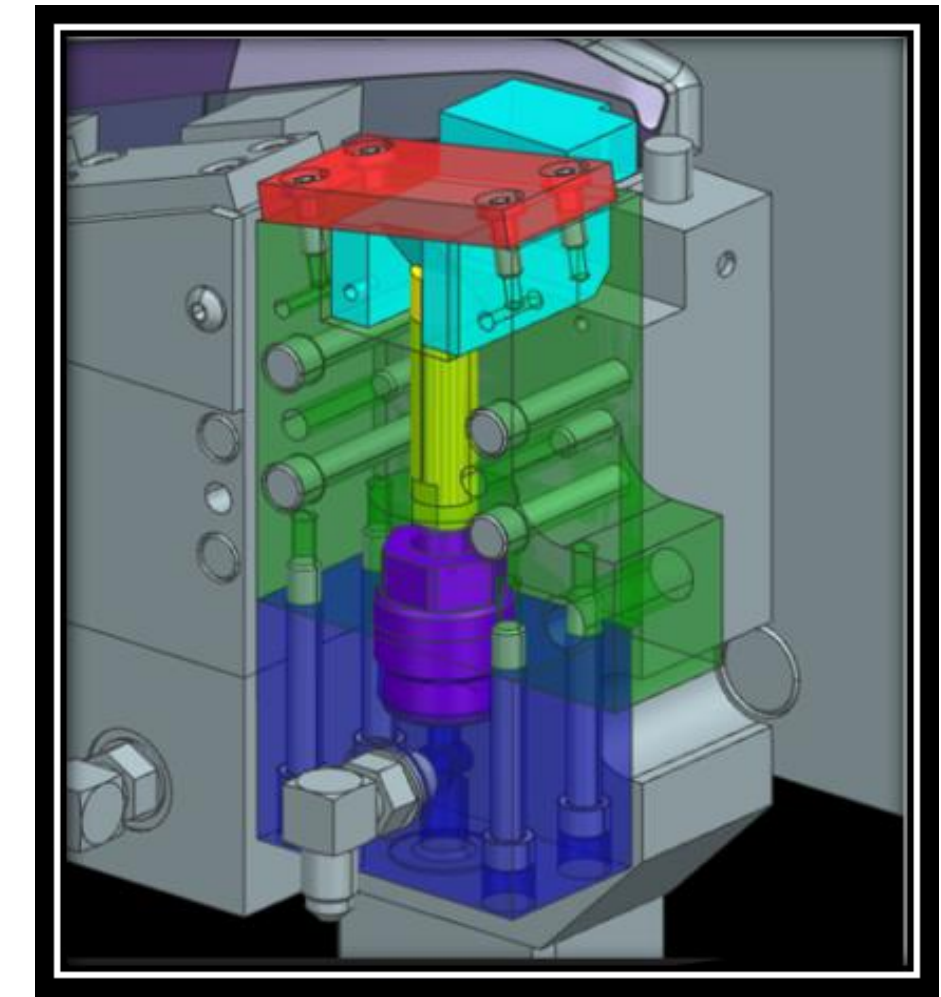


## CNC Machining Fixture – Clamp Redesign

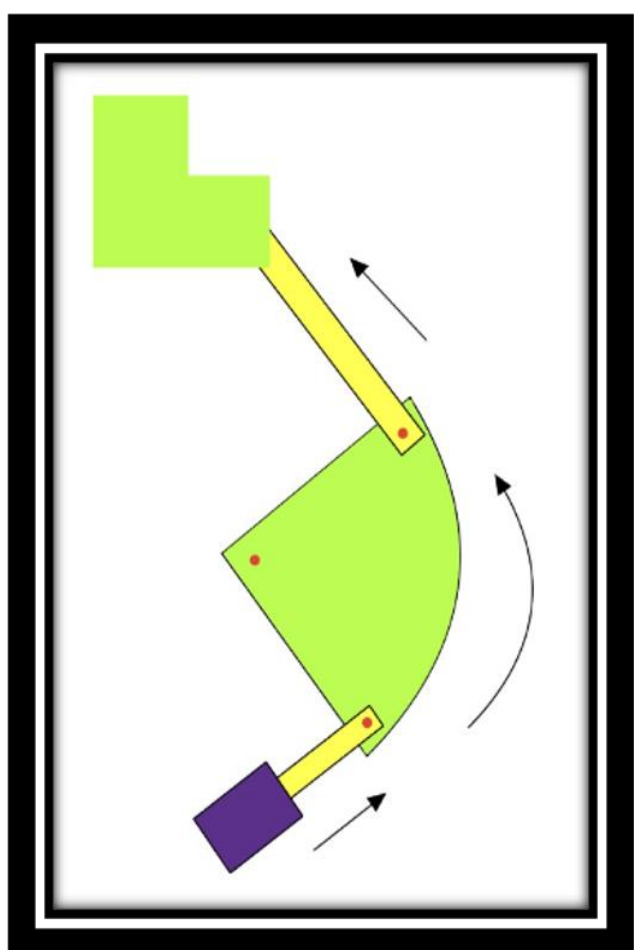
### Project Description:

We have been tasked with designing an improved hydraulic clamping system for a 5-axis CNC machining fixture. Using lessons learned from issues with the current production fixture, we will be entrusted with updating the design to enhance the overall performance and ease of use of the hydraulic clamping mechanism in accordance with the priorities set by Pursuit Aerospace personnel.

