

Case Study

Quality assurance in watch manufacturing

Avoiding corrosion damage

The Problem

An expensive luxury watch doesn't rust! If this happens anyway, due to either defective materials or processing, then a serious loss of prestige and high costs – courtesy demands that the defective watch is not repaired, but replaced by a new one – are the consequences.

A watch made of stainless steels and precious metals is, in terms of materials technology, a complex product. The material couples involved; turned steels, wrought steels, brazes and solders, laser welds, seals, polymers and decorative coatings, result in a complex corrosion system. Traditional test methods applied in watch manufacturing, such as condensing humidity and salt spray tests, have the draw back that they are time consuming, not sufficiently selective and do not generate quantitative results.

Our Remit

Our task was to develop quick, reliable and powerful tests for assaying the base materials and finished components. Suitable testing equipment was to be designed and installed at the customer's testing facilities, and training was to be provided to the customer's technicians.

The Solution

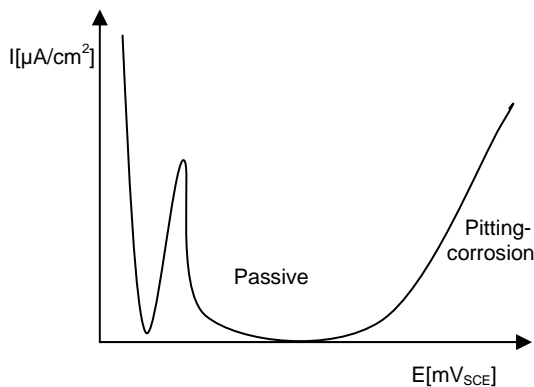
The entire production chain, including the suppliers, was studied, and the materials used were characterised with respect to their corrosion resistance. The corrosion test methods were optimised to allow materials in various processing conditions, e.g., wrought, heat treated etc., to be assayed.

Results

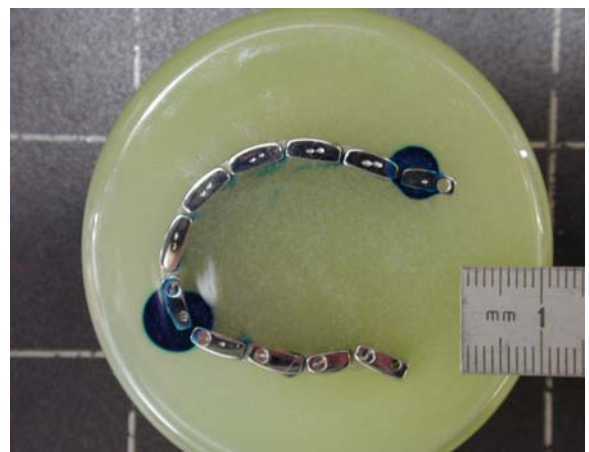
The polarisation curves developed, enable a quantitative assessment of the corrosion resistance of all the materials employed to be made. For testing entire components a test medium was developed which not only allows for the detection of corrosive weak spots, but also indicates areas of galvanic activity by causing a local colour change. Both techniques are quick and deliver conclusive results within minutes (up to a maximum of two hours). The colour indication method is even non-destructive, so watches and components can be used again after testing.

Customer Benefit

The customer is able to quickly identify materials and components with insufficient corrosion resistance and, if need be, to return these to the supplier. By systematically applying the new corrosion test procedures throughout the entire production process, the customer has been able to significantly improve his quality control process and thereby virtually eliminate unnecessary corrosion related charges and costs.



Typical polarisation curve for stainless steel in a physiological environment



Galvanic corrosion on a wrist strap. The blue zones indicate anodes (metal ions lost from a screw). The cathodes – gold and stainless steel – are marked by red patches.