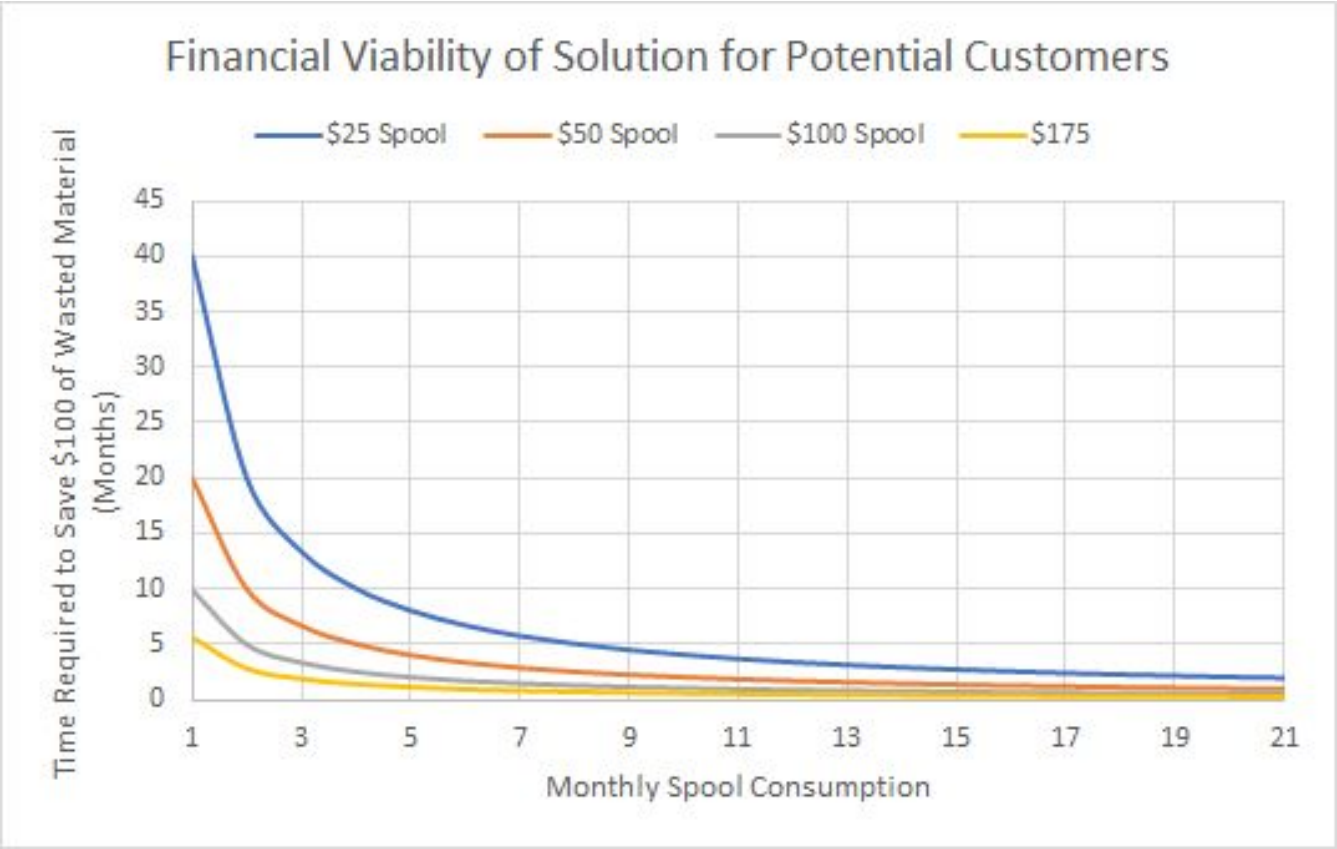
Week 8 Formal Meeting

Social Analysis of Solution

- Recycled plastic now costs consumers an extra $72/tonne (2019)
  - 3D printing expected to produce 110,000 tonnes of plastic/year by 2020
  - Recycling is not always the economic solution due to overwhelming demand for recycled plastic for consumers
- Our solution takes away a large part of recycling due to defective parts
- Our solution would save society around 1100 tonnes of plastic/year
  - (10% of market, 10% of prints wasted)
  - Equivalent to 7500L of crude oil
- Significant impact on the environment should it be able to scale up to the whole market
  - Energy Consumption
  - Pollution
  - Resource Allocation
  - Cost of recycling

