

3D PRINTER MAGNETIZATION HEAD FOR MICROSCALE APPLICATIONS

Members: Jared Van Der Zwaag,
Lindsey Shak, Vincent Truong, Wilson Li

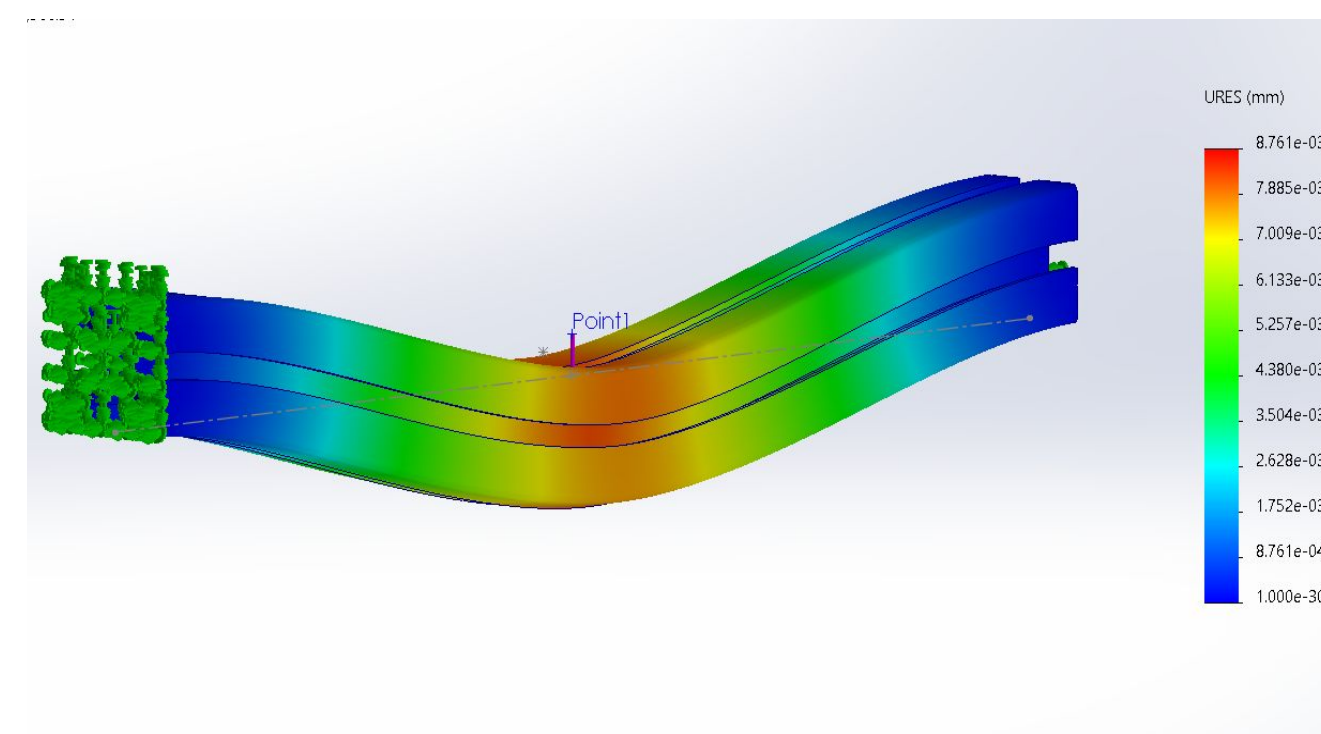
Objective: To develop techniques for 3D printing of magnetic materials with sub millimeter scale resolution for medical and manufacturing industrial applications.

Executive Summary

- Magnetization head induces a strong magnetic fields with a resin-curing laser to 3D Print parts with complicated polarity fields
- Design a gantry and mounting system to move the head in the X and Y plane while avoiding frame deflection >1 mm
- Induce and measure a magnetic field of 1T using a Gauss meter with four winded coils

Design Process for Gantry Frame

- Magnetization Head + Coils weigh 10 kg
- FEA of Point Load of 100 N on 4040 Aluminum Extrusion
- Aluminum Extrusions bend < 1 mm



