

## CHEMICAL AND PHYSICAL CHARACTERIZATION

# Tribocorrosion machine

## TRIBOCORR

Thanks to the industrial research activity and the competences acquired in the Reliability and Surface Engineering fields, II Sentiero has designed and built TriboCorr. This machine is able to carry out tribocorrosion tests by means of the simulation of specific tribological conditions in a corrosive environment.

TriboCorr is able to reproduce not only operating conditions of materials to be tested, but also

the most difficult working conditions accelerating degenerative phenomena that generally occur in the long term.

TriboCorr is both a versatile and modular tool: thanks to the interchangeable modules that compose it, it is possible to reproduce different operating conditions.

Wear is caused by a counterpart (often hard material) that puts pressure on the test-piece of material or on the treatment to be analyzed; this sample can have different shapes, according to customers' needs and the physical phenomenon to be studied. On the other side, corrosion is reproduced recreating an environment that simulates or reproduces aggressive conditions of the real working system.

Therefore, in TriboCorr we can find:

- Aqueous solution of chlorides
- Aqueous solution of hydrogen peroxide
- Lubricants
- Aggressive substances
- Acids and bases

The degradation of the test-piece can be monitored in real time through electrochemical analyses, thanks to the integrated potentiostat and the set of electrodes. It is possible also to control the friction coefficient and carry out other specific analyses.

The plant can also be used for static corrosion experiments.





# **Tribological aspect variables**

#### Input data in the system

| INPUT                         | GENERATED BY             | MEASURED BY            |
|-------------------------------|--------------------------|------------------------|
| Rotational speed/Linear speed | Electric motor + adapter | Servomotor             |
| Normal load                   | Pneumatic actuator       | Load cell              |
| Test duration                 | -                        | Interface software     |
| Environment                   | VHP-Circuit              | Concentration detector |
| Temperature                   | Resistances              | Thermocouple           |

## Output data from the system

| OUTPUT                     | GENERATED BY               | MEASURED BY                               |
|----------------------------|----------------------------|---|
| Friction force (COF)       | Test-piece sliding contact | Load cell                                 |
| Volume of removed material | -                          | Profilometer, optical/electron microscope |
| Track depth                | Test-piece sliding contact | Profilometer, optical/electron microscope |
| Wear rate                  | Test-piece sliding contact | Profilometer, optical/electron microscope |

VHP plant, Vaporized Hydrogen Peroxide, allows recreating environmental conditions required by the customer.

# **Corrosive aspect variables**

#### Input data in the system

| INPUT                   | GENERATED BY | MEASURED BY            |
|-------------------------|--------------|------------------------|
| Electrolyte composition | Circuit      | Circuit                |
| Electrolyte PH          | VPH          | PH-metro               |
| % of chlorides          | VPH          | Conductivity meter     |
| Polarization potential  | Potentiostat | Potentiometer          |
| Environment             | VPH          | Concentration detector |
| Temperature             | Resistances  | Thermocouple           |

## Output data from the system

| OUTPUT                                      | GENERATED BY | MEASURED BY            |
|---|--------------|------------------------|
| Corrosion potential                         | -            | Potentiostat voltmeter |
| Polarization density (potentiostatic tests) | Potentiostat | Potentiostat ammeter   |
| Potentiodynamic polarization plot           | Potentiostat | Potentiostat ammeter   |



Potentiodynamic curve