

ME 4171 – Environmentally Conscious Design & Manufacturing (Bras)

Assignment – Stereolithography Rapid Prototyping Process

The Rapid Prototyping and Manufacturing Institute (RPMI) is housed in the Manufacturing Research Center (Room 320, phone 404-894-9158). Its goal is to meet the needs for education and demonstration of rapid prototyping and manufacturing. Used in the design of such areas as mechanical parts, packaging, and prostheses, rapid prototyping technology impacts design, engineering, manufacturing, packaging, and marketing. Rapid Prototyping is often associated with additive, layer-based fabrication processes such as stereolithography and selective laser sintering. It also includes many other prototyping technologies and conventional processes, including CNC machining, and a host of computer-based design, engineering, and analysis tools.

In this assignment, your task is to look at the stereolithography (SLA) process for fabricating rapid prototyping parts and perform pollution prevention. It is a nasty process from an environmental health and safety perspective because it involves a number of chemicals. Start your investigation from the point of adding resin to the SLA machine and finish with the final part clean-up and delivery to the customer.

The folks at RPMI (Reggie Ponder, Giorgos Hatzilias, and Dr. David Rosen) are sincerely interested in knowing what is going on in the SLA process and how to make it "cleaner". They know you are coming so go visit the RPMI and assume that you are a pollution prevention consultant for them.

As a deliverable for this assignment, write a small report in which you document the following tasks:

- a) Draw a process diagram for the stages in fabricating a rapid prototype part.
- b) Create a mass balance for each of the stages. Be as quantitative as possible and clearly list your assumptions
- c) Identify pollutants, their (potential) effects, and (if possible) applicable legislation.
- d) Identify, discuss, and recommend options for pollution prevention in a systematic way. Look at technical as well as economical feasibility.

If you have any questions, doubts, or you need some suggestions, *please see or call me!* Don't wait until the last moment.