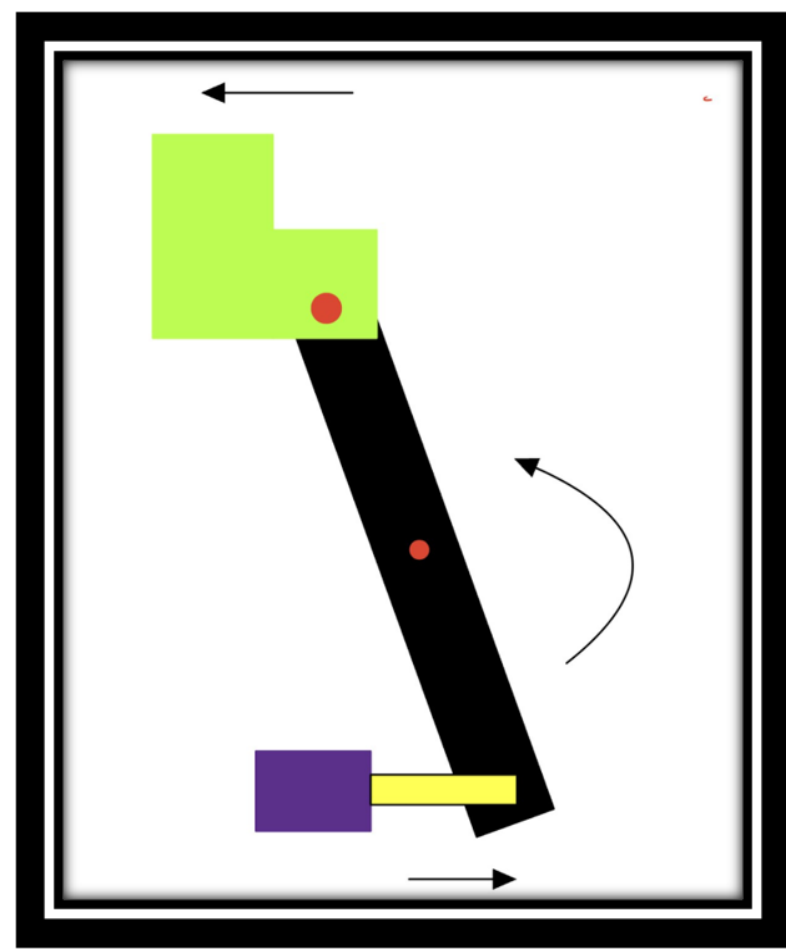


Current clamping mechanism

