

Coordinator



Partners



LIFE16 ENV/IT/000231



**LIFE4**  
GREEN STEEL



### PROJECT LIFE 4 GREEN STEEL

The aim of the project is to demonstrate the feasibility to replace the traditional energy-intensive and material-consuming machining of wrought metals with a new and innovative High Density Powder Metallurgy (HDPM) technology for the manufacturing of high-performance steel components.

The Powder Metallurgy technology is a sustainable manufacturing process recognized as a green technology: the high mechanical and dimensional requirements for high performance steel could also be theoretically met by means of an innovative Die Wall Lubrication (DWL) compaction stage in combination with high-temperature vacuum sintering and thermochemical treatments.

This means to obtain a raw material utilization (metal powder) up to 95% manufacturing near net-shape components avoiding large scrap production (at least 50%) from machining technique.

#### TECHNICAL OBJECTIVES

- Development of an effective pressing system, operating with DWL technique, to produce sintered steel parts having density greater than 7.3 g/cc and high dimensional stability.
- Study, evaluation and definition of lubricants for DWL system.
- Tailoring the high-temperature vacuum sintering stage and development of a reliable case-hardened profile of PM steel by means of the thermochemical treatment Low Pressure Carburising (LPC).
- Alloy design of powder steel chemical composition avoiding alloying elements that are harmful (nickel), or that make the recycling process difficult and ineffective (copper).
- Reduce more than 70% of the lubricant premixed with metal powder, so eliminating the burning stage, increasing energy efficiency and solving related emission problems.
- Achieve energy and material saving through the innovative HDPM technology, which has a very high coefficient of material use (95%) and therefore minimizes energy input.

#### EXPECTED ENVIRONMENTAL RESULTS

- High raw material saving (-47%).
- High production energy saving (-50%).
- Strong reduction of cutting fluid lubricants (-95%).
- Strong reduction of metal powder admixed lubricants (-70%).
- Strong reduction in CO<sub>2</sub> emissions (-50%).

