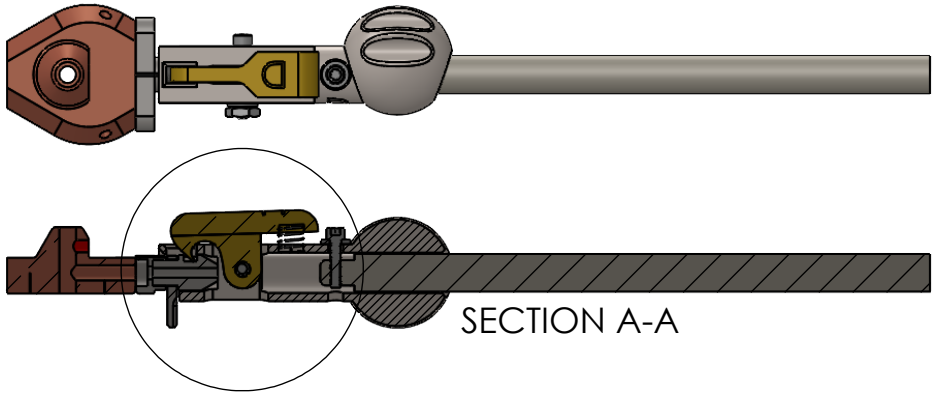
REVISION D PUCKULATOR



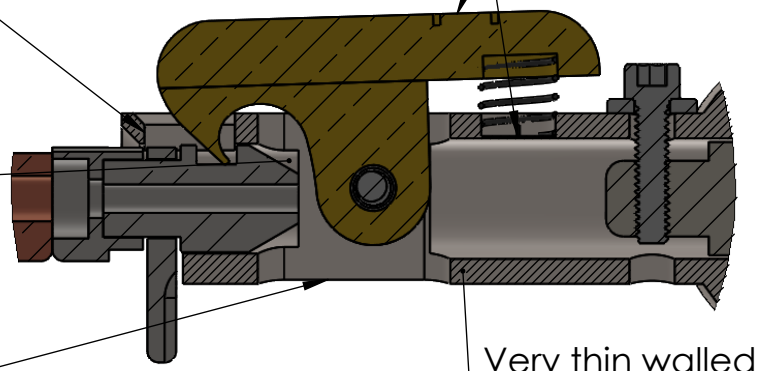
NOTE: My opinion is that the thin walled breakage problem is most likely due to the fact that the original tool CAMECA sold was machined and made out of stainless steel. so while the wall thicknesses were acceptable for stainless steel, they were too thin for plastic or 3D sintering material.

clip was too big and would rub against the walls of the quorum. not enough to release the puck, but enough to cause damage over time. (the Quorum was not made by CAMECA so this clip never fit well but fit just enough)

Thin wall that caused many print fails

Large Gap

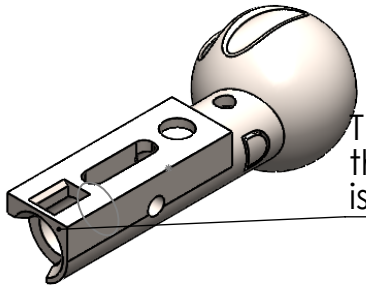
There is very little of the puckulator that is in contact with the stem. This causes a flimsy grip on the stem and makes it droop



DETAIL E
SCALE 3 : 1

Bottom is left open (most likely an artifact from when these were machined)

Very thin walled body with little reinforcement. While the tip of this puckulator usually broke first, I knew that repeated torsion could wear away this over time

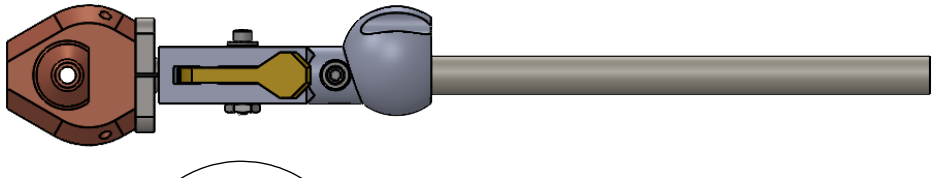


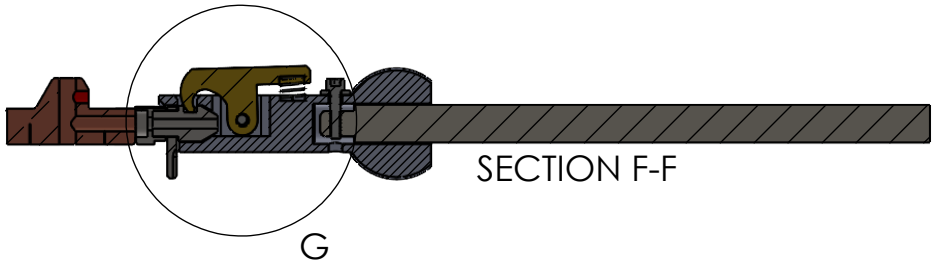
The lack of reinforcement and thin walls means the tip of this puckulator would often break. this is made worse by the 3D sintered body

DISCLAIMER: I am not familiar with what decisions were made to influence the design of the revision D puckulator. but I need to point out the flaws of the old design and offer some insight to my thoughts. Annalia McKinney is responcible for the Revision D Puckulator and I dont want people to get the wrong idea that I dislike her contributions.

