

EXPECTED RESULTS

The current production cycle of the rod has a high environmental impact:

- ▶ Not directly recyclable waste production (zinc coating prevents the direct recast)
- ▶ Production of greenhouse gases and liquid acids (from pickling and descaling chemical)
- ▶ Production of spent acid for disposal (only a fraction of which can be re-generated)
- ▶ Production of sludge for disposal (which also contain iron oxides)
- ▶ Use of large amounts of water
- ▶ Use of thick coatings of zinc to meet the interface reactions and the fragility of the compounds
- ▶ Use of energy (for heating baths for pickling and for maintaining a bath of molten zinc)
- ▶ Use of flow agents and surface active compounds such as ammonium chloride, to improve adhesion of the zinc coating

The proposed project, however, will lead to a much more “green” process able to:

- ▶ value 2,000 tons of waste metal to be used in the process of mechanical descaling, peening and converting them into particles of iron oxide pigments;
- ▶ reduce the consumption of electricity in descaling and coating hot-dip of 480,000 kWh per year (120 kWh per tonne);
- ▶ obtain a water savings of 25,000 m3 per year;
- ▶ reduce the production of acid sludge of 2,500 tonnes per year;
- ▶ save the use of 6,000 tons of hydrochloric acid and sulphuric acid compared to the processes that are still using acid descaling and pickling;
- ▶ reduce emissions of toxic fumes from hot dip coating baths depending on the composition of the bath;
- ▶ reduce the production of zinc ash due to better protection against oxidation of the bath dip coating.

LIFE+ PROGRAMME

The (EC) No 614/2007 Regulation of the European Parliament and of the Council of 23/05/2007 established the new European Programme for the financial support of products and technologies aimed at protecting the environment: LIFE +.

LIFE + replaces the previous LIFE program (Environment, Nature and Third Countries), the Community Framework Programme for cooperation in promoting sustainable urban development, the Community Action Programme for the promotion of non-governmental organizations active in the field of environmental protection and Forest Focus program. The objective of LIFE is to contribute to the development, implementation and updating of policy and legislation on the environment. This financial instrument is also designed to facilitate the integration of environment into other policies and to contribute to sustainable development in the European Union.

LIFE + co-finances environmental activities in the European Union (EU) and in certain third countries (EU accession countries, members of the European Environment Agency, the Western Balkan countries affected by the process Stabilisation and Association). The funded projects may be proposed by operators, public and private bodies or institutions.

LIFE + consists of three thematic components:

▶ **Nature and Biodiversity.**

The Nature projects contribute to the implementation and development of the guidelines “Birds”, “Habitat” and the Natura 2000 network. Biodiversity projects focus on innovative practices aimed at halting the loss of biodiversity in Europe.

▶ **Environmental Policy and Governance.**

It supports innovative or demonstration projects that show innovative solutions relating to relevant environmental issues.

▶ **Information and Communication.**

It supports projects aimed at the communication and awareness campaigns on the environment, and training initiatives and campaigns for the prevention of forest fires.

More informations on www.cavatorta.it



LIFE09 ENV/IT/000185 

MDPATC

NEW ECO-PROCESS OF
SUPERFICIAL TREATMENT
OF THE METALLIC WIRE
PRODUCTS

 **CAVATORTA**
A PROVA DI TEMPO

BACKGROUND & OBJECTIVES

Products derived from metal wire, such as nails, screws and wire mesh, are subjected to various chemical treatments, which improve performance, but which have a strong impact on the environment.

In fact they involve:

- ▶ Very high energy consumption
- ▶ Consumption of water
- ▶ Use of hazardous chemicals
- ▶ Production of waste (sludge containing iron oxides, acids exhausted) to be disposed of
- ▶ Production of non-recyclable waste products
- ▶ Emissions into the atmosphere

The project aims to demonstrate the possibility of physical treatments in place of chemical ones, improving the environmental performance of the manufacturing process of products derived from wire and converting waste into re-usable products in process or in any process.

