IME 100 Interdisciplinary Design and Manufacturing

3D Printing and design influence on material properties

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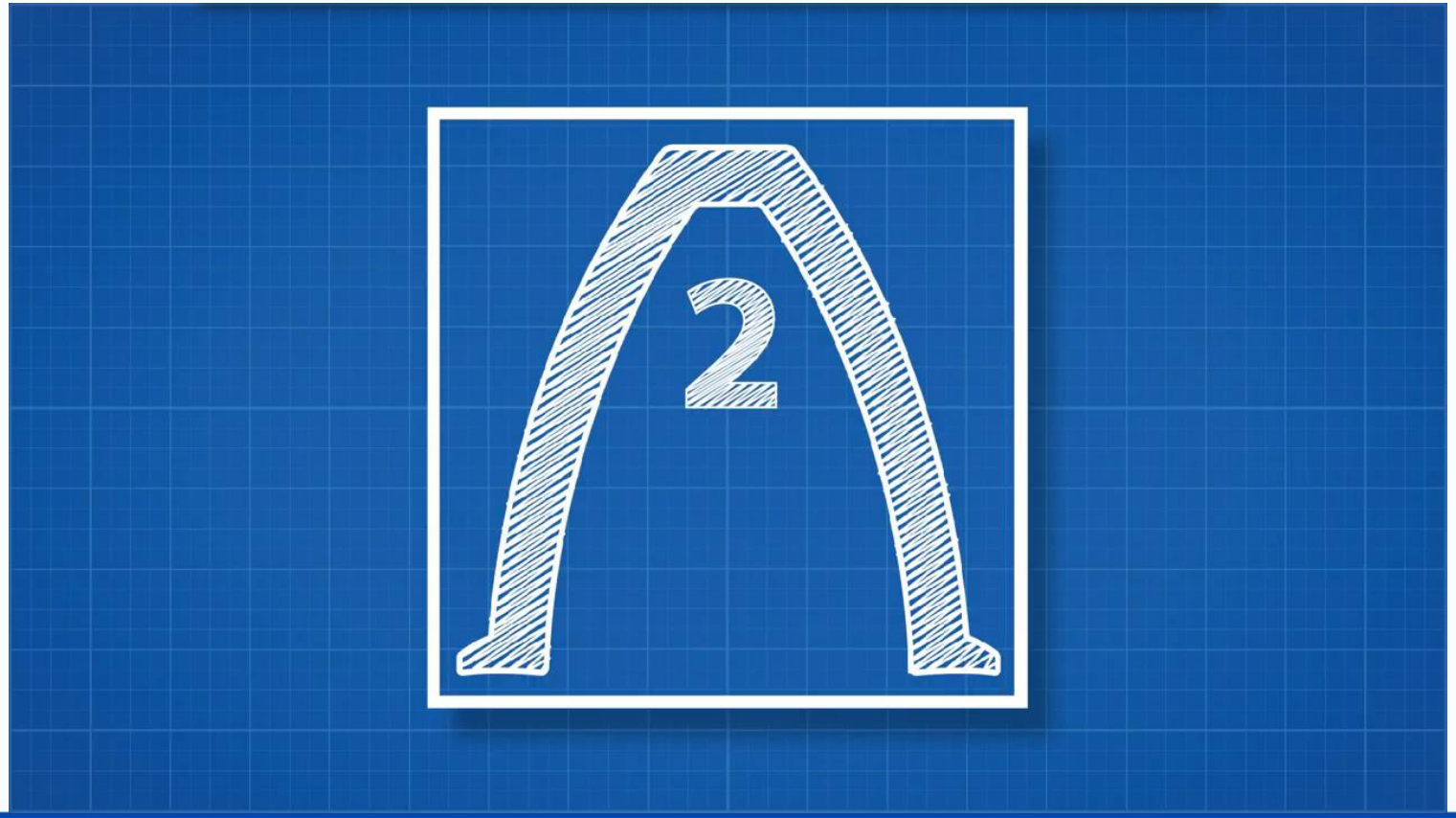
You tube videos to watch