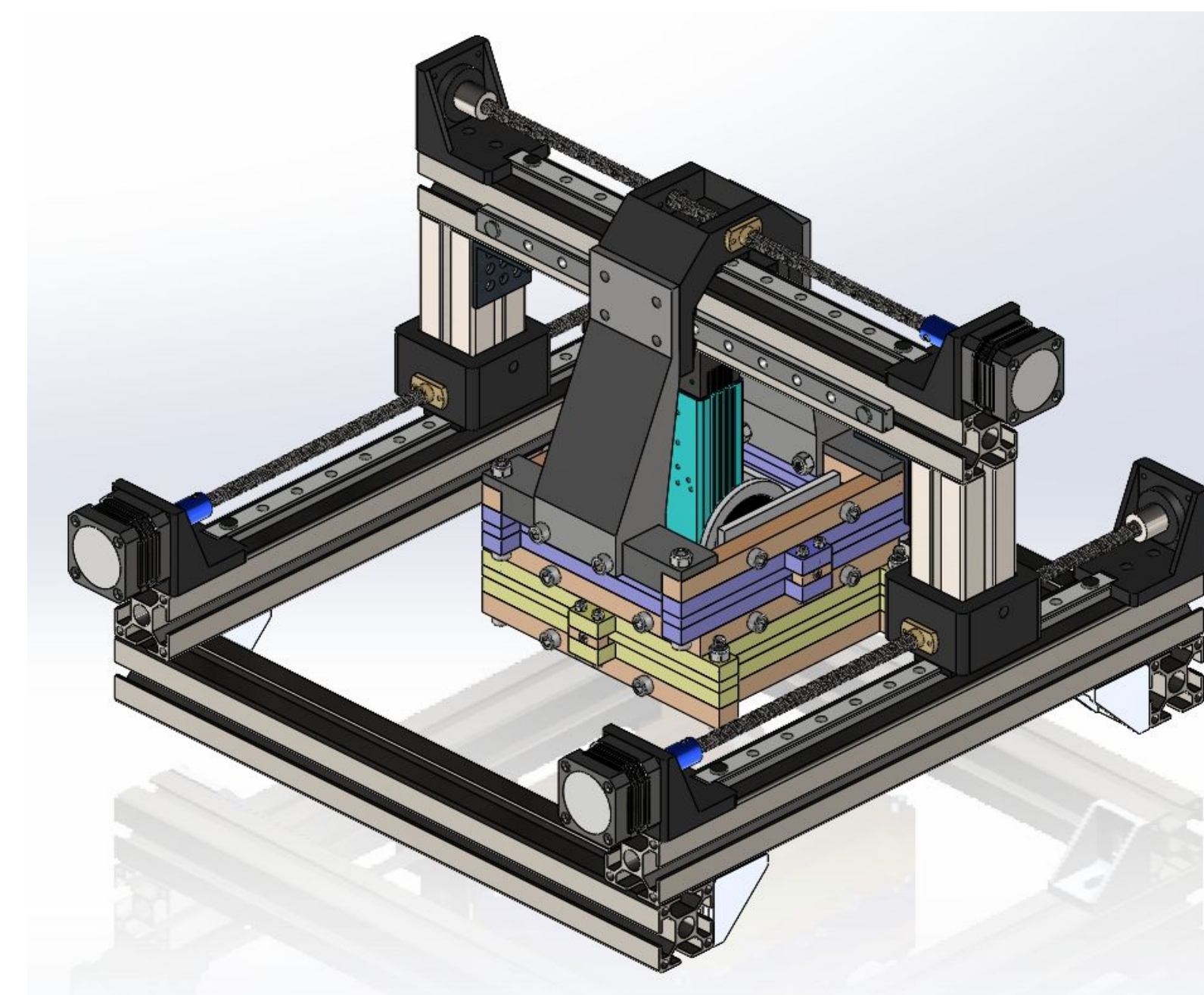
Deformation of Extrusion in mm⁻³

Future Improvements