UNLESS OTHERWISE STATED, ALL DIMENSIONS ARE IN INCHES X.X = ± 0.1 X.XX = ± .01 X.XX = ± .005	**PNNL** Designer: Alex Smith Drawing Name: **Old Specimen Stage Assembly** SCALE: 1:1 | 4/24/2024 | SHEET 1 OF 4

REVISION E PUCKULATOR



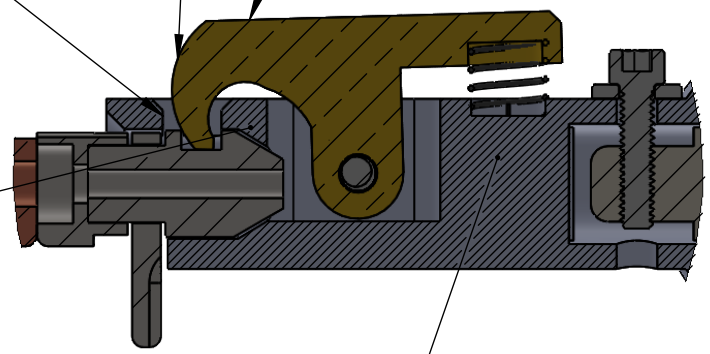


Beefier clip serve two purposes: To keep the puck from sliding out, and to apply pressure to the stem for even more rigidity

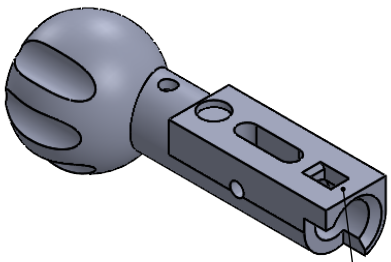
Clip has a smaller profile and does not rub against the walls of the quorum as much

Narrowed the gap for more material on the tip. preventing breakages

The puckulator conforms to the shape of the puck, allowing for a more snug fit. This feature alone was the primary goal of the redesign.



DETAIL G
SCALE 3 : 1



Open area has been filled in for reinforcement

Walls are thicker and resist breakage

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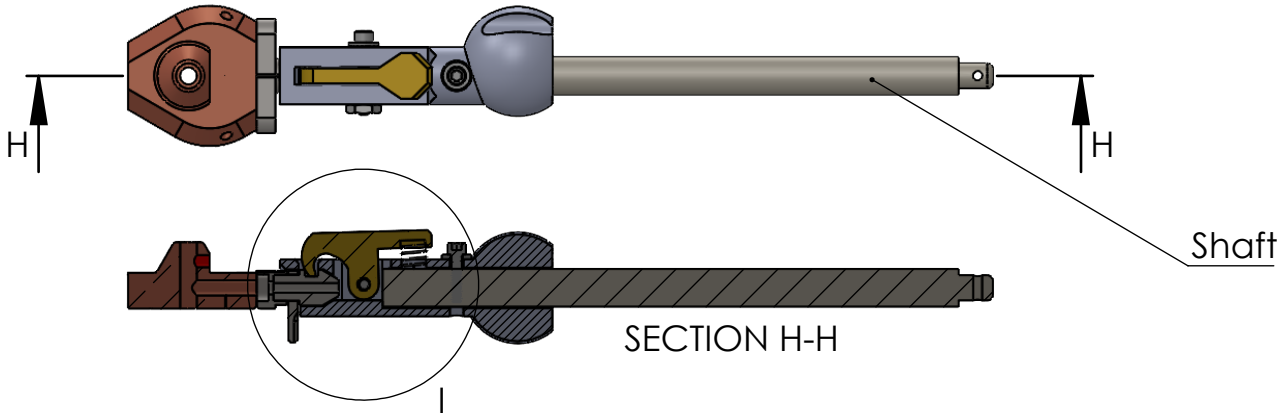
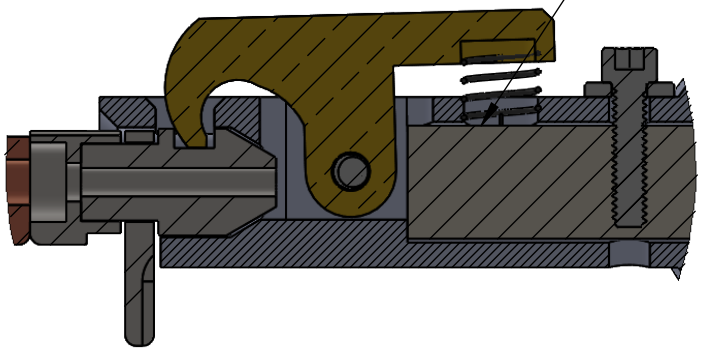
	SCALE: 1:1	4/24/2024 SHEET 2 OF 4

