Supplementary Material

# Supplementary Data

The here presented potentiodynamic voltammetry (PD) measurements were performed on the untreated and PEO-coated surfaces of the AM-printed AlSi10Mg-surfaces. Measurements were performed at the initial surfaces as well as on the long-term immersed at room temperature and at increased temperature of 80°C. The potential is given against the Ag/Ag-Cl reference electrode.

# Supplementary Figures – PD measurements

Supplementary Figure 1 shows the results of the PD measurements. Here, the untreated AM surfaces are compared to the PEO treated ones. Using the Tafel plots, the corrosion density icorr is calculated for every slope.

The measurements indicate that the corrosion potential is shifting towards negative values for increased temperatures for the native AM-surfaces. A clear break-down potential can be detected for the unprotected surfaces in all the cases. The PEO process leads to decreased corrosion densities in all cases. Furthermore, the breakdown-potential can be depressed.

The most stable behavior is shown by the PEO surfaces on the xz-as-built and polished surfaces. The heat treatment -SR – leads to some increased current density values accompanied by corrosion potential shifting at increased temperatures.

PEO on the xy-printing direction exhibits the most unstable behavior of the PEO surfaces, leading to the consumption, that the PEO process might be adapted to the printing directions and the different resulting microstructures.

## Supplementary Figures

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**Supplementary Figure 1. a)- f) PD measurement results of native and PEO-coated surfaces in comparison; g) -h) resulting corrosion density (icorr) values of the Tafel plots**