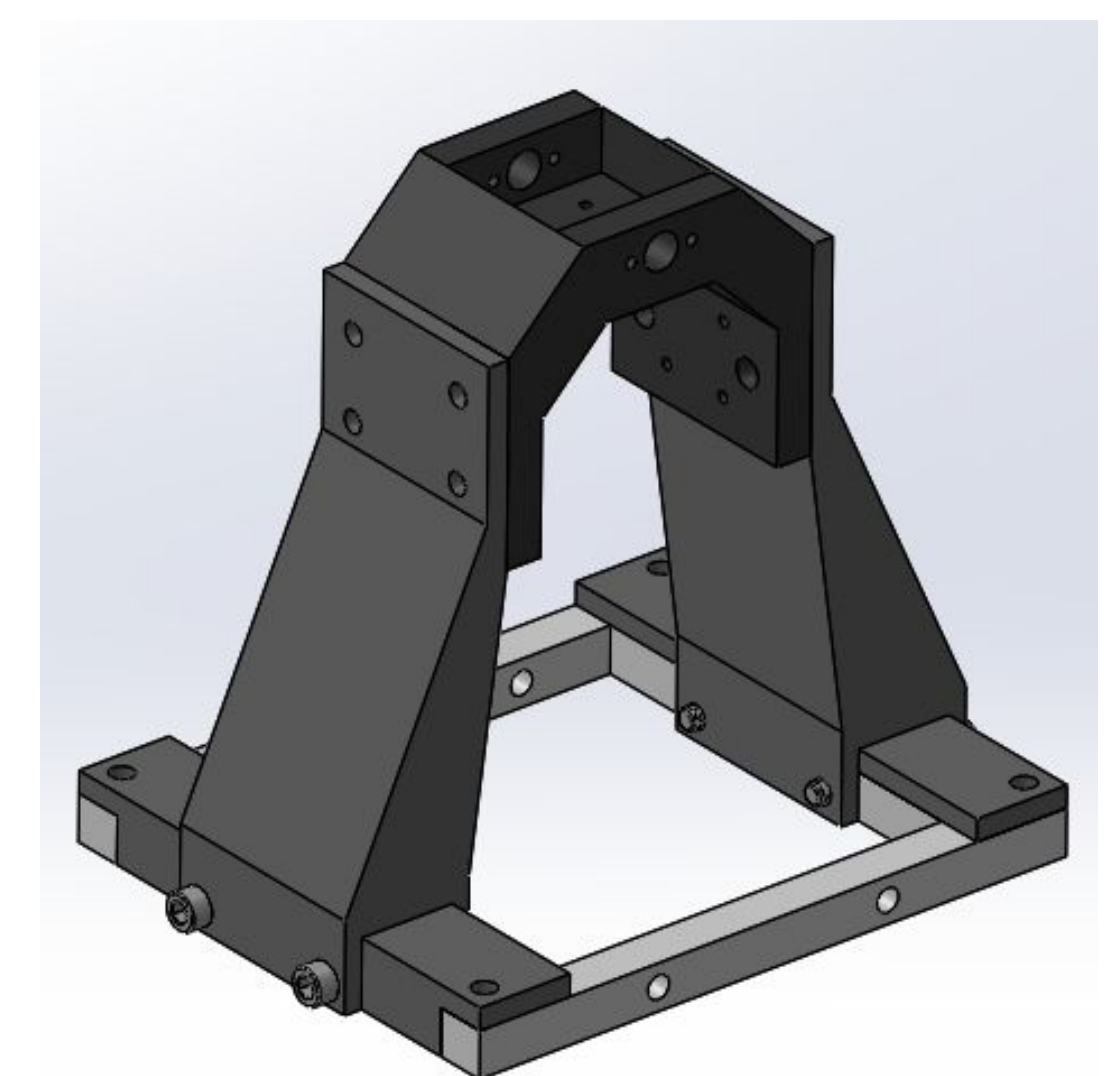
- Working area of the magnetization head is 1600mm²
- Increase working area for larger prints