- https://www.youtube.com/watch?v=hZ7Puv45RTU&list=PLPTbJLn2NGLn48xIgNfsd4jkCzHkIOvoQ

Material Properties - Tensile testing

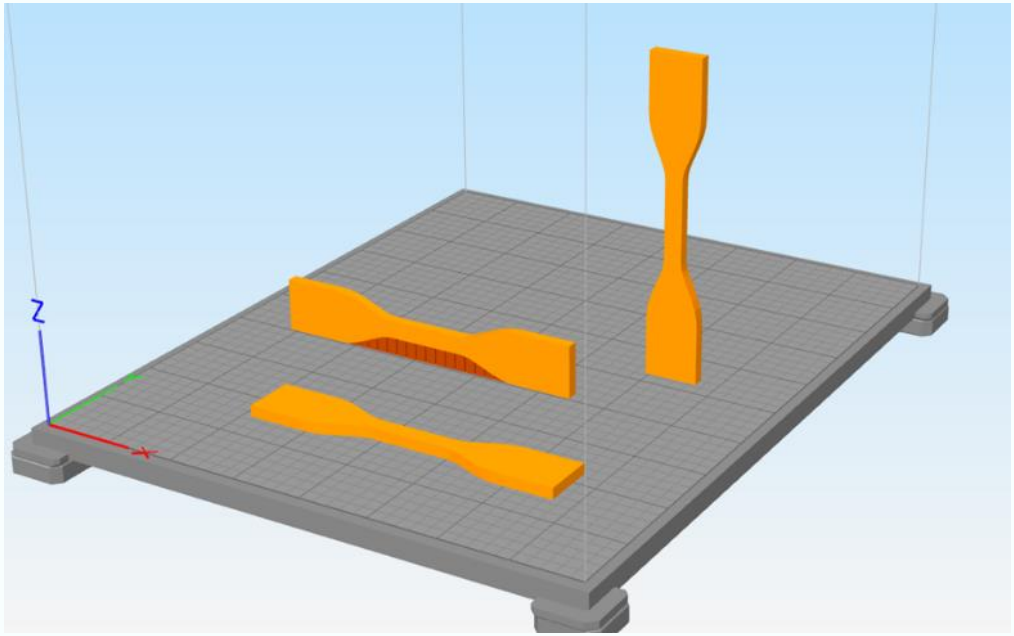


YouTube - Real Engineering

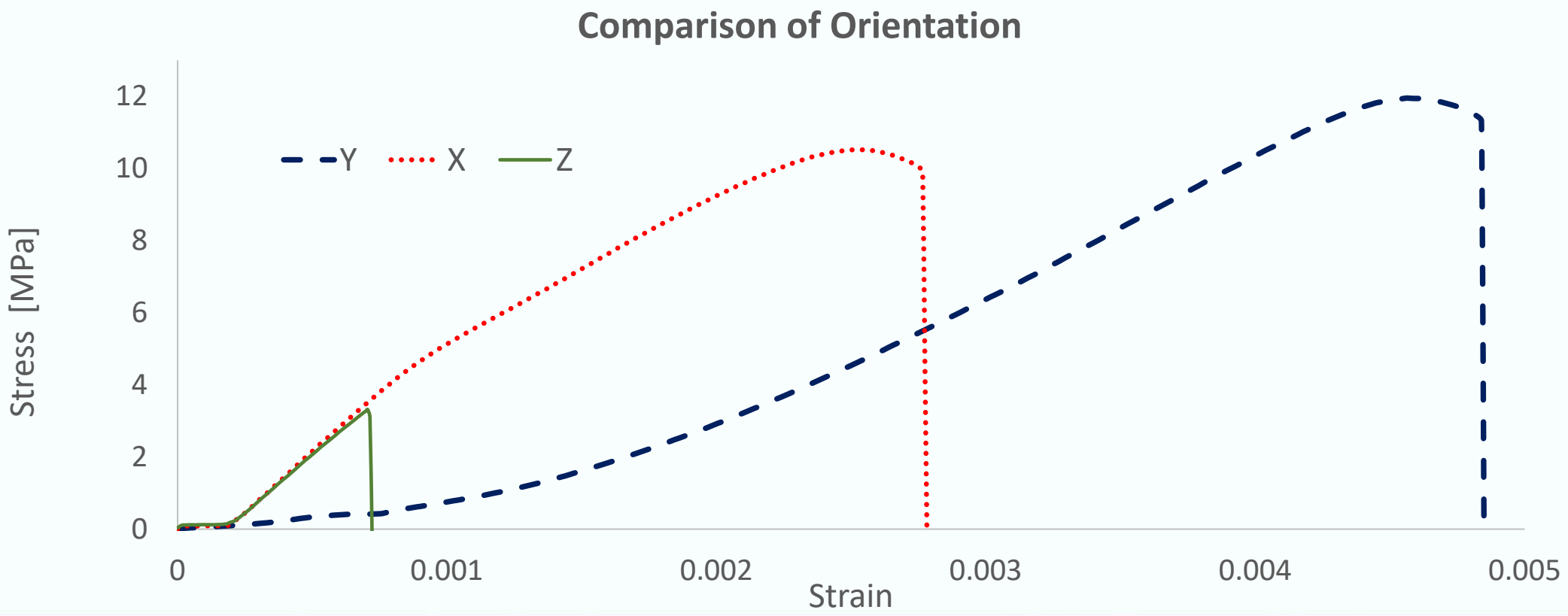
https://www.youtube.com/watch?v=BHZALtqAjeM

