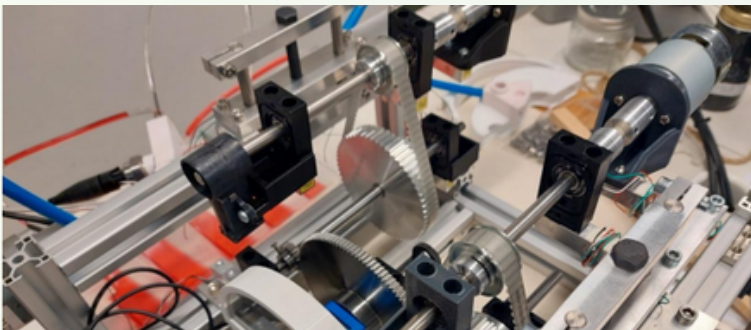


Understanding stray currents in wind turbine drivetrains

In **Task 4.6**, we collect and analyse the results from all WP4 tests on wind turbine drivetrain components. Some of these tests have already been completed, while others are still running or being prepared. At this stage, the main focus is on systematic data collection and building a common picture of how and why drivetrain parts fail earlier than expected.

A key question is whether selected components of the **wind turbine powertrain** can be remanufactured and reused. In practice, the predicted lifetimes of gears and bearings based solely on mechanical wear are often not achieved.

One important suspect is stray electrical current – unwanted current that can pass through bearings and gears because the turbine is connected to a generator. This effect is known in industry, but it is still not very well understood.



To study this, **LUT** in collaboration with Flenders Finalnd Oy is developing detailed drivetrain models that combine mechanical components (gears, shafts, bearings) with the physics of the lubricating oil film.

Electrical characteristics of the elements (such as resistance and capacitance) and oil properties (such as film thickness) are used to estimate where stray currents occur and their magnitudes and frequencies.

Oil & Gas Components



E-vehicle Batteries



Wind Turbine Gears



Advancing Standards in Remanufacturing, Repurposing, and Recycling Energy Goods

A major challenge facing the sustainable remanufacturing, repurposing, and recycling of energy goods is the lack of comprehensive internationally accepted standards. Current standards do not fully support advanced digital and mechatronic technologies that enable efficient circular value chains. Closing this gap is essential to unlock the potential of innovations like additive manufacturing, laser cladding, digital product passports, and automated quality control to accelerate the transition to a circular economy in energy sectors.

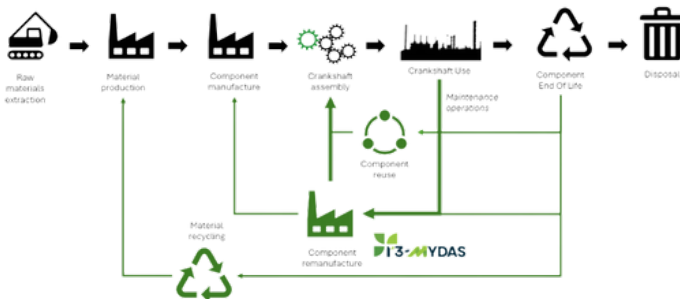
Key Recent Progress and Recommendations

The **R3-MYDAS** project has analysed demonstration cases across oil and gas crankshafts, electric vehicle batteries, and wind turbine gearboxes. The findings reveal critical gaps in current standards that do not fully capture remanufacturing-specific challenges

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R3-Mydas ensures the sustainability of new remanufacturing processes in the energy sector

R3-Mydas enables and accelerates the transition of the manufacturing industry toward more sustainable and circular value chains. To ensure the sustainability of the results, a Safe and Sustainable by Design (SSbD) assessment of the new circular value chains is expected in the three demo cases considered in the project: oil & gas, electric vehicles and wind energy sector.



To develop the study regarding sustainability for all the value chains (VC) along the R3-Mydas Project, a preliminary Life Cycle Analysis (LCA) has been proposed. The objective of this study is to assess the remanufacturing or repurposing of each Demo-case based on the data collected throughout the project.

The results will be compared with those of the current process for each case study within this Project. LCA methodologies included in the SSbD framework were used.

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