References/Acknowledgement

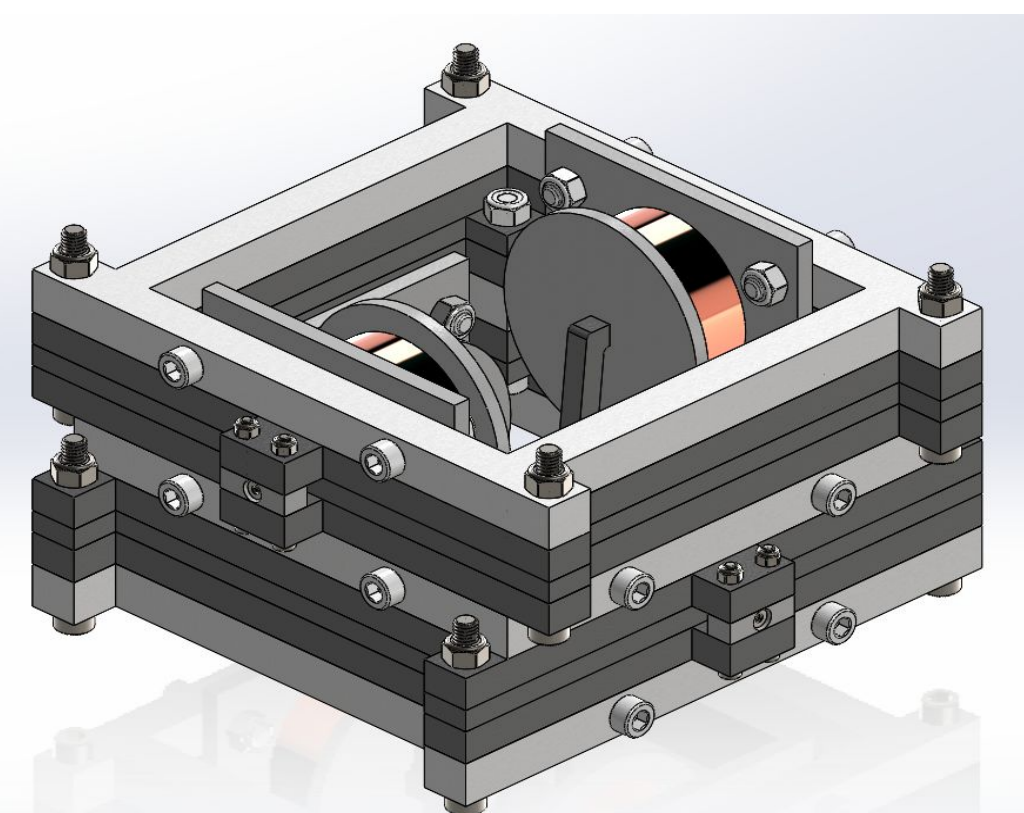
- Lars Paulsen was responsible for designing the Magnetization Head and magnetic coil mounts