Build Orientation

- Build Platform is XY Plane, Z axis is vertical to the bed
- Parts can be rotated for print optimization
- As a **group** identify the pros and cons of each orientation. Consider effects on
  - Surface Finish
  - Material Properties
  - Support Material
  - Time - Open Cura and check the effects on print time
  - Stability
  - Cost – Efficiency [Making 1000 parts]



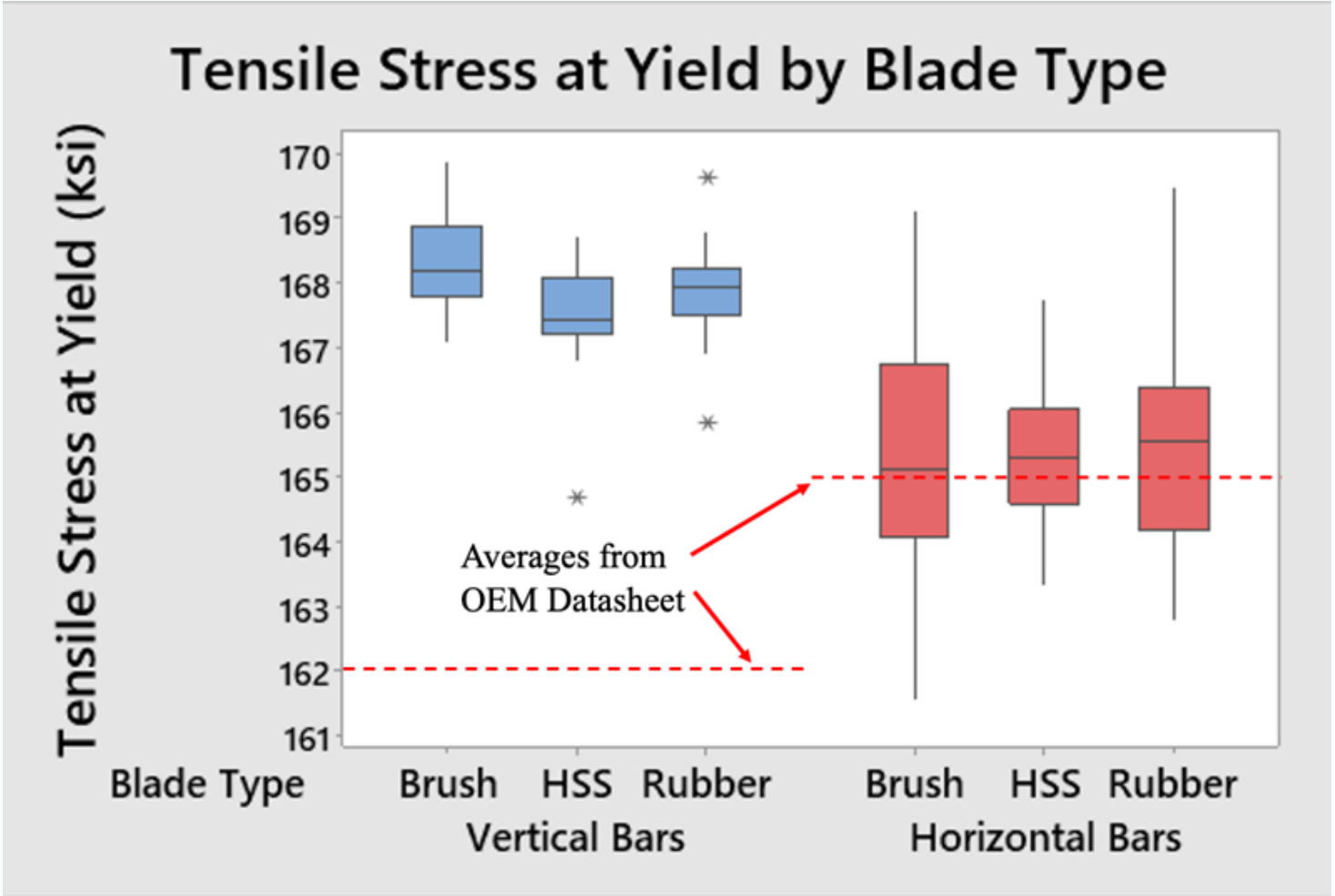
Test Results – Polymer FDM



Test Results Metal

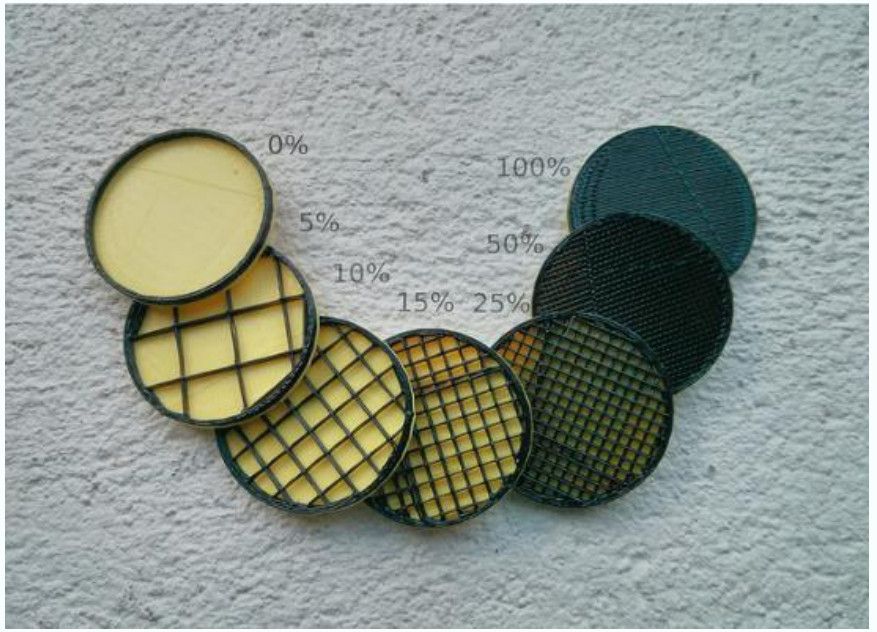
Powder Bed Fusion

Image courtesy – Haley Fox, EOS North America
Fox, H., Kamaraj, A.B., Drake, D., (under review), Investigating the effect of powder recoater blade material on the mechanical properties of parts manufactured using a powder-bed fusion process, SME NAMRC 2022.



Printing With Sparse Infill

- Vast majority of material extrusion parts printed with sparse infill, with interior of part being only 5-75% dense.
- Benefits:
  - Reduces material use
  - Reduces cost
  - Reduces print time
  - Reduces print weight
  - Sparse infill can add visible aesthetic feature
- Drawbacks:
  - Reduces part strength
  - Sparse infill can leave visible artifacts



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