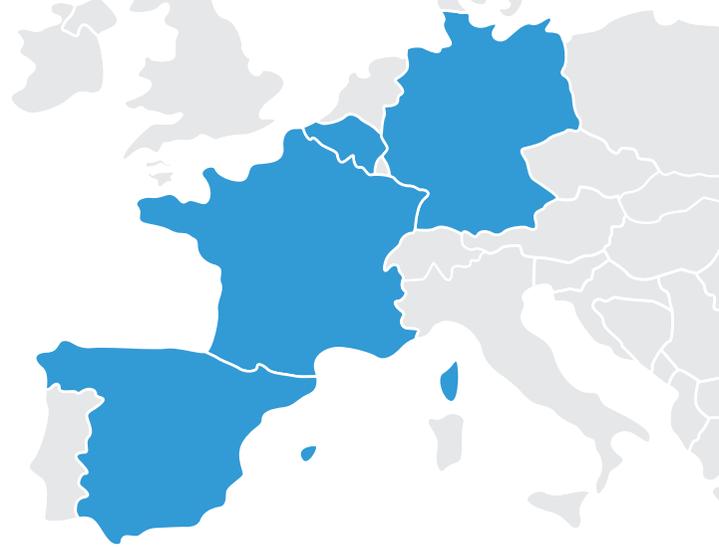


Essial Objectives

The overall objectives of ESSIAL are to :

- Decrease iron losses due to magnetic reversal processes by 20%.
- Control and decrease mechanical vibrations and acoustic noise by 20%.
- Make the deposition/removal of insulating layer and assembling easier for sustainable manufacturing process chains.
- Integrate new laser processes with maximum 10% price increase.
- Implement innovative and unconventional technologies along the European manufacturing value chain.
- Transfer the ESSIAL technology to European clusters and companies.

Achieving these goals will help Europe reaching the objectives of the energy transition agenda, while strengthening European industrial base.



ESSIAL

**Electrical Steel Structuring,
Insulating and Assembling by
means of the Laser technologies**



The ESSIAL project is coordinated by



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Essial in a nutshell



4

YEARS



13

PARTNERS



4

COUNTRIES



5M€

EU FUNDING

The ambition of the project is to use laser surface texturizing (laser scribing, irradiation, texturizing, ...) on soft ferromagnetic materials, such as usual electrical steels and special alloys, in order to improve the performance and functionalities of laminated magnetic circuits.

These soft magnetic circuits, made from stack of steel sheets separated by an insulating layer, are becoming crucial in almost all industrial sectors, as they are key elements of industrial electrical machines (such as transformers, sensors, actuators, motors, generators ...). Experts estimate that the market growth rate of soft magnetic materials will increase by 7.8% annually in the coming years.



Manufacturing processes

To define the process parameters and intrinsic mesoscopic properties associated to the main metallurgical properties of electrical steels to achieve the required magnetic and physical properties.

Physical studies

To model the macroscopic magnetic, vibro-acoustic and magneto-mechanical behavior laws of electrical steels in parallel to the measurement and characterization of samples.



Proof of concept

To measure and characterize the optimized samples and reduced scale prototypes of magnetic circuits and magnetic components (inductor, transformer, motor).

Prototypes

To manufacture and test 3 prototypes in real conditions:

A 355-kW rotating electrical machine

A 70-kVA voltage transformer

10kW DC and 110 kVA AC chokes for power converters



Up-scaling

To define in-line monitoring and upscaling strategies for mass production.

Exploitation, dissemination and communication

To facilitate the take-off of the ESSIAL technology

