

## SURFACE FINISH

One of the biggest advantages of Metal AM is the ability to produce complex internal structures, cavities and freeform geometries. Surface finish and tolerances of as-print parts often don't meet the criteria of technical applications. Therefore, additional processes are necessary. The conventional processing of such surfaces and structures can only be realized with very great effort, if at all. This is true for all metal AM processes. For this reason, the need of surface finish, support and powder particle removal is necessary for every component. Right now, the ability of surface finish often limits the AM-design because surface have to be attainable for conventional processes.

### PROJECT OVERVIEW

#### DURATION



2020: 3 month

#### PARTNER



- John Deere GmbH & Co. KG
- Walther Trowal GmbH & Co.KG
- Heraeus Holding GmbH
- Siemens AG

#### FUNDED BY



Industrial Consortium of DMRC

#### RESEACHER



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#### Introduction

The surfaces of additive components are not as smooth as for conventional machined parts due to the manufacturing process. Therefore, AM manufactured components require a surface post treatment. Due to the complex geometries of AM components with undercut and difficult to reach areas, conventional machining like drilling or milling are not suitable as overall surface treatments. Even sand blasting often does not meet the requirements. In cooperation with Walther Trowal the vibratory finishing technique was investigated as a surface treatment for additive manufactured components. This offers attractive possibilities for improving the surface.

#### Objectives

In the end, surface finish is necessary for nearly every application (e.g. adherent particle removal for hydraulic applications, optical purposes, etc.). Due to this limitations of surface finishing, more studies and investigations are necessary in the field of metal surface finish.

On this account a study about effect of different surface finish technologies of metal AM parts for internal structures and freeform geometries (e.g. mechanical, electro-chemical, etc.) is conducted. The aim is to apply different surface finish processes and measure the roughness values after the treatments. Moreover, an evaluation of the ability of removing adherent particles and a valuation of the material deduction will be applied.

#### Workpackages

This project is divided into three major workpackages. The first workpackage addresses the development of a suitable demonstrator to evaluate the performance of the different treatments regarding outer surfaces, edges, corners and surface roughnesses. In the second major workpackage the three treatments are applied and the demonstrator geometry is surface finished. As postprocessing processes, a vibratory finish on a Walther Trowal machine, a dry electro polishing on a DLyte system and classic sandblasting is conducted. The third workpackage includes the

surface measurements on the different areas and the comparison of the technologies. On the one hand the surface treatment is evaluated, on the other hand the economic suitability of the technologies.

#### Expectations

Surface finishing is very important for additive manufacturing and of great interest to industry. For this reason, we expect exciting results from this project (project start May 2020) with regard to an effective and economical finishing of additive manufactured components.

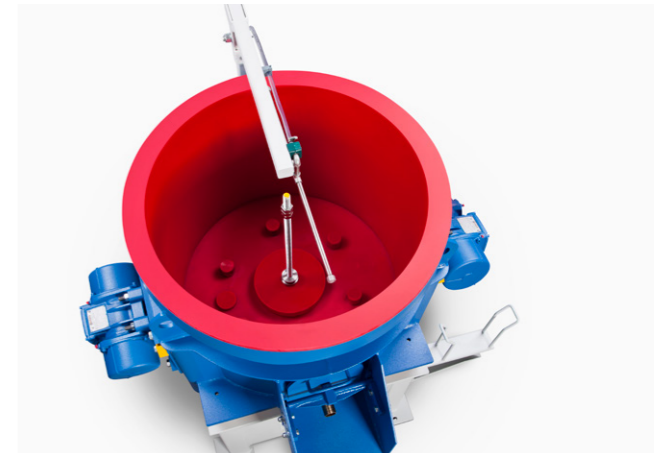


FIGURE 1 Equipment used in this project – Walther Trowal AM2

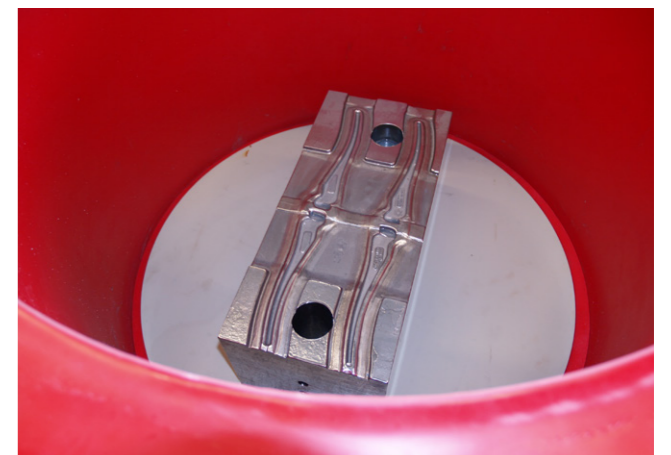


FIGURE 2 Fixation of a component in the vibro polishing system



FIGURE 3 Finished part