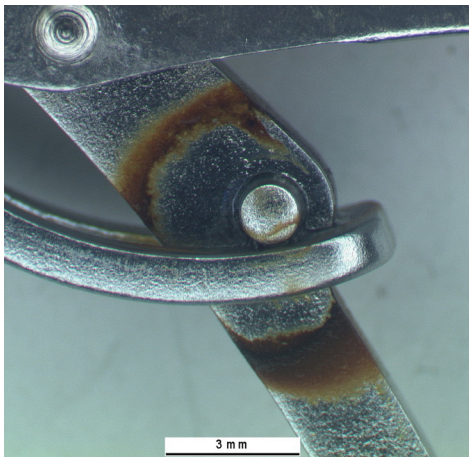


Corrosion and corrosion measurement

Corrosion (from the Latin *corrodere*, «gnaw away») generally designates the gradual destruction of a material by the influence of other materials from its environment. The economic damage caused by corrosion adds up to many billion francs per year. Several tons of steel corrode per minute all over the world. The pipelines in the chemical big industry, the drinking water installations, the automobiles and the ships, the electronic products but the medical ones as well have to be manufactured in such a way that they can be used for many years without corrosion.

The corrosion resistance of a product depends on many factors. The material used is one of the most important ones. In addition, the surface treatment by (electro-) polishing, passivating, coating or laser labelling has an influence as well. The geometry can provide holes and crevices that can become preferred areas of attack for local corrosion and favour the latter. An important factor is as well the environment itself, the milieu.

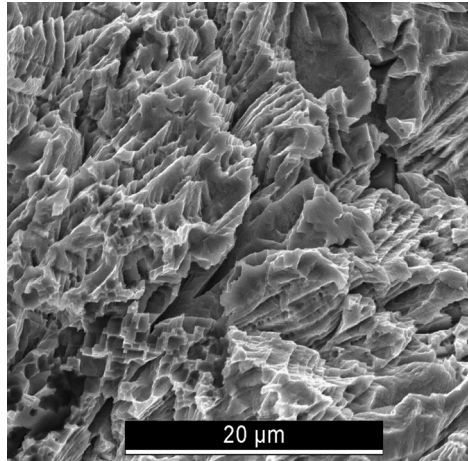


Crevice corrosion on an instrument

Corrosion measurement

The RMS Foundation carries out the measurements of the corrosion resistance of metals, mostly with the use of electrochemical methods. We use a device for the local measurement of the corrosion properties, the so-called

EC-pen, to characterise the parts to be investigated. The EC-pen permits an easy and rapid determination of the susceptibility to corrosion on real sur-



Corrosion on a fracture surface

faces, i.e. on those that have not been modified by a special specimen preparation.

In potentiodynamic tests, we apply a continually increasing electrical potential from the outside and measure the resulting current. In the process, the current density is the degree of the corrosion rate subject to the applied electric potential (voltage). The most frequent type of corrosion in «stainless» steels is the local corrosion (pitting or crevice corrosion), in which the protective passive film dissolves at closely limited sites. This produces holes in which very high corrosion rates emerge; the measured total current density rises suddenly and precipitously. The sooner the current density increases by several rates, the less resistant the investigated material will turn out.

Other than the electrochemical tests we perform as well simple immersion tests in aggressive media. In these experiments the real environment or even a stricter one is simulated for any length of time. The results of the corrosion tests are the basis for the resistance assessment of a component in the intended situation of use. This enables the corrosion experts to recognise the weak points in the choice of materials, in the machining (including surface treatment) or in the design of a component and to propose improvements.

Newsletter No. 3

Facility for corrosion measurements:

- EC-pen with Jaisle potentiostat; for local potentiodynamic corrosion measurements without limiting the surface properties (pen tip: A = 1.5 square mm)
- It is possible to carry out the measurements with the EC-pen at room temperature or by means of a tempering unit (climatic chamber), for example at body temperature (37°C). Solutions with different chloride concentrations are available as corrosion medium.



Tip of the EC-pen (white tip) for the local determination of the corrosion properties on a real surface (here a rough-blasted surface). The measuring surface is just of 1.5 square mm.

Please discuss with us! We will be happy to advice you. Or ask for our service catalogue. These and other information are also on our web-site.

The RMS has been certified according to ISO 9001:2008. Selected services have been accredited according to ISO 17025.