# Applied Mechanics and Corrosion

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## Tribocorrosion: A threat to materials

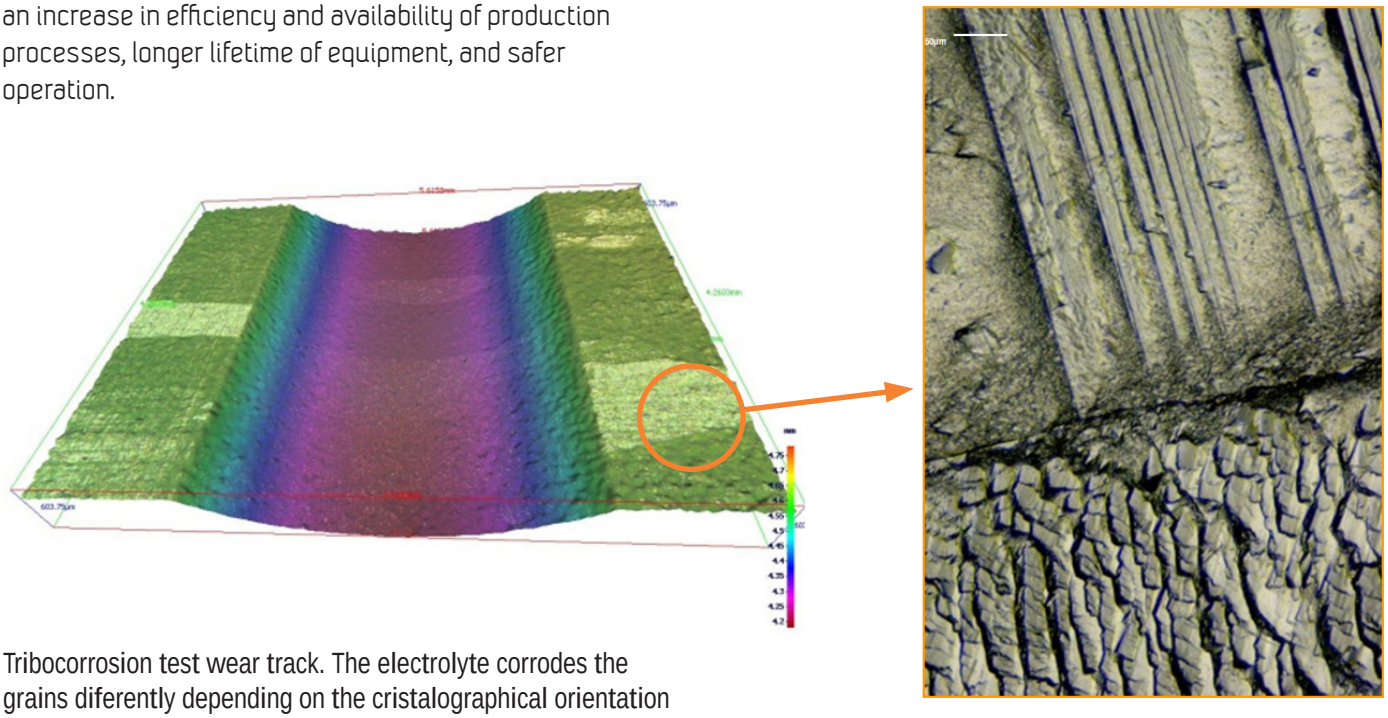
**Tribocorrosion is a material degradation resulting from simultaneous action of wear and corrosion. Under these conditions the materials selection is a challenge since the material has to effectively withstand wear, corrosion and their combined effect.**

Typical tribocorrosion equipment

### The importance of tribology & tribocorrosion

Losses to the gross national product of countries by equipment failure due to wear and corrosion are larger than 1% in total. Potential financial savings in the industry by reduction in maintenance, downtime, breakdowns, and replacement of equipment are considerable.

Application of good practices and known tribological principles can save industry and society from these cost. Research within tribology contributes thereby to an increase in efficiency and availability of production processes, longer lifetime of equipment, and safer operation.



Tribocorrosion test wear track. The electrolyte corrodes the grains diferently depending on the cristalographical orientation

## From laboratory to industry

Tribocorrosion can be studied at lab scale with tribological equipments which can control not only the wear mechanisms, but also the chemical and electrochemical processes.

