# PO0628 – Comparison of oxide layers manufactured by Plasma Electrolytic Oxidation on the AlSi10Mg alloy manufactured by casting and 3d printing (#261)

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## Introduction

Additive manufacturing, widely called 3d printing, allows to create new quality of metal products. A microstructure of 3d printed AlSi10Mg alloy can be described as an eutectic area surrounded by Si-network. Eutectic, fine-grain microstructure improves durability of material in comparison to cast, dendritic aluminium alloys. The presence of Si particles is challenging for electrochemical surface treatments, for instance to anodizing. In this study, Plasma Electrolytic Oxidation (PEO) – the most environmentally-friendly kind of anodizing – was performed on the cast AlSi10Mg and on the 3d printed AlSi10Mg specimens.

## Methods

Lased Powder Bed Fusion Process, Plasma Electrolytic Oxidation (PEO), metallographic microscopy, Scanning Electron Microscopy, surface roughness test

## Results

Thin, porous, conversion oxide coatings with a thickness less than 10 μm were obtained. Based on metallographic and SEM analysis it was found that the composition of oxide-layers is more mixed in 3d printed AlSi10Mg case. There are more Si-oxides-rich zones, which are smaller than in layer on a cast substrate. Moreover, oxide film produced on 3d printed specimens has higher roughness parameters.

## Conclusion

Obtained oxide coatings are too thin to have significant impact on mechanical properties. However, differences between films produced on cast and printed alloy are noticeable. Higher current – voltage parameters, which are characteristic for Plasma Electrolytic Oxidation process, lead to the easier formation of silicon oxides.

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