Concept Generation & Selection

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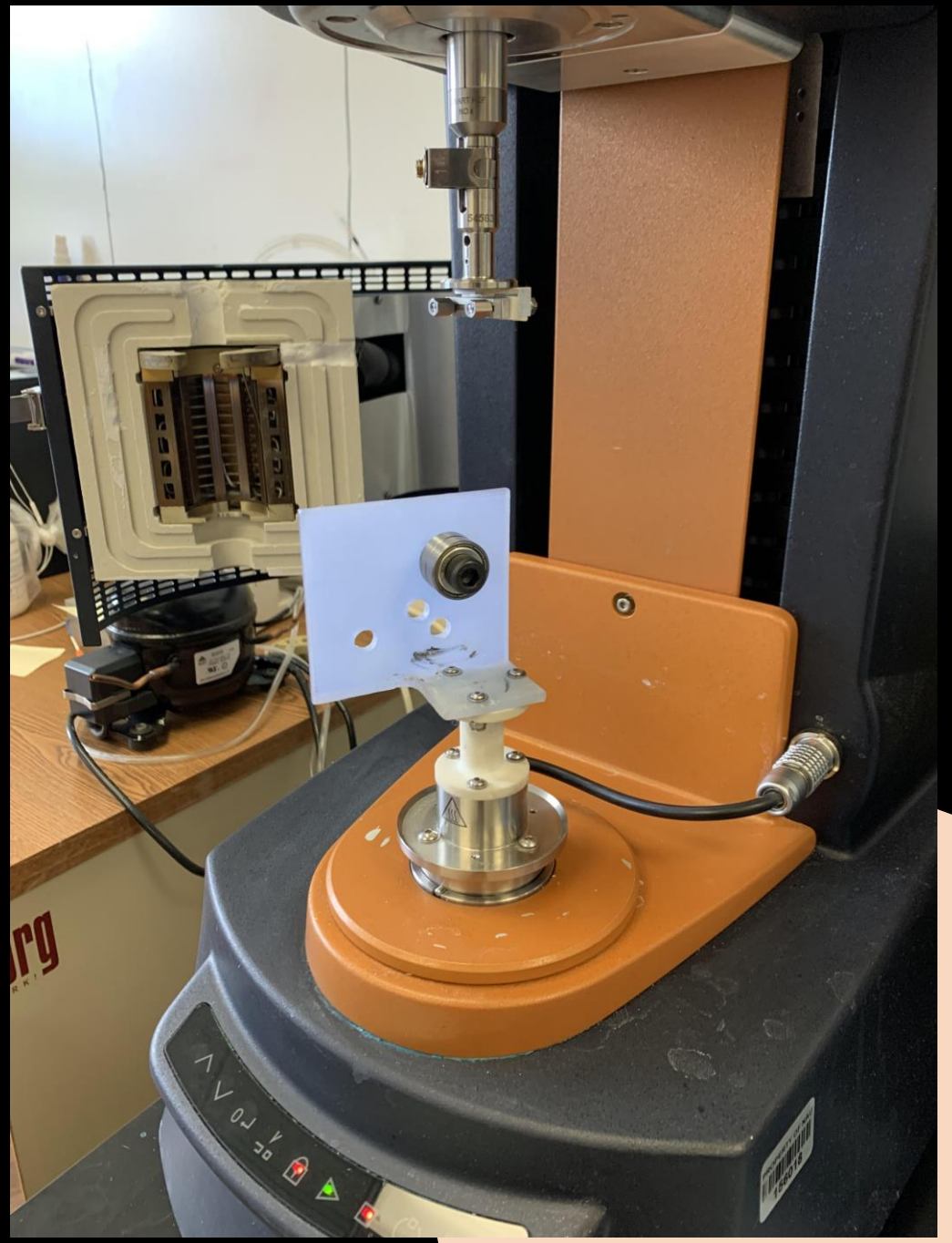
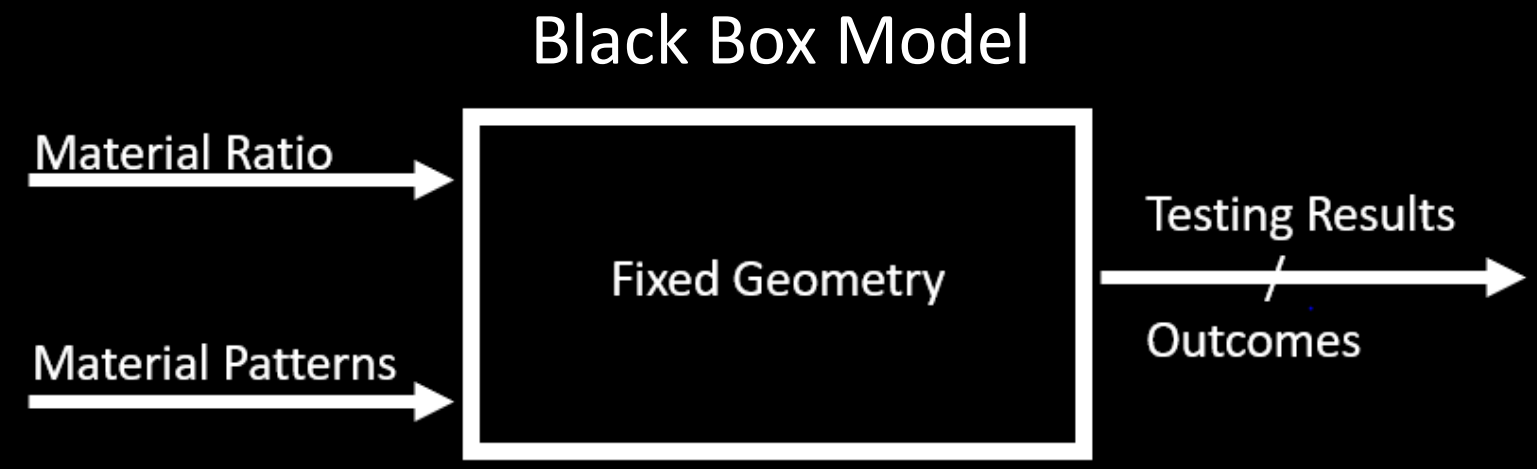
Introduction

