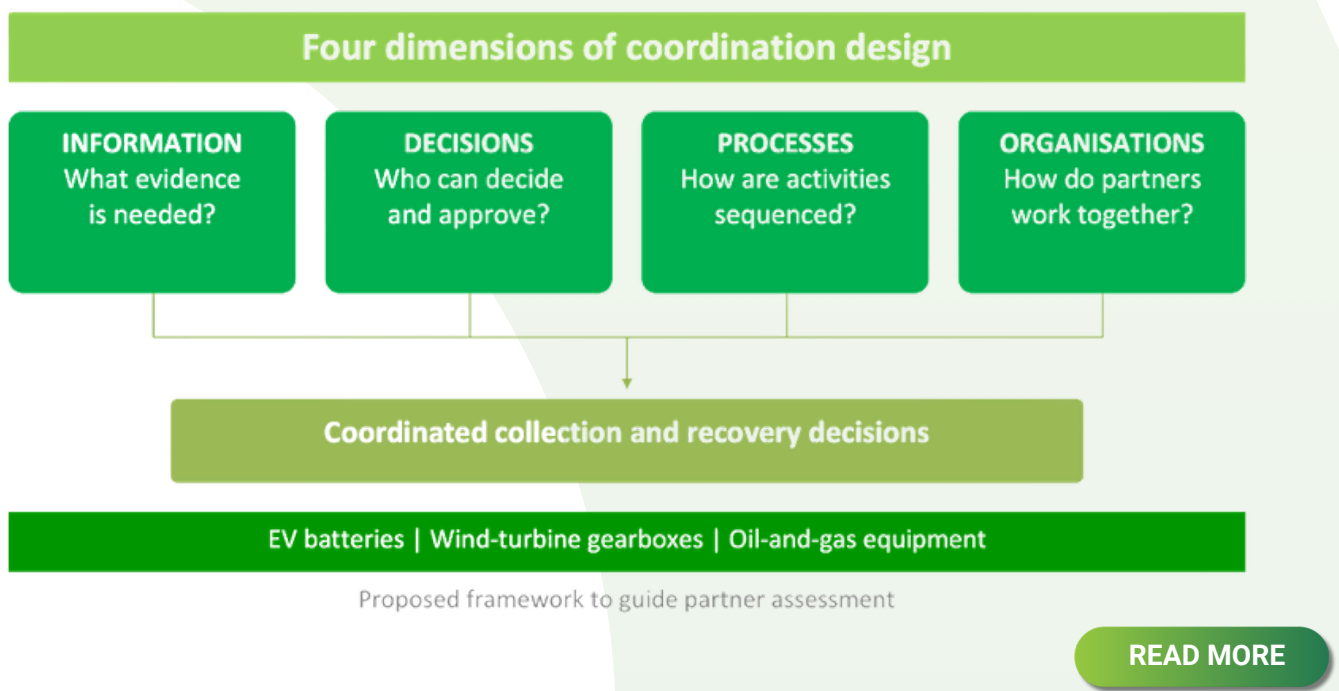
Giving Industrial Assets a Second Life

What stands between a used industrial asset and a second life? Often, the challenge arises long before the asset reaches a remanufacturing workshop. A wind-turbine gearbox awaits collection, an EV battery requires a safety assessment, or an industrial pump arrives without a complete service history.

Each situation highlights how logistics and information can determine whether recovery is practical. Within R3-MYDAS, we are examining how better coordination of collection, assessment and recovery decisions can help these assets return to productive use.

Our work draws on a systematic integrative review of academic research, complemented by industry and policy sources. It explores how factors such as uncertain returns, incomplete information, transport constraints, and fragmented responsibilities affect recovery systems. Prioritising early screening is crucial: assessing an asset beforehand can avoid unnecessary journeys, repeated handling, and delays by enabling better decision-making before allocating significant logistics resources.

We have created a proposed **Reverse Logistics Coordination Design Framework (RL CDF)** that integrates four key dimensions: the necessary information, decision-making authority, activity sequence, and organisational arrangements among partners. Together, these dimensions highlight areas where coordination improvements are needed.



Partners



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