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DER MEDIEN

IT NUMBER		MODULE	SCOPE	EXAMINATION
PL: 181332	**3D-Printing/Add. Manufacturing**	**4**	**5**	**PL: PA**
PV: 181333				**PV: LÜ**
181332a	3D-Printing/Additive Manufacturing	2	3	
181332b	Computer Aided Design	2	2	PV

3D printing technology represents a revolution in the way to work materials throughout history. Apart from some previous experience, 3D printing began in 1984, when Chuck Hull patented his system in the United States, with the name of stereolitography. Although there have been 30 years ago there since, the 3D printing technology has spread widely in the last five years for various reasons:

- the availability of new materials with higher functionality and performance;
- the expiration of patents protecting some additive manufacturing technologies, enabling market entry of universities and small companies manufacturing and marketing economically very af fordable personal printers;
- the task of marketing being made by leading companies globally;
- the unexpected applications that have enabled these manufacturing technologies and distribution has enabled Internet.

LEARNING OUTCOME

- be able to list and describe the operational principles of all relevant AM processes;
- appreciate the influence of product position on the quality of the final AM product;
- understand the effects of different orientations on product quality;
- be able to select the best combination of position and orientation for a given product;
- describe the applications of each process and their advantages for those processes;
- describe the disadvantages of each process for its applications;
- basic understanding of the various technologies used to finish (post-process) AM products;
- knowledge of operational procedures required for finishing techniques;
- explain benefits /improvements made to AM products by finishing operations;
- describe quality control methods used to check the effectiveness of these finishing techniques;
- knowledge of all safe working practices & procedures;
- understand consequences of failing to adopt safe working practices & procedures;
- know how to improve safe working practices & procedures if they are found to be sub-optimal;

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The general objectives for this course are following summarized:

1) Knowledge: Factual and theoretical knowledge in broadcontexts within a field of work or study.
2) Skill: Arange of cognitive and practical skills required togenerate solutions to specific problems in a field of workor study.
3) Competences: Exercise self-management within the guidelines of work or study contexts that are usually predictable, but are subject to change supervise the routine work of others, taking some responsibility for the evaluation and improvement of work or study activities.

The course is divided into four blocks:

Block 1: Additive manufacturing technologies and printers.
Block 2: Material properties
Block 3: CAD/CAM design, software packages and 3D scanning
Block 4: Basic maintenance

Contents

1) Application of safe working practices and procedures;
2) Understand the different types of Additive Manufacture processes available as well as their advantages and disadvantages;
3) Understand the different materials, and their properties, used to produce components by the AM process;
4) Understand how problems and defects can occur in components produced by AM processes as well as the preventative measures;
5) Understand the finishing techniques (e.g. Machining, HIP, Coating, Heat Treatment) used for the various AM techniques;
6) Possess CAD Design skills relative to manufacturing/product design;
7) Understand how position and orientation affects the build's properties.

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Working knowledge of CAD system(s) used for AM products ability to apply CAD systems effectively to AM products:

Pre-production phase

- know what data, documentation and specifications are requited of each component;
- know where to find relevant data, documentation and specifications if any are missing or incomplete;
- know where build files are stored and how to download them;
- understand how to check that the build file relates to the correct component;
- know where build files are stored and how to download them;
- understand how to check that the build file relates to the correct component;
- basic understanding of engineering drawing principles;
- ability to convert readily between imperial & metric systems of measurement;
- know basic principles of engineering metrology & tolerancing- familiarity with specifications & nomenclature relating data files to specific components;
- know how to "dry run" software to check that he build & data files are correct;
- knowledge of the materials and quantities required for each process/product;
- understand the handling & storage requirements for each material;
- familiarity with documentation and how it should be checked/completed.

Set-up phase

- understand which files are appropriate for a given application;
- know how to import appropriate files.

Production phase (PP)

- be familiar with documentation for component & customer records, particular prepares them for a future in product development and research.