Bachelor thesis (BT) on Additive Manufacturing (AM) processes

First suggestion for synopsis of BT – 3.10.2016

1) Introduction

Scope of bachelor thesis, goals and intentions

Importance of AM today and possible future development

General research on AM technologies and related topics

Practical part of BT

2) Generally about AM

What is AM in general, term AM / 3D printing / rapid prototyping / …

Brief history of AM development, countries of importance regarding AM history

Basic categorization of AM technologies

Materials used in general - State (powder/liquid/molten/sheet), Type (polymer, metal, ceramics, composites), recycling possibility,…

Comparison with conventional product manufacturing – CNC

Fields of applications – aviation / car / electrical industry, medical applications, food printing,…

3) What precedes product manufacturing

How to obtain data – CAD model / laser scanning / CT, MRI / microsoft kinect /others…

Handling of data - pc formats STL / AMF, Slicing data to layers, related issues, …

Taking into account way of product manufacturing – differences in part design for AM / CNC etc…

General simplified AM process chain

4) Technologies – Vat Polymerization

Powder bed fusion

Material Extrusion

Material jetting

Binder jetting

Sheet lamination

Directed energy deposition processes

Comparison in following areas:

Basic operation principles, mechanics, kinematics, build platform,…

Materials used and their limitations, basic chemical reactions / ongoing processes, types of handling and processing,…

Processes requirements, required equipment

Parts made – mech. properties, accuracy, build speed, curling and warpage problematics, post-processing,…

Main advantages / disadvantages

5) Practical part of Bachelor Thesis –open to suggestions

Design of new Material extrusion printer – CAD model

Suggestions for some improvements in material extrusion processes (nozzle clogging, flow of molten plastics, heat transfer and distribution problematics)

Programming in python - simulation of heat transfer in some of the processes, like PBF

Possibility of recycling unused materials and its problematics (VP fluid, PBF powder, Material extrusion re-melting parts,…)

Other possibilities

6) Summary

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