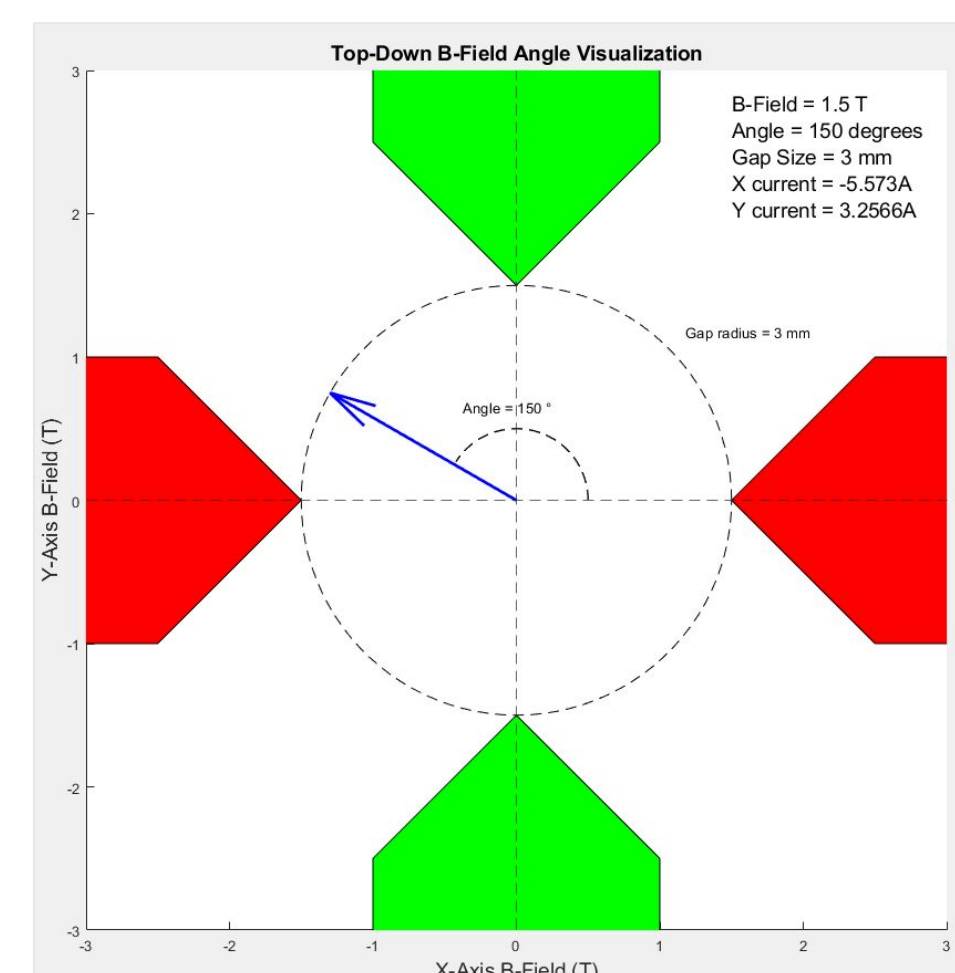
Final Gantry Design



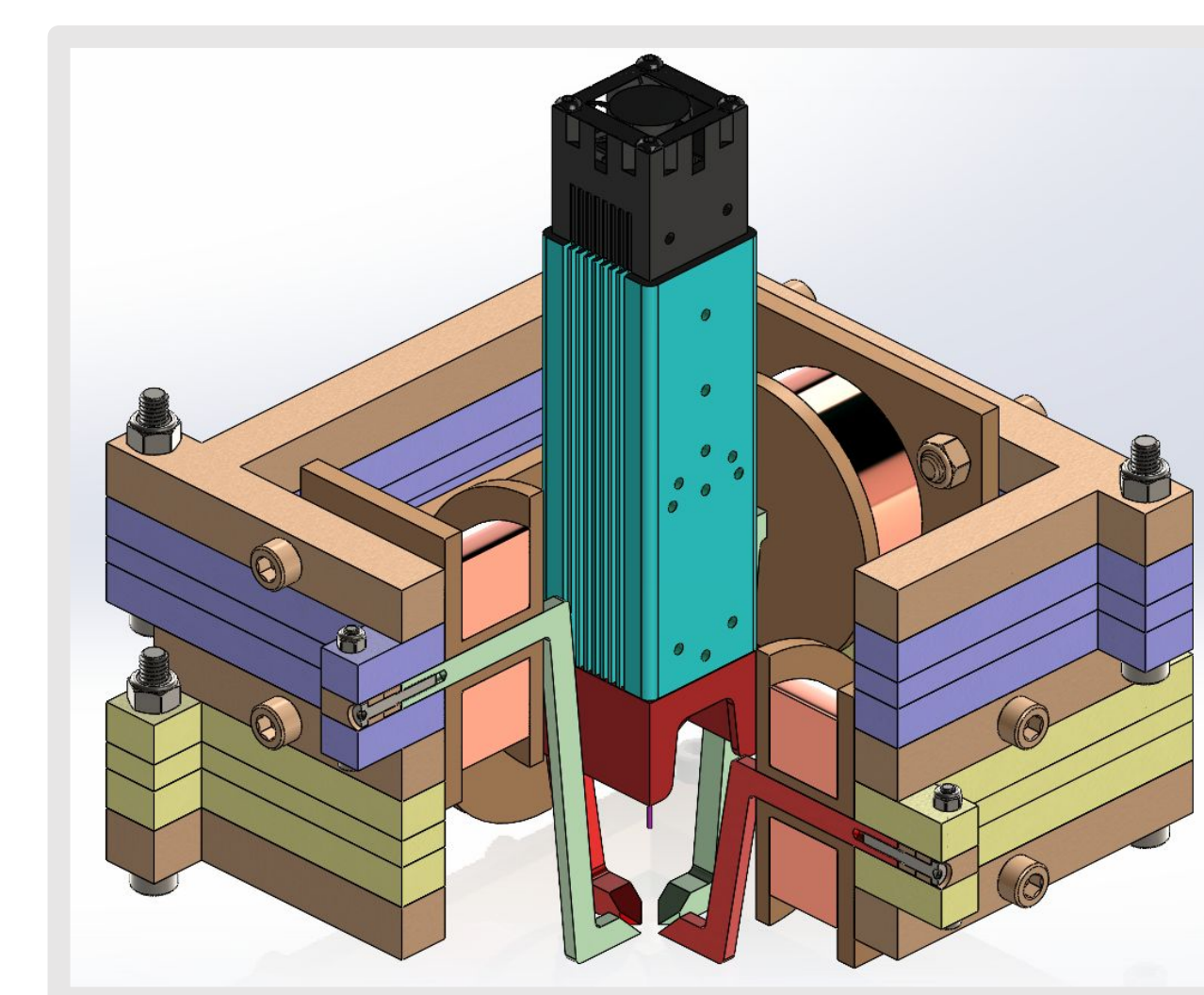
Final Gantry to Head Mount



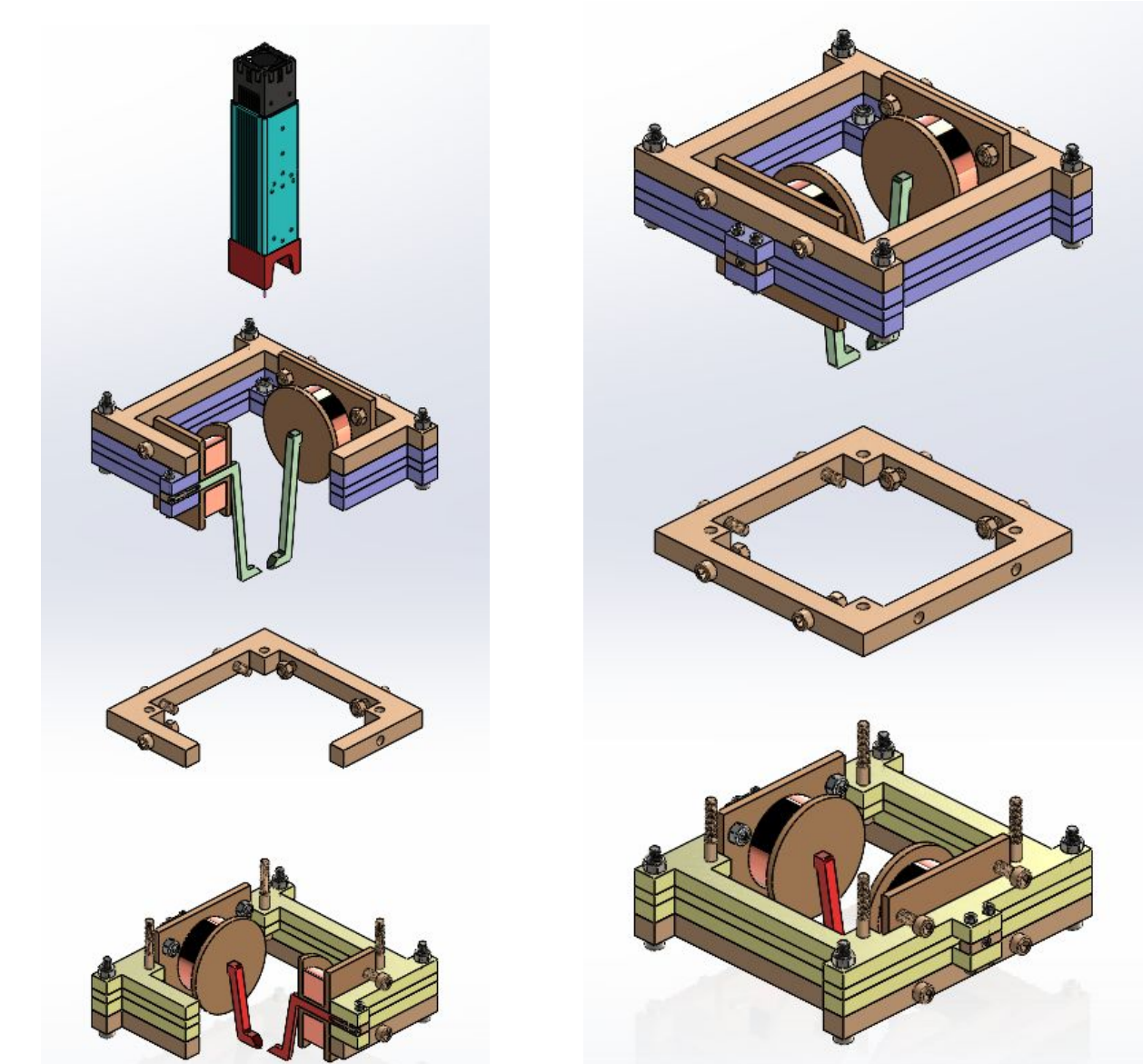
Magnetization Head with Winded Coils



Zoomed in view on magnetic tips and area of magnetization



Split Color Model Section View



Exploded Views