### Design Options:

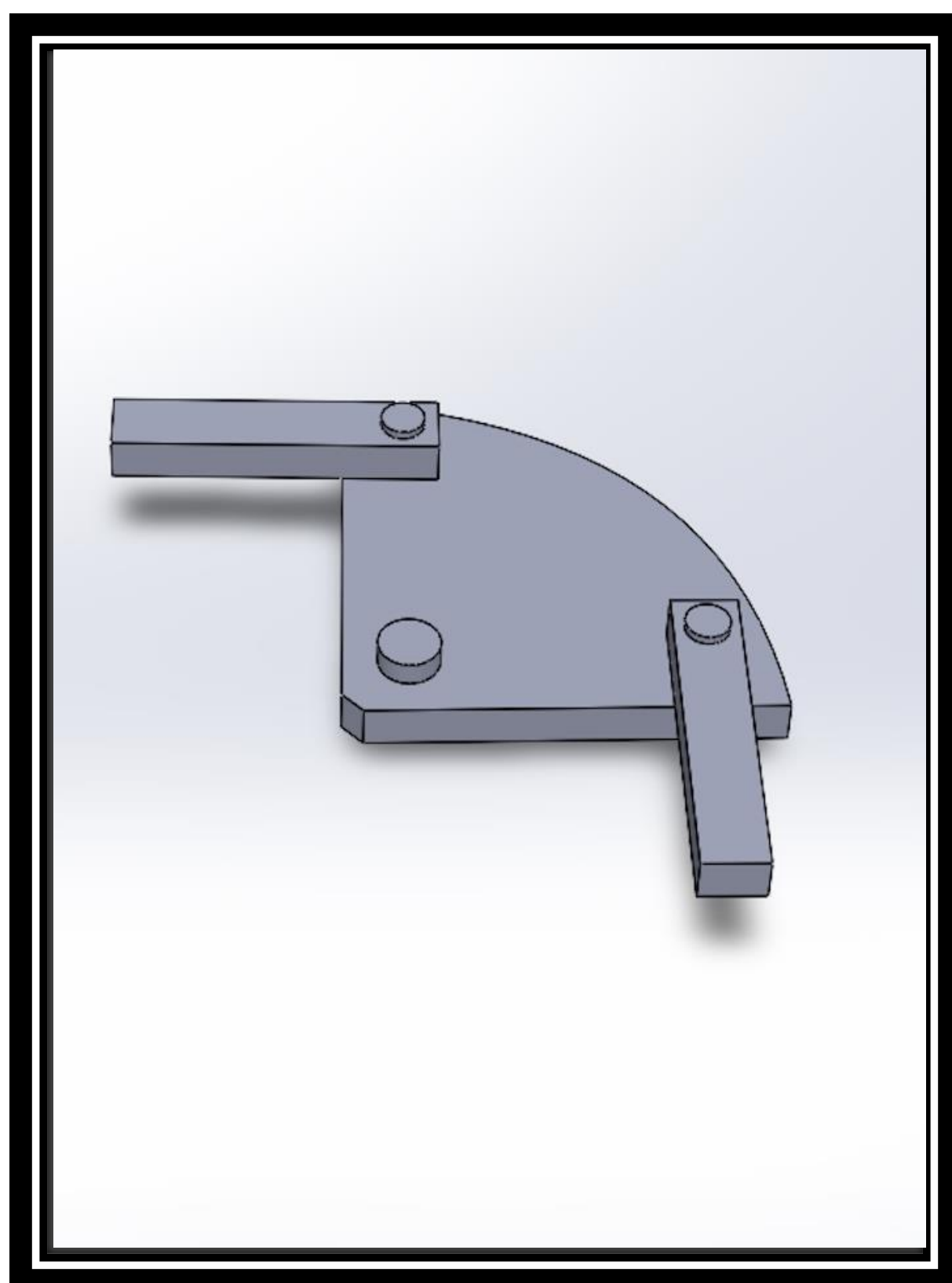