Team BDL/Aneuvas 3D Printing is tasked with:

- Creating a 3D printed model that replicates organic tissue measurable to the human carotid artery.
- To analyze, design, 3D-print and test "plug and play" models of blood vessels in the brain, such as aneurysms, using innovative layering methods.
- Provide the client with qualitative data on material properties for each method.



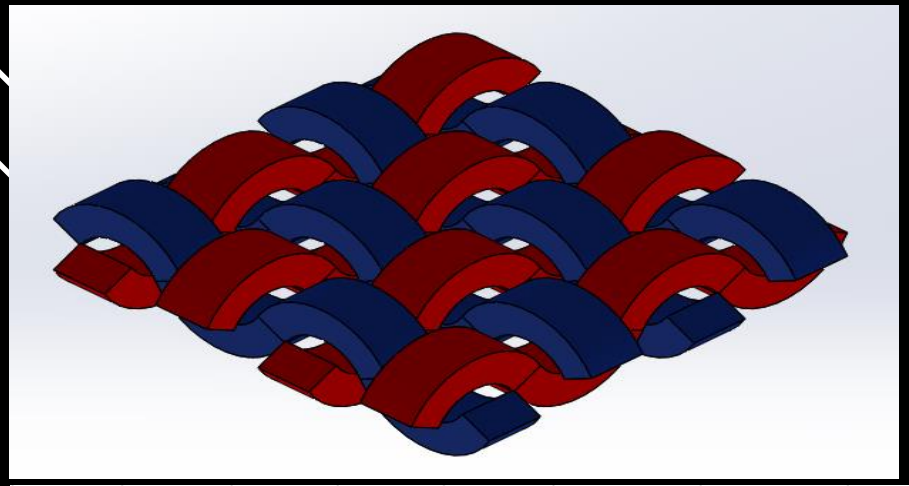
Project Modeling

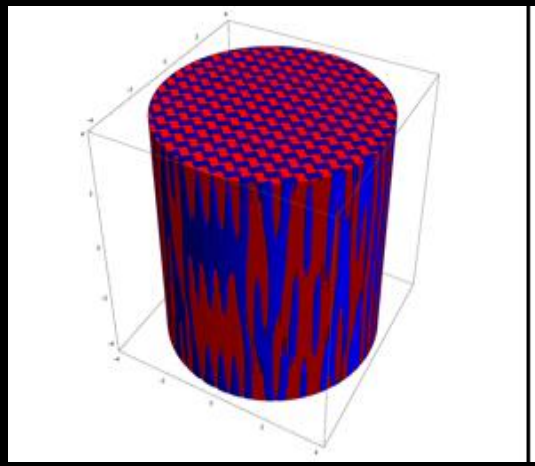


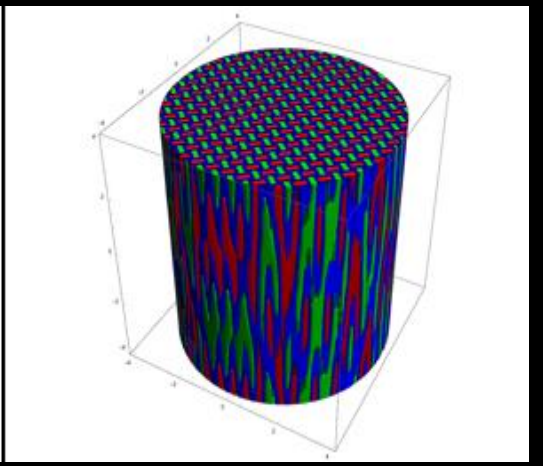
Concept Generation

- Our team decided to utilize information from the bioengineering lab to generate different concepts.
- Brainstorming and C sketch were used to find 4 different concepts that we thought would generate the best data.
- The four concepts are characterized by a unique layering method.
- Layering methods include:
  - Cross-Hatch
  - Alternate layering (e.g. Legos)
  - Gyroids
  - Alternate Shores

