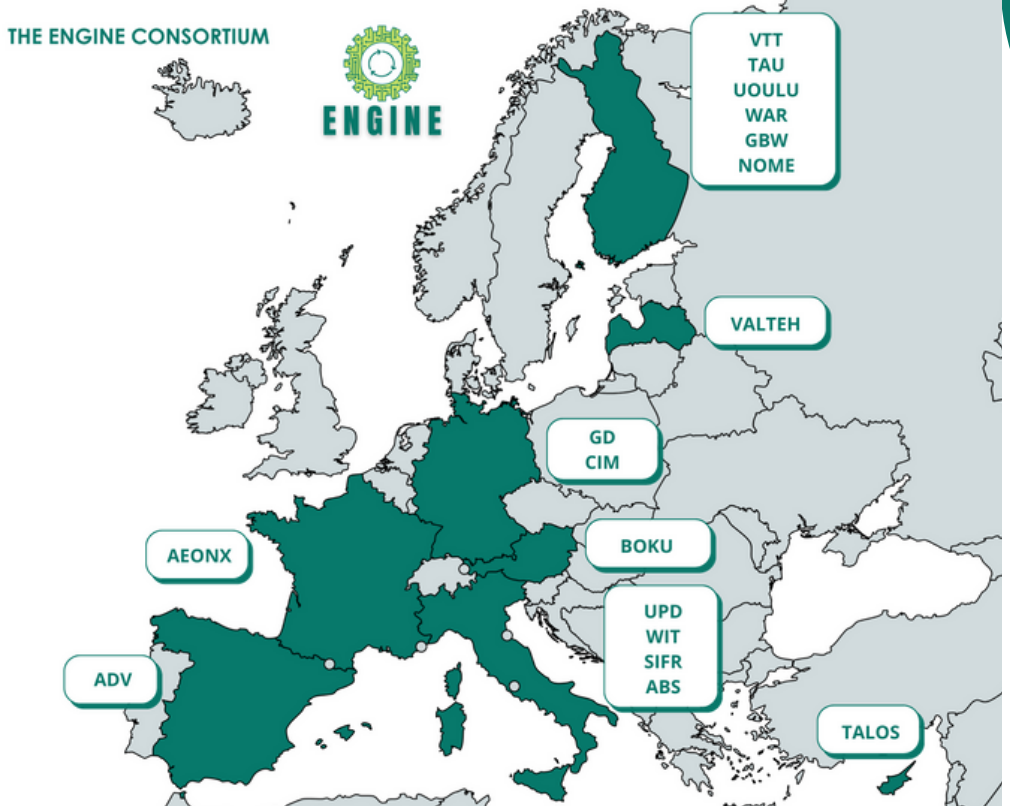

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ENGINE

ZERO-DEFECT MANUFACTURING FOR GREEN TRANSITION IN EUROPE

ENGINE system

The metal product design and manufacturing system that integrates the separate modules to enable sustainable-by-design product development and first-time-right and zero-defect manufacturing.

ENGINE toolbox

Software suite for sustainable-by-design product development and first-time-right manufacturing.

ENGINE exchange

Data management solution for industrial data storage, sharing and seamless, multiple-location integration of software and hardware tools.

ENGINE production

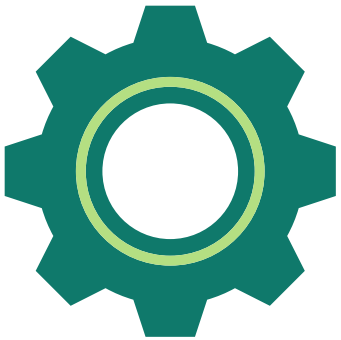
Production control, diagnostics, and monitoring solution enabling zero-defect manufacturing.

The project will develop methodologies for first-time-right manufacturing, automated diagnostics & production monitoring, zero-defect manufacturing, and sustainable-by-design product development.

It will also refine metal product life-cycle-assessment (LCA) and life-cycle cost analysis methods as well as investigate repair and refurbishment strategies as means of reducing manufacturing waste and extending the product lifetime.

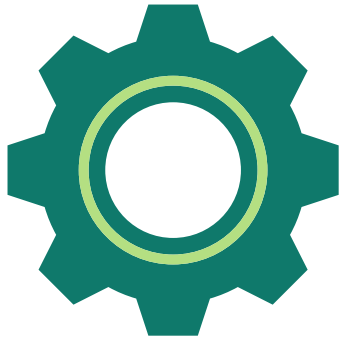
ENGINE development

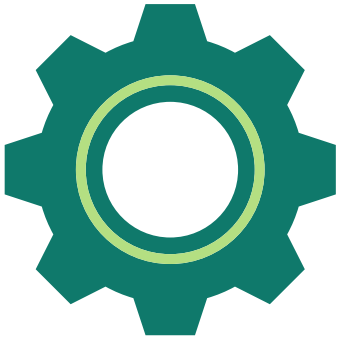
The ENGINE project will develop:



Four **software tools** (physics-based modelling package, predictive artificial intelligence (AI) lifetime assessment tool, sensor output simulator, AI damage recognition tool) enabling engineers to model and monitor defects in manufacturing and operation, as well as optimize processes and products to prevent defect initiation and propagation.

Four **methodologies** to assist engineers in preventing the generation and propagation of defects. Two methodologies concern product design process and in-situ production monitoring separately, the third considers the zero-defect manufacturing as an integrated design, production monitoring, and data-sharing process, the fourth considers LCA in product and business decistions.





Three improved **diagnostic methods**: (1) Automated and robotized ultrasonic immersion testing (2) in-situ and real-time vibration and acceleration measurements during testing and operation (3) electromagnetic slag carry-over detection to detect sources of microimpurities and inclusion during material preparation