

The logo is a circular emblem with an orange background. It features the word "TAMPA" at the top and "HACKERSPACE" at the bottom, both in white, uppercase, sans-serif font. In the center, there are white line-art icons of a pencil and a pair of pliers, crossed at their handles.

3D Printing Concepts

A Brief Introduction

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3D Printing Concepts

- FDM
- SLS
- SLA



FDM - Fused Deposition Modeling

- Trademarked by Stratasys Inc
- Fused Filament Fabrication (FFF)
- Layers of material laid down by extruder



FDM

- Common
- Uses heated thermoplastics
- Limits on overhangs



SLS - Selective Laser Sintering

- Laser is used to fuse layers of powdered material
- Flexible materials (plastic, metal, glass, ceramic, sugar...)
- Material is expensive
- No overhang limitations



SLA - Stereolithography

- Ultraviolet curable liquid resin
- Laser draws pattern in resin
- No overhang limitations
- Can be massive
- Expensive (\$80-\$120 a liter)
 - Form I may change this



Design Concerns

- Depends on tech used
- Print time
- Loading
- End use
- Tolerances
- Material properties



FDM Concerns

- Overhang (no > 45 degrees)
- Not adhering to build plate
- Infill



Print Time

- Bigger model = Longer print
- More complicated = longer print
- Lines are fast
- Complex curves are not



Print Time

- Print head has inertia
- Small lines increase print time



Loading of Part

- Material properties come into play
- Avoid load along the axis normal to the build plate
- Extra strength?
 - Casting
 - Wrapping in fiberglass or carbon fiber



End Use of Part

- Material properties come into play
- ABS is NOT food safe
- May be watertight
- Finish
- Warping



Tolerances

- Manufacturing defects
- Compounding error
- Snap fits may take trial and error
- Hole diameters
- Extruder size



Material Properties

- ABS
- PLA
- Nylon



ABS

- Think LEGO bricks
- Strong
- Colors print similarly
- \$30-\$50 per kilogram
- Wicks moisture
- NOT Food-Safe
- Hot plastic smell



PLA

- Less warping than ABS
- Cooler temps
- Extruder temp based on color
- More transparent
- Wicks moisture
- Sweeter smell



Nylon

- Haven't tried
- Hotter extruder
- Expensive
- Hard to source
- Toxic?
- Wicks moisture



So Which is Best?

- ABS preferred by engineers
- PLA for display
- Nylon - unknown



General Concerns

- FDM machines get hot
- Ventilation is important
- Prints fail, tweak and try again
- Noise
- Prints take time



General Concerns

- Level print bed is important
- Proper temperatures
- Age of filament



Advice

- Simple parts
- Secondary operations
- Rapid PROTOTYPING
- Keep Calm and Print On



Questions?