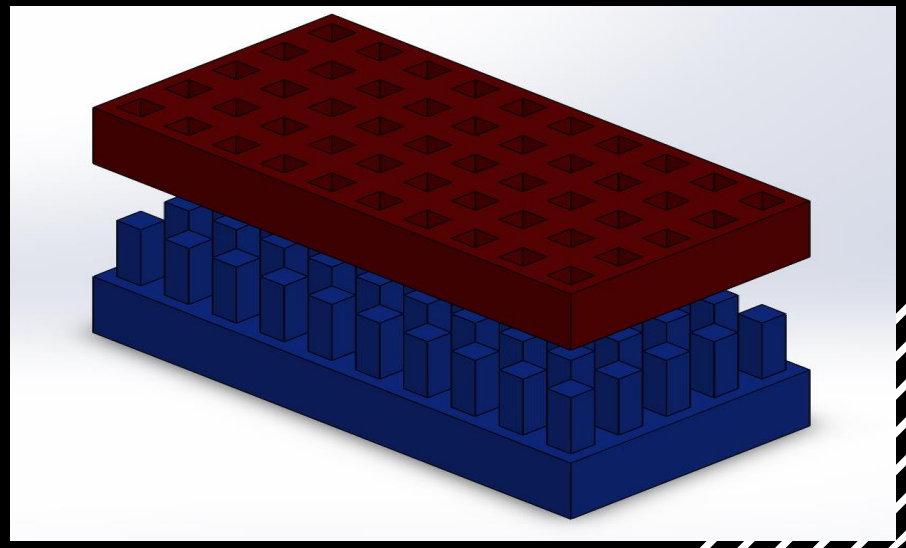
Concept Evaluation

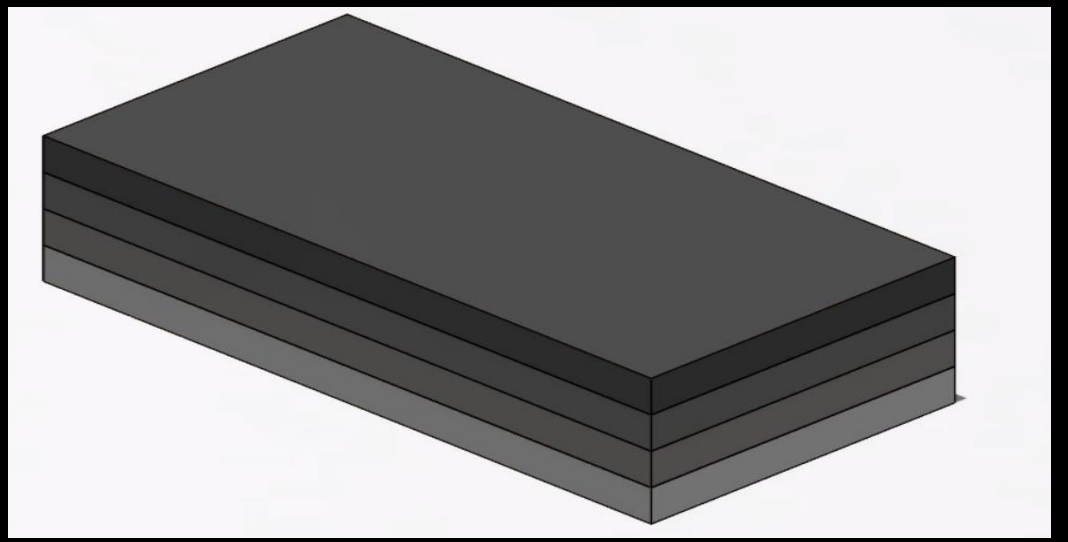






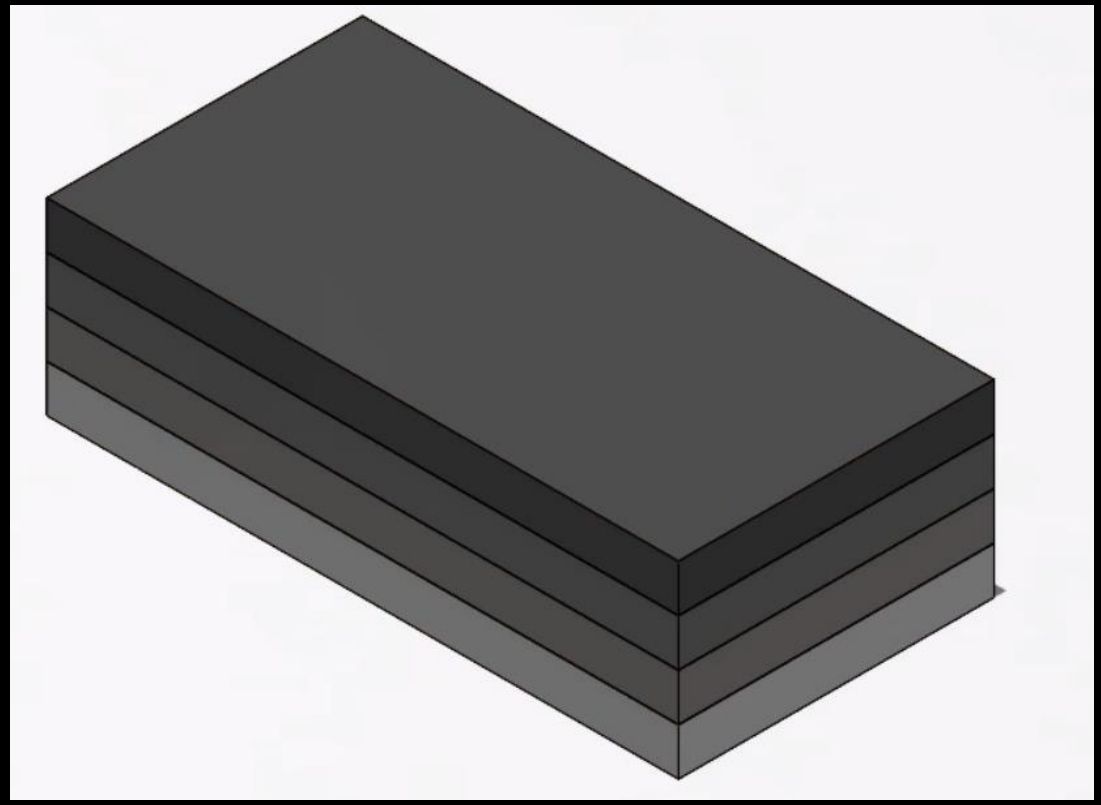
Pugh Chart					Alternatives											
					Cross-Hatch			Alternate Layering (Lego)			Gyroids			Alternating Shores		
Criteria				Baseline	VC-A30-30A	VC-A30-40A	VC-A30-50A	VC-A30-30A	VC-A30-40A	VC-A30-50A	VC-A30-30A	VC-A30-40A	VC-A30-50A	VC-A30-30A	VC-A30-40A	VC-A30-50A
Soft Interior				5	3	2	1	4	3	1	2	1	1	5	3	1
Hard Exterior				1	1	3	5	1	3	5	4	4	4	1	3	5
Lightweight				5	1	3	5	1	3	5	1	3	5	1	3	5
Compliance				3	5	4	3	5	4	3	3	2	1	5	4	3
Similar Properties to Organic Tissue				3	3	2	1	5	3	1	3	2	1	5	3	1
Key	High	Med	Low	Totals	13	14	15	16	16	15	13	12	12	17	16	15
	5	3	1	Rank	9	8	5	2	2	5	9	11	12	1	2	5





Design Chosen

- 2x4x1.2 mm rectangle
  - Each layer is 0.3 mm thick
- Materials are layered on top of one another
  - Layers are meshed to create a tighter bond
  - No airpockets
- Each layer has a higher hardness than the last



Alternate Shores method

Budget Planning

Bill of Materials				
BDL/ Anuevas 3D Print				
Material	Qty (grams)	Description	Functions	Cost/ per gram
Agilius	80	rubber	Mimic softness of vessels	$0.25
VeroClear	70	rigid	Mimic hardness of vessels	$0.20
Support	160	rubber	Supports Print	$0.15
Total Cost Estimate:				$58.00

Table 1: Estimated Build of Materials for Samples

Bill of Materials				
BDL/ Anuevas 3D Print				
Material	Qty (grams)	Description	Functions	Cost/ per gram
Agilius	42	rubber	Mimic softness of	$0.25
VeroClear	327	rigid	Mimic hardness o	$0.20
Support	732	rubber	Supports Print	$0.15
Total Cost Estimate:				$185.70

Table 2: Estimate Build of Materials for 3 Full Models

- Roughly $300 will go into the materials of the samples/ models
- $500 will go to renting out equipment needed for our project
  - 3D printer, rheometer, and fluoroscope
- $200 will be set aside for reprints, addition models, or small tools that aren't provided by the lab


THE END