REVISION E PUCKULATOR (ALT)



Unlike Version D, Version E has the spring rest directly against the shaft instead of attempting to make a thin wall between the two

I have found that some of the shafts these puckulators connect to are not short. if that is the case, I have made an alternative version of the Version E Puckulator to allow an extended shaft



DETAIL I
SCALE 3 : 1

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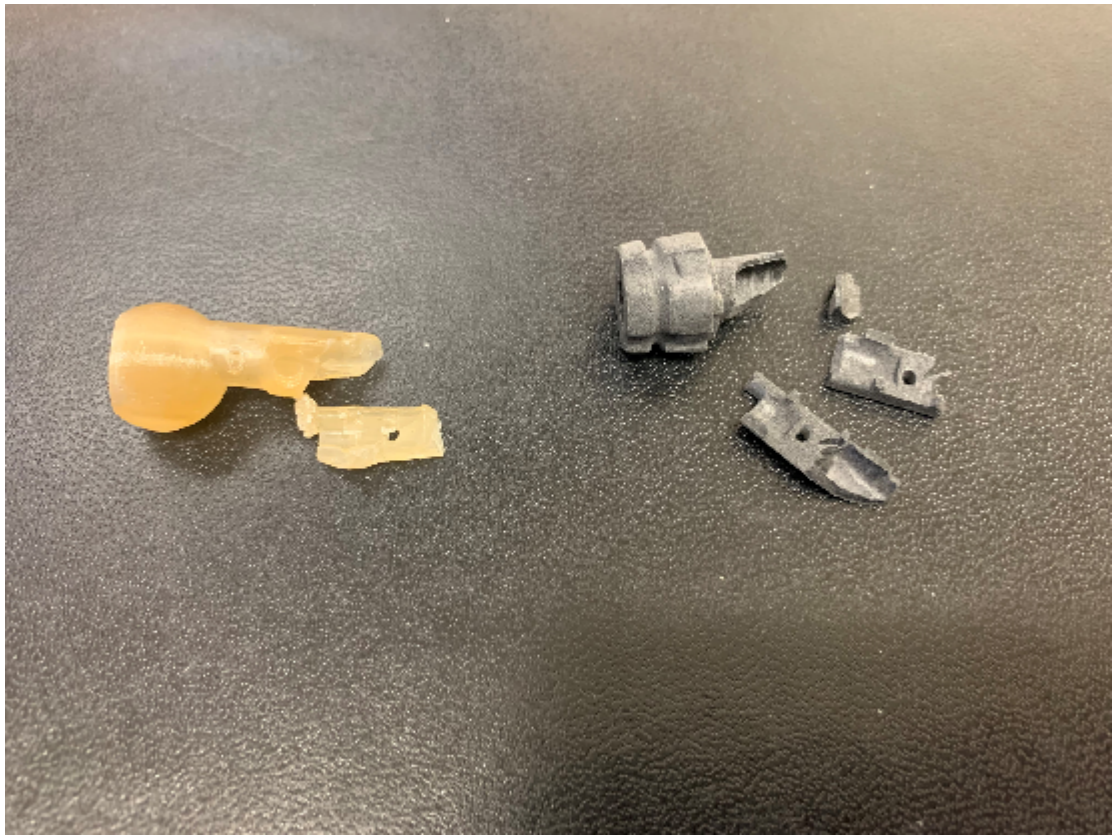
	SCALE: 1:1	4/24/2024 SHEET 3 OF 4

NOTE: The Revision E Puckulator used in this experiment was made out of PPSU (Polyphenylsulfone). PPSU was used because its properties were most suited for the experiements it would be used in. Something to keep in mind is that the durability of the puckulator is directly influenced by the material and quality of print.

The Revision E is on the left and the Revision D is on the right. Both samples were subjected to destructive and function tests under Cryogenic conditions. Both puckulators performed their functions. The final test involved gripping both ends of the puckulator with pliers and subjecting them to torsion until failure. The Revision E required significant force to break. However the revision E was crushed under the force of the pliers while trying to get a grip.



Something to note is that the Revision E puckulator broke as if it was a solid whole. Breaking perpendicular to the layer lines. a fear I had while developing was that the 3D printed shape would have inherent weaknesses to torsion. however these results prove that the layer adhesion with PPSU is strong enough to be a non-issue

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	SCALE: 1:1	4/24/2024 SHEET 4 OF 4