Design Option #1

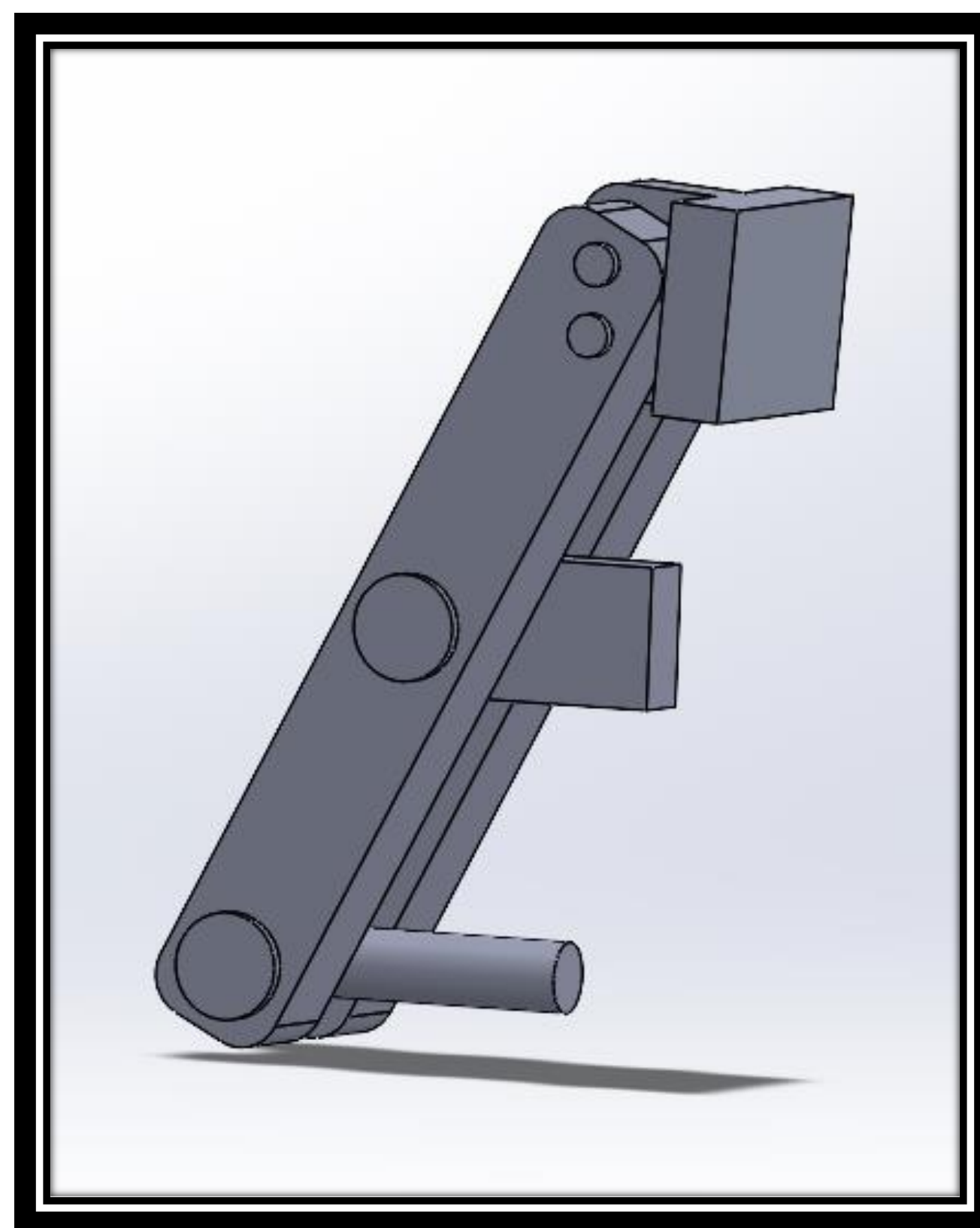


Design Option #2

