Safe and Traceable Materials? Ecor International

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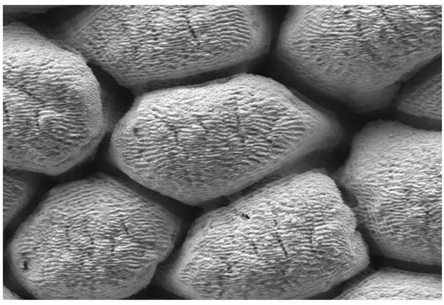

Bumps microstructure with femtosecond pulsed laser processing (10-15s) of AISI 316L steel

GOALS

The Demetra Project, called "Development of materials and traceability technologies for food safety and quality", was born with the aim of creating new systems for the improvement of food safety, both in terms of human health and product traceability.

The objectives of the project can be traced back to three strands. The first aims to reduce the presence of pollutants – such as nickel – by replacing austenitic steels with ferritic steels, more suitable in terms of safety.

The second objective, on the other hand, aims to reduce bacterial growth and/or other pathogens – such as fungi – on certain parts of industrial machinery particularly exposed to the phenomenon and to improve surface cleanability; these issues are rather common in the Food and Packaging sector, given the significant exposure to the risk of contamination of food.

In this sense, we will try to adopt surface treatments with laser microstructuring technology and thin coatings in PVD (Physical Vapor Deposition) and Sol-Gel. These technologies will also generate positive environmental impacts due to the reduced use of chemical agents.

The third objective, finally, will be to carry out a non-clonable tracing. The system will monitor the entire supply chain returning a complete history of the entire production process going to understand the materials used, the treatments carried out and the machines used/realized. This will ensure greater control in terms of certification and safety for final consumers.

THE ACTIVITIES

In order to achieve the best possible result, the team of Ecor International Spa has applied its technological skills in surfaces and materials. What we tried to observe during the project was the quality of welding by performing metallographic observations, mechanical and corrosion resistance tests. Subsequently, the engineering team analyzed the angle of contact of surfaces subjected to surface treatments and the behaviour of material-process systems to the washing cycles of industrial machines for the Food and Packaging sector.

As reported by Ivan Moretti, Research&Innovation Manager of the project, the results of the analysis carried out on the welds showed better performances in the laser welding process compared to TIG welding with particular reference to welding between austenitic and ferritic steel. The laser welding technology is preferable due to the minor deformations related to the reduced thermal input and to the microstructure with no formation of undesirable phases.

Laser welding between two lengths of 470Li and 304L steel

The main difficulties of the operations were represented by the optimization of the welding process and by the realization of super hydrophobic surfaces – through laser technology – that ease sanitization and cleanability. These surfaces have been realized through bumps microstructures on flat and cylindrical substrates of AISI 316L steel that have allowed to provide markedly super hydrophobic properties.

Currently, among the various phases of the project, the design and implementation of a test rig (test bench) is underway to verify the integrability of systems between material and process developed on the components of industrial machines for Food Packaging simulating the washing cycles to which they are subjected.

PARTNER

Among the partners that are collaborating on the project there are prominent realities. In particular:

– CSM Rina Consulting,

– Poste Italiane,

– Net Service,

– Università della Calabria.

Ecor International in summary
Founded in 1976 in Schio, in the province of Vicenza (Italy) Ecor International SpA has specialized in the production of critical components and complex systems. The company today has 200 employees and a turnover of 45 million euro. The company holds production plants in Veneto and Campania region besides an Industrial Research Center in Modena, Il Sentiero International Campus Srl, that deals with the study of Surface Engineering, Reliability Engineering, Additive Manufacturing and Joining Technologies. Ecor International business areas include Food Industry, Aerospace & Defense, Advanced Mechanics and Industrial Research.

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