The Quiz: FAC135 3D Printing

Your Name Here:

Read the chapter and study the two powerpoint presentations which are posted in the lms with this assignment. Use the information in them (as well as any resources you wish to access on the internet) to address the following cases:

For each of the following, list the specific 3D printing process and the specific material or materials you would use to create a solution. Justify your answers in terms of appropriate materials, costs, and process qualities.

Case Problem 1:

Your extremely wealthy (and notoriously stingy) great aunt Edna Mae Grundling wants to have her hip and knee joints replaced. The more money she can save on the procedures, the more money she can leave to you in her will.

You have determined that you could save her a lot of money by 3D printing the necessary parts for the surgeon to implant. (One of her sons is a veterinary surgeon and is willing to do the operation in the middle of the night when no one is looking if you can provide accurately created artificial joints.)

Describe how you would get the dimensions you need to model the parts and what printing process(es) and material(s) you would use to create them.

To get the dimensions needed for the hip replacement Edna will have to get a CT scan. From the files of the scan we can use a program called OsiriX to convert the cat scan files into an STL.

I think the best way to print this would be to use Directed Energy Deposition, with this 3D printing method we can print with almost any weldable metal as well as ceramics! Coincidentally it takes titanium and ceramic.

Case Problem 2:

You want to be a sunglasses designer for hip people who want to be the first to try anything.

You have access to pre-manufactured sunglass lenses and you figure you can design frames to fit them.

Your customers are willing to pay a premium for uniqueness but they do demand high quality.

What 3D printing process(es), and material(s) would be best?

For this I would use photopolymerization because resin prints through this method are very high detail.

Or I would use regular 3D printing but exclusively use wood + PLA filament. I’d sand and finish my prints so the hipsters think it’s fancy wood

Case Problem 3:

Your great uncle Edwin Max Grundling owns a foundry specializing in sand-casting bronze muffler bearing frisnet collars for the Formula 1 collecter car market.

Uncle Ed wants to try a low production run of a new design without having to invest in a permanent mold pattern. You tell him you could print the sand molds without needing to use a pattern. He asks you how on earth you can do that. What’s your answer?

(You’ll need to learn about metal casting processes, specifically sand casting, to answer this question!)

For this print we would want to use metal, wood or a specific plastic. Luckily that specific plastic is something we can print! We want to use polystyrene filament! Usually this is used for supports for ABS prints, but Wikipedia said we can use it for sand casting patterns so we will.

Case Problem 4:

Uncle Ed and Aunt Edna have a fiftieth wedding anniversary coming up.

Counting themselves, their children, their childrens’ spouses, and their grandchildren, there are 32 members of the family –enough to make a complete chess set. They want each chess piece to be a miniature sculpture of a family member.

Explain how you would create the 3d models and then choose (and justify your choices) 2 (two) different 3d printing processes (and appropriate materials for each process) that would work for this project.

To get the models we can actually use our phone camera, either take a bunch of photos of each person from a lot of angles, or use an application that lets us record as we walk a circle around them and turn that into a model.

For the material I was thinking wood PLA because it would feel fancy and like a traditional chess set.

For the second printing method I would go for Photopolymerization again because of the high detail.

Case Problem 5.

Your collectible 1976 Toyota Corolla 2 door sedan is missing a window regulator handle. You have one you can copy, so you are going to 3d print it.

The window regulator is composed of three parts: the crank which fits over the grooved thingee that comes out of the door, a spinning knob that goes on the other end of the crank, and a rubbery ring that goes on the outside of the knob.

What process(es) and material(s) would you use to create and print the replacement part? It needs to look good for the *Concours d’Elegance*!

I want to do almost this exact thing with my 1985 rx-7!

I want to use Photopolymer Resin printing specifically with heat resistant resin so it doesn’t melt inside the car on hot summer days. My car ->