GSB NEWS
3.11.2021

Dear members of the GSB,

today we will enter the field of the rest potential analysis.

Today's issue is intended as an introduction to the subject. Further contributions - including reports on the experiences of users - will follow.

We would like to wish you an enjoyable time of reading.

Your GSB Team

The Rest Potential Analysis

It is common for coating companies to wait a long time for corrosion test results. If quality deficiencies are found, it is possible that production has been going on for a very long time. For a test with a duration of 1000 hours, this would be about 6 weeks. High costs due to warranty claims can be the result.

With the rest potential analysis, the quality of a carried out pretreatment can be checked within a few hours.

A GSB working group of pioneer users meets regularly to exchange information on practical applicability and experience in day-to-day business. The aim is to further develop the process in this way and to draw up guidelines for its use in day-to-day business.

Today we would like to take a closer look at the procedure and are pleased to have a guest contribution from our cooperation partner Mr. Peter Schrems from the IPS Elektroniklabor GmbH & Co. KG.

Quick Overview on RPA - Peter Schrems

Introduction

In cooperation with the GSB International a complete measuring system for rest potential

analysis was developed by iLF Magdeburg gGmbH and IPS Elektroniklabor GmbH & Co. KG. While the RPAiLF method was developed by iLF gGmbH and a first pilot system was installed at some test customers, IPS Elektroniklabor GmbH & Co. KG developed a complete system suitable for industrial use with the corresponding hardware and software. Special emphasis was placed on the functionality of the measuring system even under adverse conditions. The electrochemical method of open curcuit analysis (RPAiLF) is used for testing, evaluating and monitoring Cr-free pretreatment layers on aluminium alloys.

Complete RPA test set
RPA-measurement device; Measurement cells; Electrodes; Faraday cage; Dispensing peristaltic pump; PC incl. software

The complete measuring system makes it possible, primarily in the (aluminium) coating industry, to obtain important process quality parameters within a short time, so that it serves a quasi inline control with reduced waiting times.

Measurement method

First, three pre-treated aluminum sheets or profiles are inserted sideways into a measuring cell. Then the electrolyte (5% Na2B4O7, pH 7) is filled into the measuring cells. In addition, there is a reference electrode (Ag/AgCl), which is immersed in the electrolyte and fixed via the stand. The sheet metal (as working electrode) and the reference electrode are electrically connected to the high impedance potential measuring device via cablesso that the free corrosion potential can be measured.

For each measuring cell, a tube of the peristaltic pump is positioned next to the reference electrode so that the corrosion stimulator is thus transferred to the electrolyte. The fourth tube of the pump leads to a measuring vessel to additionally control the amount of the dripped corrosion stimulator. The measurement is started, recorded and evaluated via the PC with the dedicated software. First, the measurement is carried out for 60 minutes without adding the corrosion stimulator. During this time the potential stabilizes and it should tend to more positive values indicating an increasing passivity of the surface. After 60 minutes, corrosive loading begins by adding a corrosion stimulator to the electrolyte. This is done until the rest potential drops abruptly. After this, the measurement can be finished and evaluated.

Evaluation Criteria

After the measurement, the evaluation can be carried out with the help of the software. The critical chloride quantity (c-kr value) at the time of the potential drop is calculated.
The c-kr value indicates the resistance of the pre-treated Al material to a corrosive load under defined boundary conditions. It is used as a reference for process control during pre-treatment.

