



SURFACE TREATMENT & COATINGS

Coatings, reinforcement, functionalization and surface finishing on metallic alloys, ceramics and polymers

To develop new surface treatment processes, from the laboratory to the industrial scale, to improve performances of materials and coatings, in respect of REACH regulations and SHE constraints (substitution of hexavalent chromium, cyanides, etc.).

IRT M2P contributes to increase the maturity of processes as well as reliability thanks to modular and robotic industrial platforms. These latter enable the development of various types of treatments, metallic coatings and sol gel as well as various post additive manufacturing finishing processes. A platform dedicated to innovative painting applications completes this equipment.



EXPERTISE & SERVICES

Metallic materials and surface treatment processes

- Deep knowledge of preparation and surface treatment processes
- Deep knowledge of electrolytes (additives, (in)organic complexing agents)
- Management of electric parameters (pulsed current)
- Formulation of new solutions in surface treatment
- Development of coatings by co-deposition

R&D studies and surface treatment services (Al, Mg, Ti alloys, steel and stainless steel)

- Development of processes in compliance with environmental regulations
- Development of tailor-made surface treatment processes
- Development of post-additive manufacturing finishing processes
- Robotic application of organic and hybrid coatings
- Surface treatment parameters tuning
- Maintenance of chemical baths deposition
- Recycling of used baths and waste valorisation

Scale transfer support

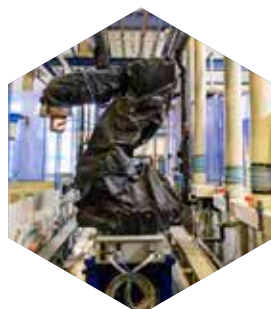
- Processes/ validation at industrial scale
- Increase of process maturity and reliability
- Set up and transfer of reliable and industrializable analytical methods
- Practical and theoretical training

Characterization and control of materials and coatings

- Microstructural observations: phase identification, coating morphology (thickness, porosities, etc)
- Elementary composition analysis
- Surface topography analysis (roughness)
- Functional properties evaluation: fatigue resistance, corrosion behaviour, wear resistance, micro-hardness, electrical conductivity, adherence

Simulation (Comsol multi-physics®)

- Modelling of metallic structure corrosion behaviour
- Modelling of surface treatment processes (equipments sizing, current lines distribution, etc.)





TECHNOLOGY

Surface preparation and activation

Mechanical (sand-blasting, shot-peening, laser peening);
Chemical and Electrochemical ; Solvent degreasing

Light alloys treatments (Al, Ti, Mg)

Chemical conversion (Cr III/Zr, Ti, Cr-free) ; Sulfuric, phosphoric, sulfo-phosphoric, sulfo-tartaric, sulfo-boric anodizations ; Anodized layers (Cr III/Zr, Ni acetate, PTFE) impregnation and sealing ; Hard anodization ; Micro Arcs Oxidation (MAO)

Steels treatments

Chemical plating: copper, nickel (low, middle and high phosphorous) ; Electrochemical plating: nickel (sulfamate, Watt and Wood), trivalent hard chromium, ZnFe high Fe content, ZnNi 12-15%, cyanides-free silver, Zn and alloyed Zn passivations and top-coat ; stainless steels passivations, phosphating (Zn and Mn)

Surface finishing (additive manufacturing & conventional metallurgy)

Chemical polishing ; Electrochemical polishing ; Plasma electrochemical polishing ; Dry Lyte Electropolishing ; Levelling coatings (metallic and sol-gel coatings) ; Tribofinishing

Special processes

Painting application (solvent, water-soluble, powders); Sol-gel coatings ; Aluminium-based metallic ceramic coatings ; Metallic-based hybrid coatings and organic binders ; Zinc flex coatings ; Electrophoresis

APPLICATIONS

- REACH compliance: hexavalent chromium substitution
- SHE compliance: cyanides removal on silver processes, ZnFe high Fe content
- Performance optimization: tribological properties, corrosion, temperature, fatigue and wear resistance
- Coatings dedicated to H₂ production systems
- Virucide/bactericide coatings
- Surface treatment automatization & processes robotization: painting spray, sol-gel immersion/spraying
- Post-additive manufacturing finishing
- Effluents treatment and valorization

Principal markets:

Aerospace, naval, automotive, building, energy, military, materials/equipment manufacturers, suppliers of surface treatment, railway, sports/leisure, medical, luxury

Further information on our activities www.irt-m2p.fr

EQUIPMENT @M2P

SURFACE PREPARATION

- Solvent degreasing machines
- Sand-blasting and shot-peening machines

MULTI-SCALE TREATMENTS

- Chemical/metallurgical laboratories
- 3 flexible and instrumented surface treatment lines
 - Pilot line (9 tanks 60L)
 - Semi-industrial line (21 tanks 150-300L)
 - Semi-industrial line (15 tanks 600L) for the treatment of parts up to 500 kg, including 4 spraying tanks with a volume of 130L
- Automated treatment (robot) by immersion and spraying for complex geometries (sol-gel, finishing)
- Reverse pulsed current generators (50A to 1500A)
- Robotic platform for the treatment by spraying/painting of parts until 1,5 m in length
- Dip-spin chamber for bulk processing
- Dry Lyte Electropolishing equipment (15L)
- Effluent treatment pilot

CHARACTERIZATION

- Ionic polisher
- Optical microscope ; MEB-FEG ; XRD
- 3D interference microscope, mechanical profilometer
- EDX, ICP-OES, SDL, OHN/CS analyser, X-ray fluorescence
- ENOVASENSE®, Deltascopie
- Macro/micro-hardness instruments
- Conductimeter according to MIL DTL 81706
- Salt spray (400 and 1000L) according to ISO 9227
- Potentiostats
- Taber abraser
- Fatigue tests: rotating bending benches, tensile compression cyclic machine

RELATED ACTIVITIES

MECHANICAL SURFACE TREATMENT

HEAT & THERMOCHEMICAL TREATMENT

Various treatments (coatings, mechanical, heat, thermochemical) could be combined and associated to further improve materials and coatings performances.



About IRT M2P

The Institute of Research and Technology for Materials, Metallurgy & Processes (IRT M2P) is your partner for developing innovative products and processes to accelerate your company's growth.

We bring our expertise, a wide array of state-of-the-art semi-industrial technological platforms and a network of academic labs to the R&D projects we carry out with our more than 120 industrial partners.

Working together

- Multi-partner research projects with private/public co-funding
- Private research studies, tailor-made services
- Small series & prototype production
- Training

Contact us to discover our 9 areas of technological expertise:

- > Advanced Foundry
- > Life Cycle Assessment & Recycling
- > Metal Powders
- > Surface Treatment & Coatings
- > Mechanical Surface Treatment
- > Heat & Thermochemical Treatment
- > Composite Materials
- > Multimaterials Joining
- > Analysis & Characterization



**Institut de Recherche
Technologique**

**Matériaux Métallurgie
et Procédés**

Surface Treatment Platform

12, rue de l'Artisanat
F-67120 DUPPIGHEIM

Headquarters

4, rue Augustin Fresnel
F-57070 METZ
+33(0)3 72 39 50 85
contact@irt-m2p.fr

www.irt-m2p.fr