Economic Analysis of Solution



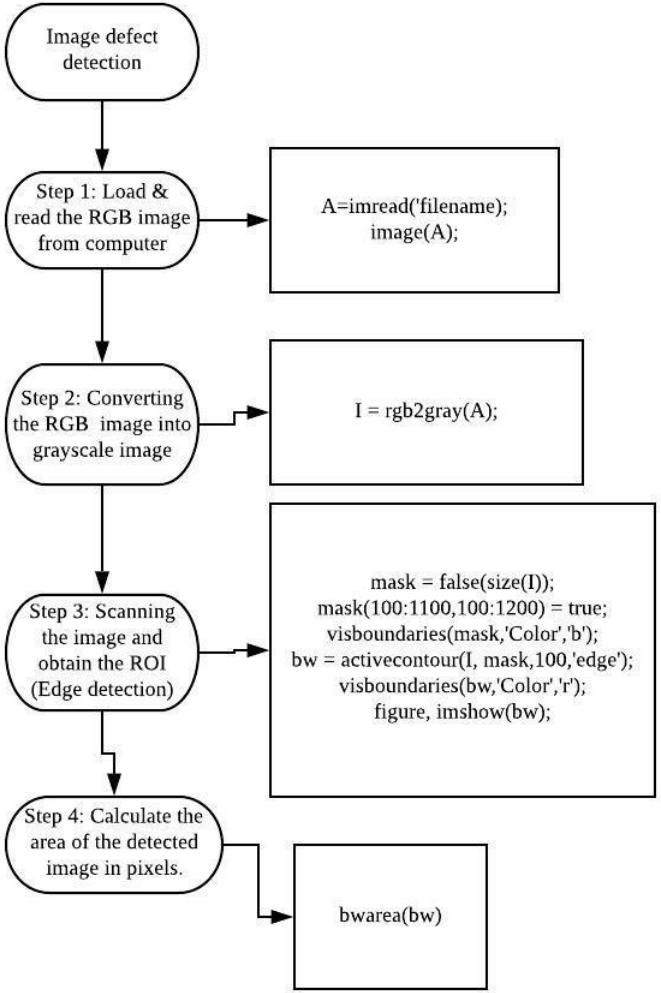
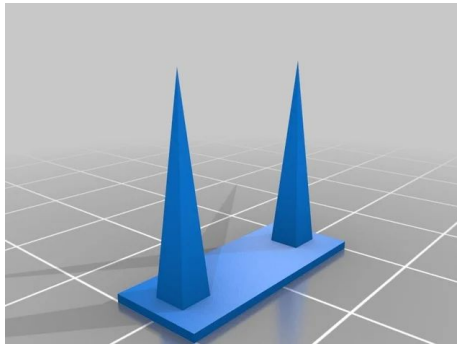
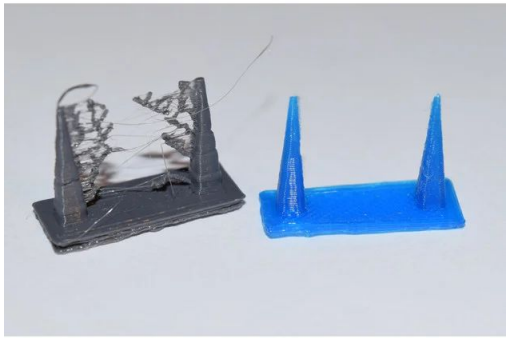
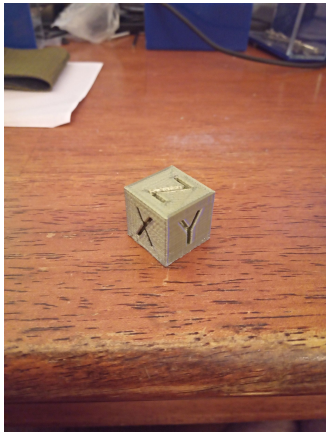


