**COURSE 12: ADDITIVE MANUFACTURING FOR INDUSTRY 4.0**

Team: …………………………………………………………………………………………………………………………………………………

Student’s name: …………………………………………………………………………………………………………………………………

**Workshop 7 – Worksheet 7.1**

**Objectives of workshop:**

Design and develop a complex product which is suitable for 3D printing.

**Requirements:**

* You should team up with three more colleagues and select a complex product with a minimum of 10 components.
* Each selected product must address two sub-assembles: hardware (mechanical & electrical) and software.
* Make a portfolio based on the structure below
* Develop a pitch presentation and demonstrate the functionality of your product.

**Structure:**

1. State of the art in product design and development of .... (name of your product)
2. Product description of .... (name of your product)

* Function of the assembly
* Objective of the assembly
* Main components description (Bill of Materials)
  + For each component you should mention: manufacturing technology (AM/ stamping, injection noulding/ CNC machined) or if it is purchased
  + Characteristics of the manufacturing technology, materials, equipment used etc.
  + Characteristics of the purchased part and web link.
* Working hypothesis of the assembly (Stress scenario, environment conditions which might influence the development process, any other process and product restrictions or special requirements)
* Calculus
* etc.

1. Computer Aided Design of components and Assembly procedures

* *Description of all design stages for all individual parts of the assembly*
* *Description of all assembly conditions*
* *Description of Motion studies*
* *Description of FEA studies*
* *Description of Topologycal optimisation studies*
* *etc.*

*Note: Make sure you cover the description for all redesigns of the parts and all concepts of your product.*

1. Additive manufacturing of .... (name of your product)

* *AM principles which were used in the design of the parts*
* *Description of each part function in accordance with the general function of the assembly*
* *Description of optimisation process for 3D printing parameters in Cura or ZSuite for all individual parts of the assembly (including the redesigned parts)*
* *Justification for each 3D printing parameter chosen in accordance with the part function and the assembly function*

*Note: Make sure you cover the 3D printing parameter description for all redesigns of the parts and all concepts of your product.*

1. Conclusions and future development
2. Annexes
3. Annex 1 – CAD Models for part 1, 2, ...n (names of your components)
4. Annex 2 – Assembly CAD file for product ...... (name of your product)
5. Annex 3 – \*.STL files for part 1, 2, ....n (names of your components)
6. Annex 4 – \*.gcode/ \*.zcode/ \*.zcodex files for part 1, 2, ....n (names of your components)
7. Annex 5 – \*.3mf (Cura) / \*.zprojx (Zsuite) files for part 1, 2, ....n (names of your components)

*Notes:*

1. *One \*.3mf (Cura) / \*.zprojx (Zsuite) file can contain several \*.stl files, according to the optimum build layout that you set.*

*The annexes folders will be uploaded on the Moodle platform together with the word document of the project.*