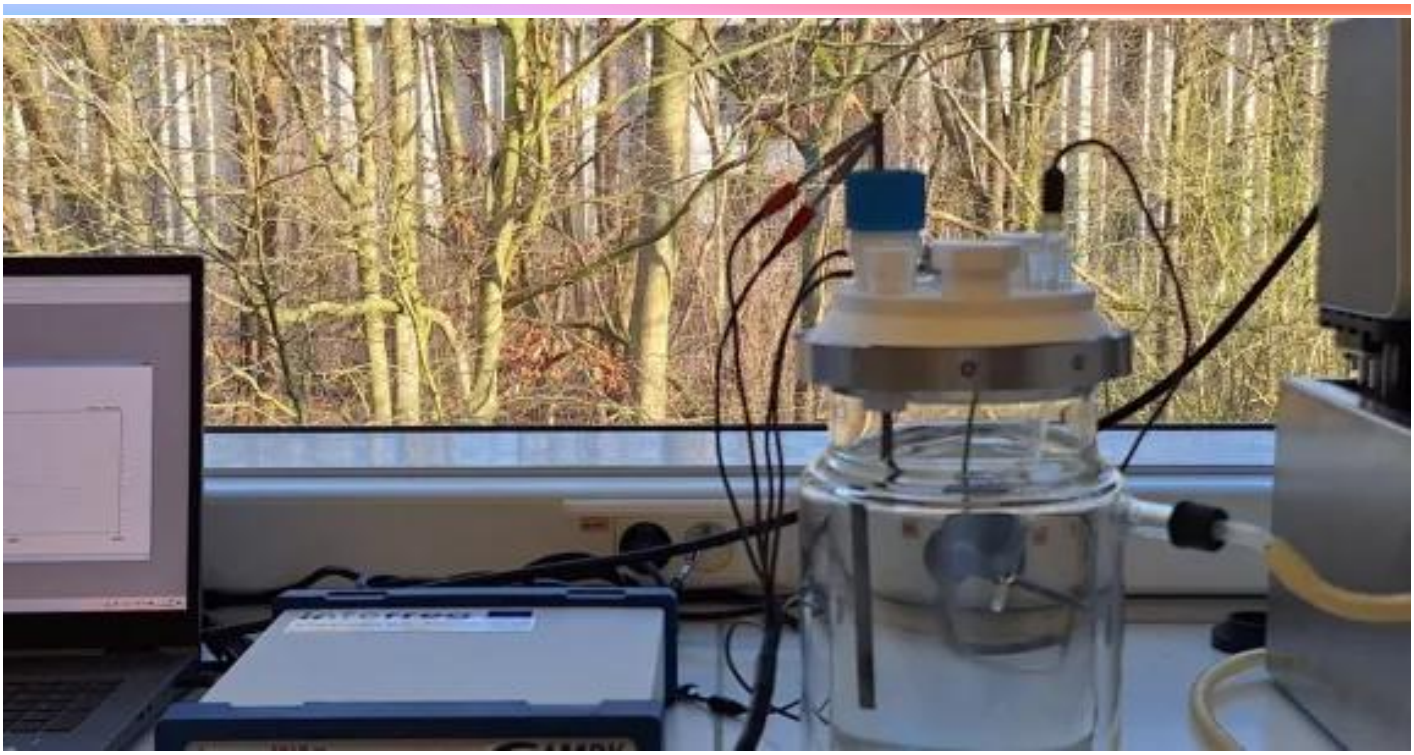


Corrosion testing in additive manufacturing

13 April 2026, 08:17

Jérika Lamas

Unlocking the true potential of additive manufacturing? Don’t forget corrosion testing!

Additive Manufacturing (AM), especially Laser Powder Bed Fusion (LPBF), is transforming the way we design and produce components. Its ability to create complex shapes and near-net-shape parts has made it very popular in industries such as tooling, aerospace, and automotive. Many companies want to use AM, but few fully understand the challenges it introduces. More specifically, they often fail to understand the risk involved with the materials’ corrosion behaviour.

Even advanced alloys like the Co-free maraging steel M789, designed for high strength and better corrosion resistance, can be affected by surface defects inherent to LPBF. Unmelted powder particles, high roughness, and micro-notches at melt-pool boundaries can create weak spots where corrosion can start. This makes the performance of AM parts highly dependent on surface condition and post-processing, not just the alloy itself.



Corrosion on 3D-printed materials with different surface finishes after electrochemical testing.

Electromechanical testing helps quantify corrosion performance

This is where electrochemical testing plays a crucial role. Tests such as open circuit potential (OCP), linear polarization resistance (LPR), and cyclic polarization allow engineers to measure corrosion behavior, detect vulnerabilities, and understand how post-processing treatments like polishing, heat treatment or surface modification, affect durability.

Using these tests, industries can:

- Identify critical defects from the AM process
- Optimize post-processing to improve surface quality
- Compare new AM alloys with traditional materials
- Predict both short-term and long-term corrosion performance

Ignoring corrosion testing can lead to unexpected failures, particularly in complex geometries where surface finishing is difficult, or in aggressive environments. By integrating electrochemical testing into the development process, companies can reduce risks and improve the reliability of AM-produced components.

In conclusion, while AM is a promising and popular technology, its full potential is only realized when the corrosion performance of materials is carefully evaluated. Electrochemical testing provides the insight needed to make informed decisions and ensure that AM components perform safely and reliably in real-world applications.

This work was developed in collaboration with the Department of Mechanical Engineering at KU Leuven, Flanders Make, Sirris, and RENA Technologies Austria GmbH, and will be presented at the 8th CIRP Conference on Surface Integrity in Yokohama.

Care to find out more and get started on corrosion testing?

You want to understand how your products or materials behave in challenging environments? You are considering additive manufacturing for your tooling and components? We will gladly help you along.

Our electrochemical testing services can help you identify risks, optimize materials, and ensure long-term performance. Contact us to evaluate see whether your product is fit to avoid corrosion and to discuss how our testing can help improve its durability.

Contact us

*For any other question or inquiry, feel free to **drop a note**.*

Authors



Jérika Lamas