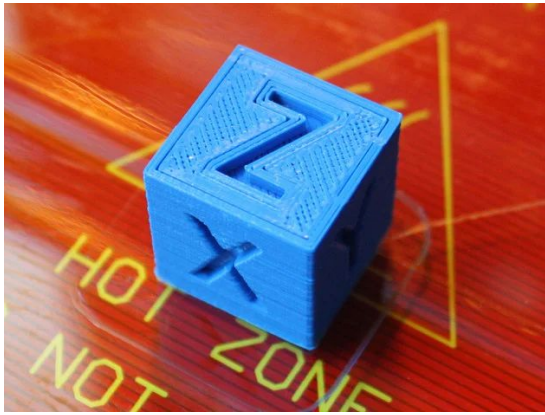
Image defect detection
Step 1: Load & read the RGB image from computer
A=imread('filename);
image(A);
Step 2: Converting the RGB image into grayscale image
I = rgb2gray(A);
Step 3: Scanning the image and obtain the ROI (Edge detection)
mask = false(size(I));
mask(100:1100,100:1200) = true;
visboundaries(mask,'Color','b');
bw = activecontour(I, mask,100,'edge');
visboundaries(bw,'Color','r');
figure, imshow(bw);
Step 4: Calculate the area of the detected image in pixels.
bwarea(bw)

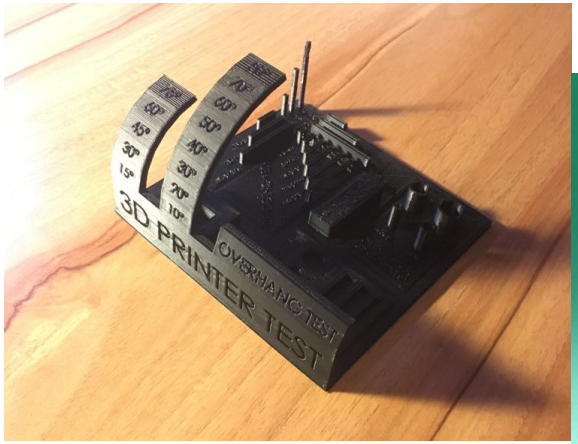
Stress tests

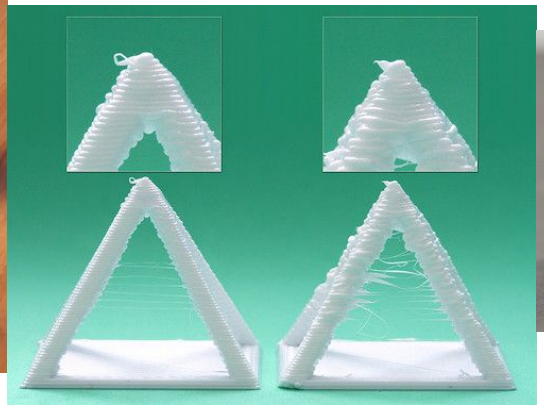


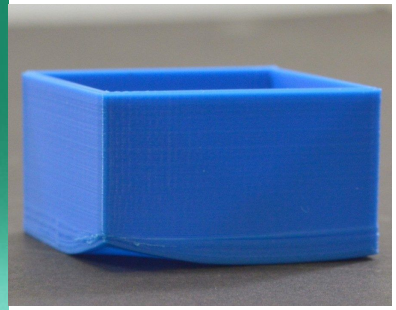












Defect criteria

- What is defect?
  Amount of material at any position that is different from the design drawing.
- Minimum detectable defect? (MDD)
  ± 0.5mm displacement
- Should the printing process be stopped when MDD appears?
  Depend on the type and location of the defect.
- Layer height
  <80% of the nozzle diameter
  Standard 0.4mm nozzle, layer height max 0.32mm
  Not possible to detect defect after each layer
- 5% tolerance limit, ±0.5mm MDD, layer height max 0.32mm
  Check once every 10 layers
- Shrinkage for FDM printer products
  0.2%-1%
  Not critical
- Defected product fixing
  Hand-held small angle grinder (C$ 60)