INTRODUCTION TO ADDITIVE MANUFACTURING

Problem Sheet 1

St Mary's University Twickenham London

SECTION A

Introduction to Additive Manufacturing

1. General aspects of additive manufacturing

(a) Define the terms additive and subtractive manufacturing, citing examples of both.

(b) Give an application to which additive manufacturing is well-suited and stating your reasons why.

(c) What are the implications of additive manufacturing for commercial manufacturing and industry?

2. Design and commercial implications of additive manufacturing

(a) Are you able to sell printed items from a design sharing website, such as Thingiverse, on Ebay? Why not?

(b) You run a successful toy company that has for many years produced small superhero figurines which are well-liked by a community of fans. You see the rise of 3D printing as a threat to your business as now many people can afford to scan and reproduce your figures (without buying them from your company!). How would you protect your business from this loss of revenue? What would you do to engage with this new market of fans with 3D printers?

(c) As a hobbyist-designer, you would like the community to be free to use your design and all of its derivatives, attributing you appropriately, and for non-commercial use only. Which type of copyright license would you choose?

SECTION B

The Generalised AM Process

1. Describe the steps involves in producing a printed item.

2. What types of information do STL and g-code files hold?

3. Explain why the ratio of the number of faces to the number of edges in a STL file is 1.5, if the mesh is watertight.

4. Annotate each line of the following g-code with the corresponding action by an fused filament fabrication printer. At what stage of printing do you think that this code will be executed. You may use a g-code "cheatsheet".

```
G28 X0 Y0
G1 Z150 F300
M104 S0
M140 S0
M84
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