Experience gained from the late 80's when the first studies on tribocorrosion started has led to a better selection of materials for harsh environments.

Some examples of engineering systems where substantial improvement has been achieved during the last few years include the biomedical implants, offshore components, and chemo-mechanical polishing in the silicon industry.

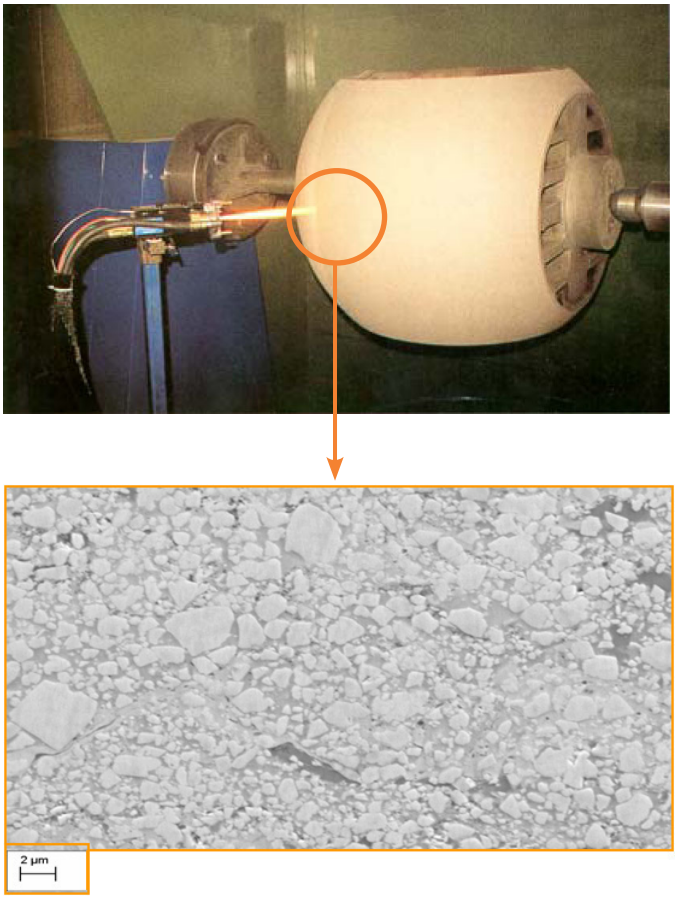
## Combating tribocorrosion

Detailed knowledge of the environment and the mechanical processes are needed before selecting the right material. Tribocorrosion can be minimized by selecting the right material for a given application or by selecting the right process parameters:

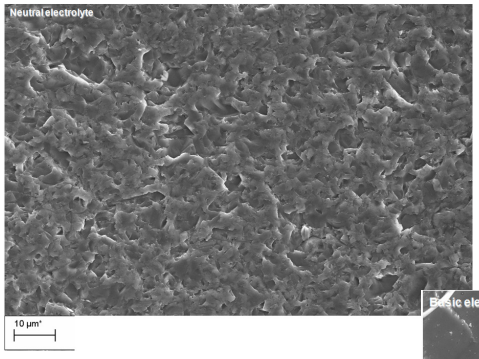
The pictures show a typical example of erosion-corrosion protection by applying a WC-CoCr coating onto the base material with a thermal spray gun.

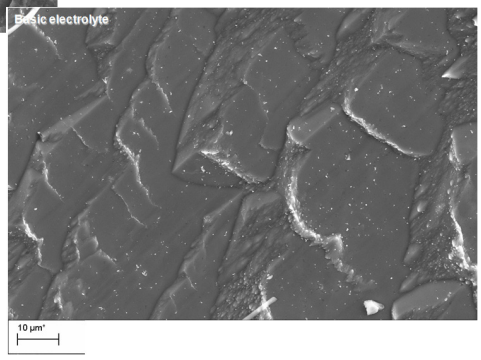
Another example is the effect of the corrosive electrolyte in a grinding process.

Oxidized and worn surfaces in erosion-corrosion samples




Erosion-corrosion protection by means of coating technologies, such as thermal spray.




An example that surface topography depends on the electrolyte involved in the wear process.

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