PROJECT

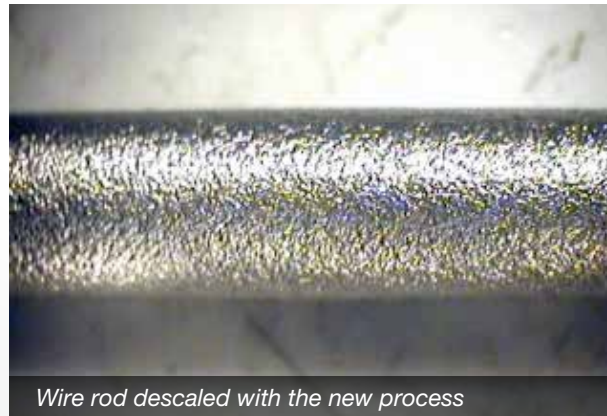
Trafileria e Zincheria Cavatorta S.p.A, a company that has always paid attention to the implication arising from their work environment has decided to engage in an interesting and significant challenge: to prove that the treatment process of steel wire and nails can be done without the use of chemicals.

In particular treatment is used for **dry cleaning of surface to be machined mechanically working through a process of descaling and grinding** that does not require the use of sulphuric acid and hydrochloric acid (highly toxic substances and pollutants) currently in use, then **the phase drawing is performed by an innovative microwave plasma surface treatment** in place of the traditional pre-treatment involving the use of ammonium chloride. To demonstrate the feasibility of the new process, the company intends to build a pilot plant capable of treating up to 1,000 kg / hour (4,000 tons / year) of wire rod. The project **“MDPATC”** was featured on LIFE + and subjected to the evaluation of the European Commission, which considered the project worthy of support for the aims and results for the innovation it offers.

DEVELOPMENT ACTIONS

To reach the realization of the pilot plant, the project takes place through the implementation of specific technical activities:

- ▶ **mechanical descaling and grinding** of the blade that will lead to the development of a system for the cleaning rod through the mechanical action of prismatic metal fragments, assisted by a system of magnetic separation of the abrasive particles are able to divide the particles of rounded shape from those still used as abrasive prismatic (characterization of waste arising from the manufacture of prismatic rods available, creation of test equipment for abrasive descaling of wire rod samples, characterization results and definition of project requirements for the descaling system, design and creation of a system of descaling of wire rod and grinding of the blades; design and construction of a mechanical and magnetic separation to produce iron oxide pigments and circular strokes for shot peening, the characterization of the products obtained; evidence operating with continuous feed of wire rod);
- ▶ **microwave plasma treatment** (definition of equivalent permittivity of the plasma based on its expected characteristics, numerical simulation and optimization of microwave applicators for plasma generation, numerical simulation of systems “suffocation” to prevent microwave leakage from the container microwave design and manufacture of microwave plasma sources, on the basis of numerical simulation results, including devices



Wire rod descaled with the new process

to prevent microwave leakage; tests on drawn wire and characterization of the results obtained, in terms of microstructure and homogeneity of treatment);

- ▶ **dip-coating** (design and optimization of the ternary mixture of alloy coating bath through the DOE system, design and construction of a bath of dip-coating and auxiliary components, design and construction of transportation systems for transit wire in the coating bath, hot bath running tests on the dip-coating, in the optimized conditions, and further optimization of process parameters, characterization results and mass balance and energy of the coating bath, including a quantification of emissions);
- ▶ **assembly of the pilot line** (design and optimization of the layout of the pilot line, pilot line installation and construction of transportation systems, connections, safety devices, cabling, connection to the auxiliary tests of continuous operation with different rods and varying treatment parameters, characterization of the products obtained, especially in terms of corrosion resistance and weld microstructures, mass balance, energy and environmental assessment of actual achievements and results obtained).

In addition to technical activities will be carried out simultaneously the other activities necessary for the realization of the project and in particular:

- ▶ management activities of the entire project, both administratively and technically-organizational;
- ▶ monitoring activities to be aware of the situation in real time progress of the project and the results compared to those initially set;
- ▶ dissemination of results of activities with the intent to make available to interested project progress and results achieved gradually

It will also place a very important activity, the after-LIFE Communication Plan, in order to plan a more effective and lasting dissemination of project results also terminated.