# Rotating Disk Cellular Solid Testing Apparatus

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## I. Project Description

Current mechanical testing for materials used in impact mitigation neglects the effect of rotational acceleration, a common factor in concussions. The objective is to build a test apparatus capable of spinning elastomeric foam samples at variable speeds up to 3000 RPM based on the experimentalist command while capturing digital images of the deformed surfaces. Ex-situ digital image correlation will be used to quantify the in-plane strain components, assessing the effects of rotational acceleration on the foam efficacy.

## II. Team Members

**Nicholas Agtual**
Electronics and Team Lead

**Kyle Mesch**
Rotational Assembly Lead

**Derek Nunotani**
Drivetrain Lead

**Dylan Lawrence**
Structure Lead

**Madison Anderson**
Sample Holder and Safety Lead

## III. CAD Models

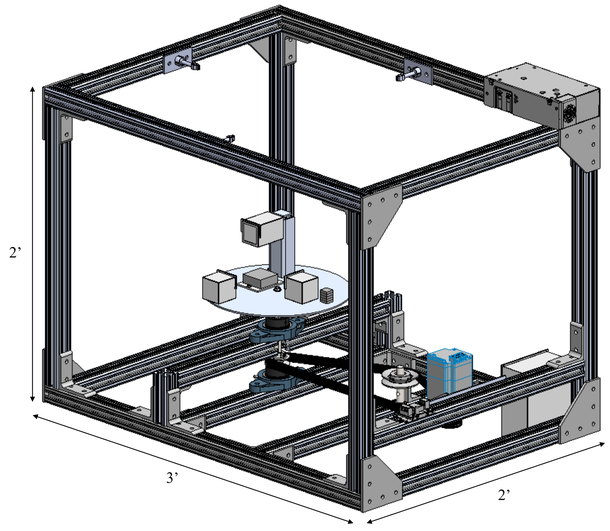


Figure 1: Test Apparatus CAD Model

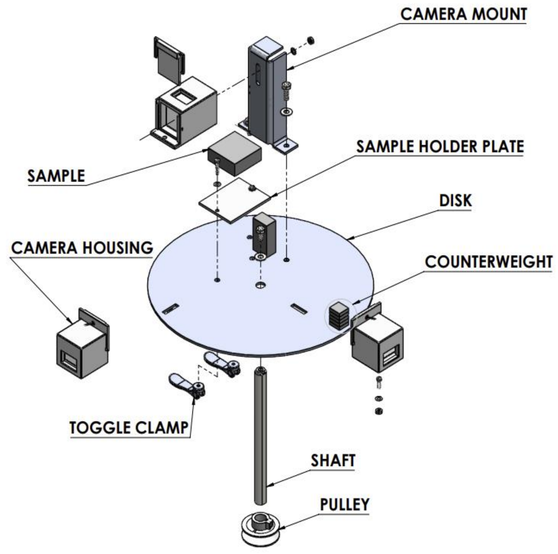


Figure 2: Rotation Subassembly Exploded View

## IV. Electronics and Software

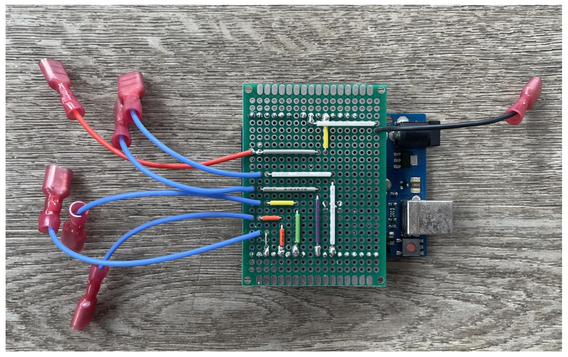

Figure 3: Custom Arduino Shield

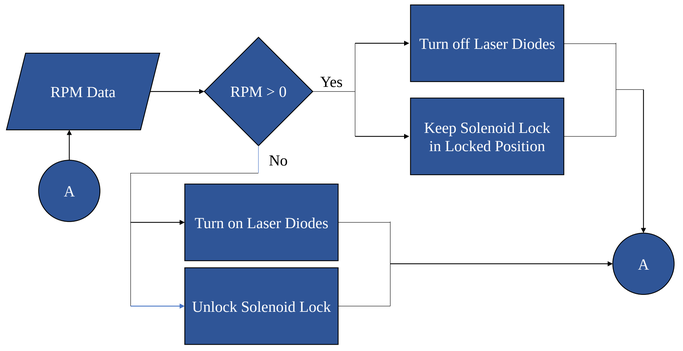


Figure 4: Software Logic

## V. Experimentalist Command

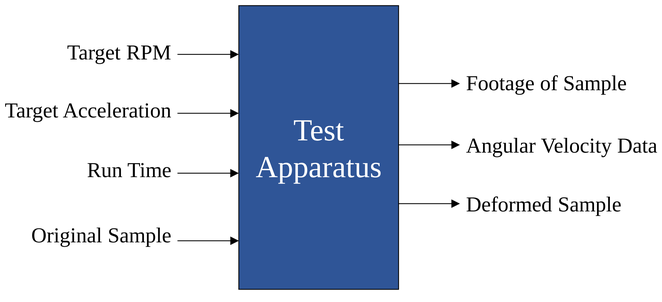


Figure 5: System Inputs and Outputs

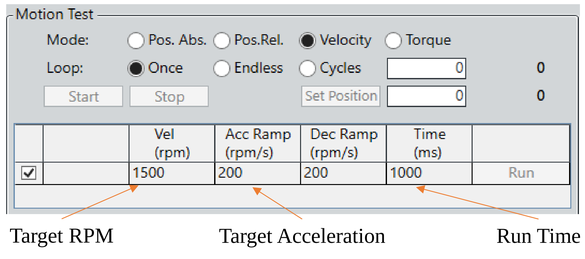


Figure 6: Motor Controller Graphical User Interface

## VI. Manufacturing

Figure 7: Water jetting Components

Figure 8: Turning Shaft and Pulley on Lathe

Figure 9: Cutting Polycarbonate Panels to Size with Wall Saw

## VII. Acknowledgements

Team Spin It to Win It thanks Dr. Shaffar for arranging and advising this project. We would also like to give thanks to Dr. Youssef and all members of the Experimental Mechanics Laboratory for organizing this project and providing guidance throughout the whole process. Lastly, we would like to thank Mr. Lester for helping us with manufacturing all the requisite components of our design.

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