

Ko-15.4126 Production Technology Special Topics (2014): 3D-Printing

Questions for exam

April 10, 2014

1. What are those features of a part that can be produced particularly well using Additive Manufacturing technologies as compared to traditional manufacturing technologies?
2. Give the list of the ASTM approved Additive Manufacturing processes and describe one example of each process.
3. (a) Calculate the total cost per part for the case where 25 parts are made in one build using material extrusion process. The height of the parts 5 cm and layer thicknesses are 0,2 mm. Assume average layer cross section to be 2 cm², extrusion line width to be 0,7 mm and extrusion speed to be 6 cm/s. The wait between extrusion stopping and starting in a new layer is 3 s. Assume preparation time and warm-up time to be 15 min together and cool-down and part removal time to be 10 min together. Weight of each part is about 10 g and material cost is 100 €/kg. Material extrusion equipment cost is 120000 and it is amortized in 6 years. Expected usage is 4000 h in a year. (b) Calculate breakeven quantity between additive manufacturing and injection molding if the injection molding tool is assumed to cost 5 k€ and the production cost for each part is 0,1 € in injection molding.