Ms. Schleicher is looking forward to answering your questions about the rest potential analysis:
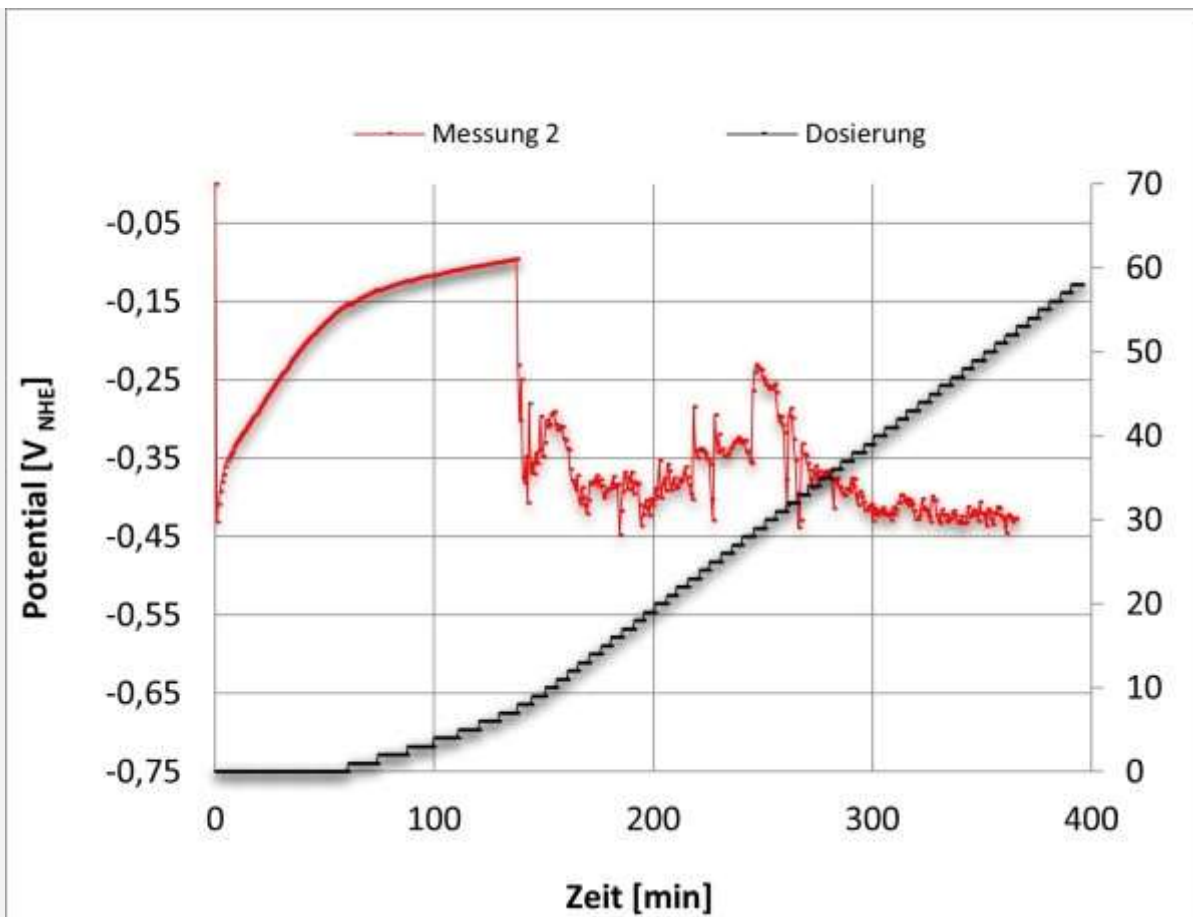
katrin.schleicher@gsb-international.de

Experimental setup for RPA with 3 measuring station
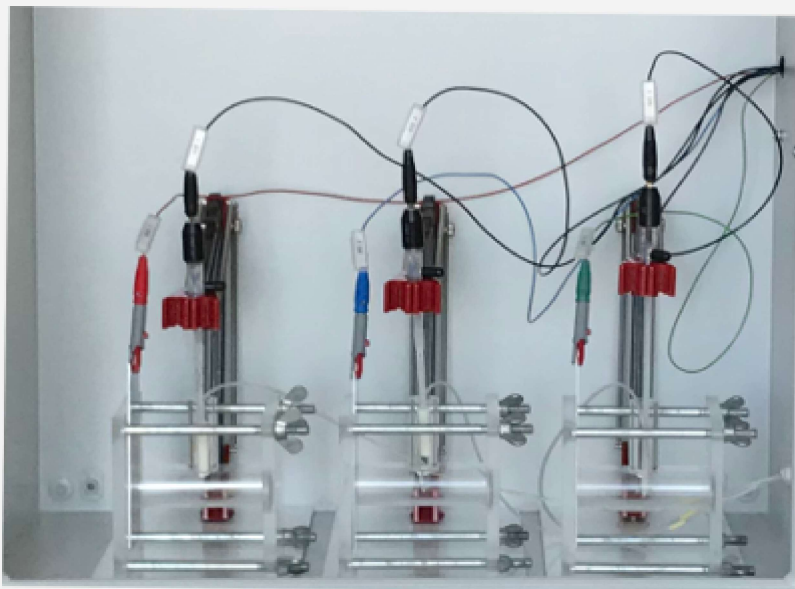
View on right side of Faraday cage
with computer and dispensimg peristaltic pump

Example of a potential-time curve for a pretreated aluminum sheet

*Image source diagram: iLF Magdeburg GmbH

Editorial Office

We are looking forward to your topic suggestions, questions and comments regarding the GSB-NEWS!

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