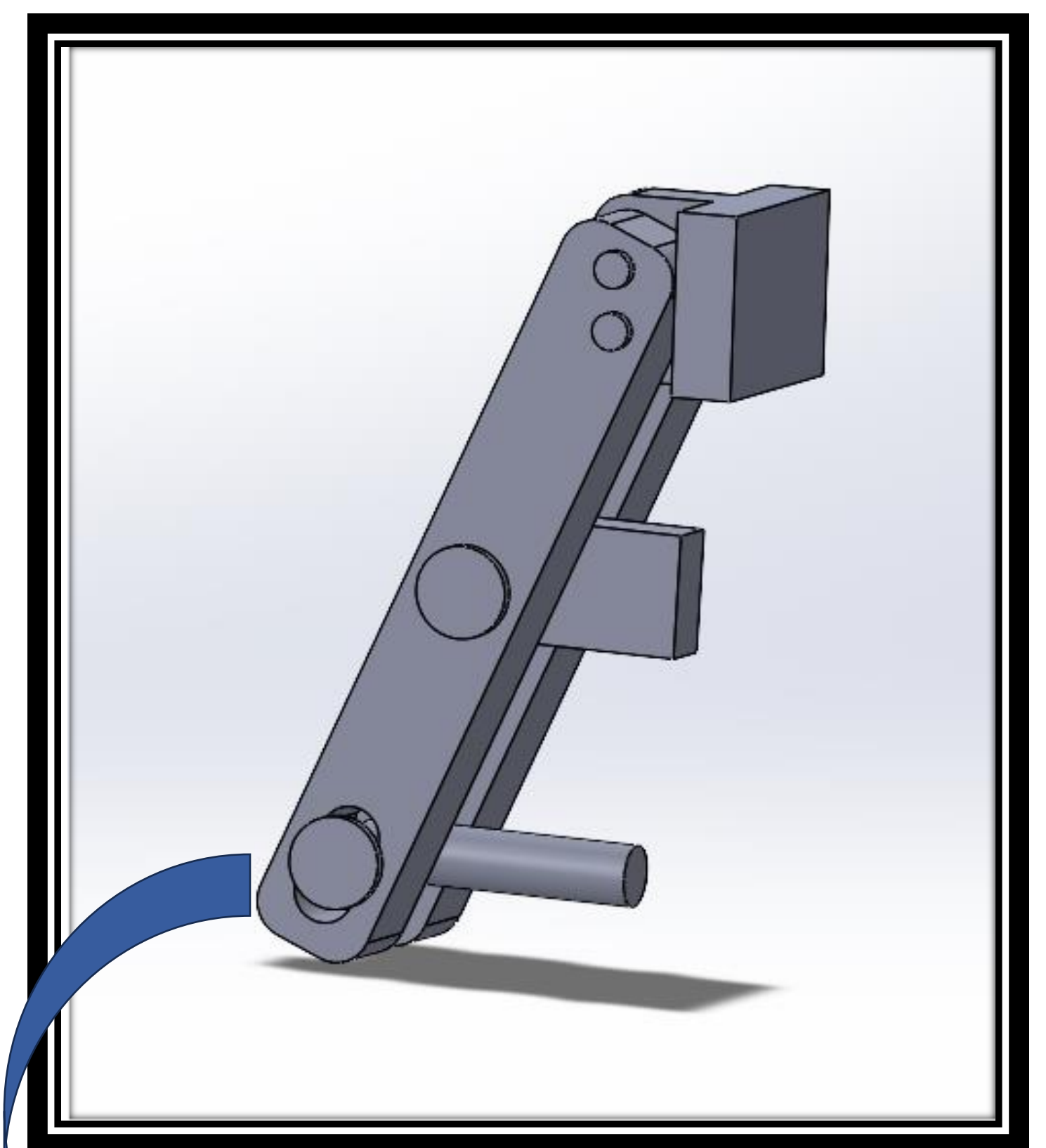
### Auto CAD 3D Modeling:



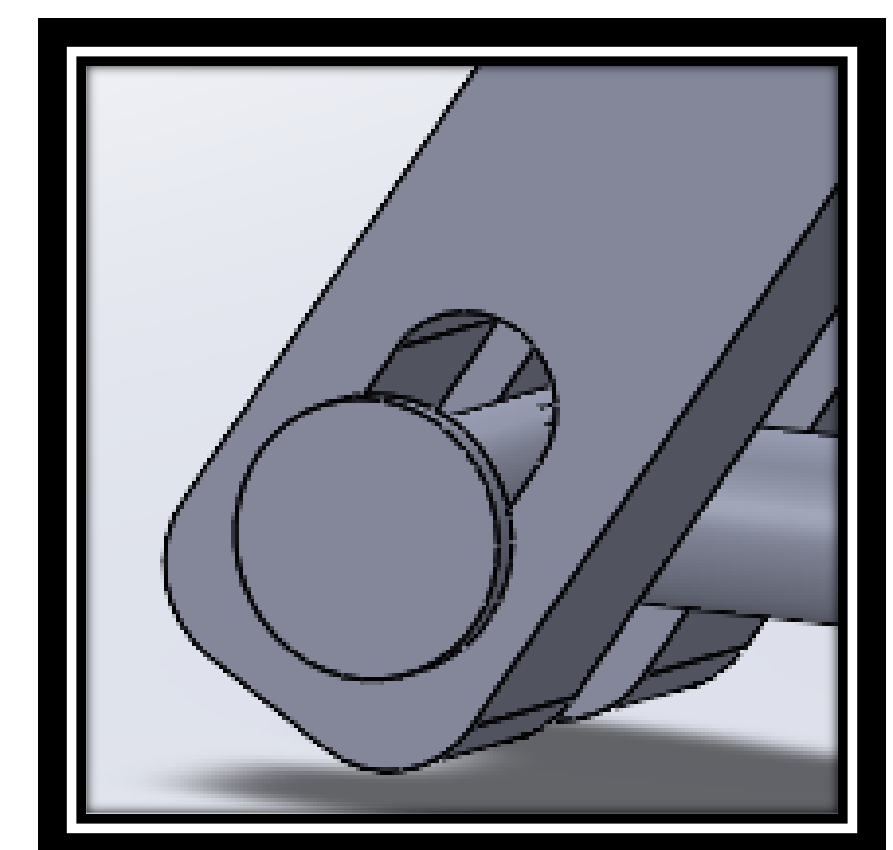
Bell Crank



Lever Arm



Lever Arm (with slot)



### Next Steps:

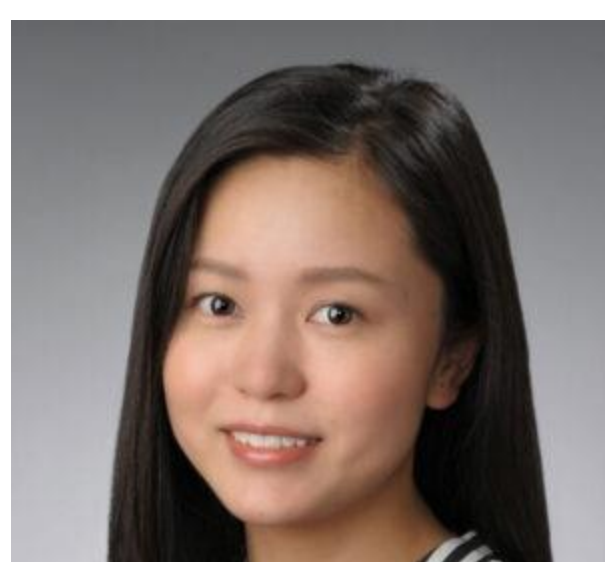
1. Finalize 3D models
2. FEA simulations in Ansys
3. Prototyping and testing at Pursuit facility

### Deliverables:

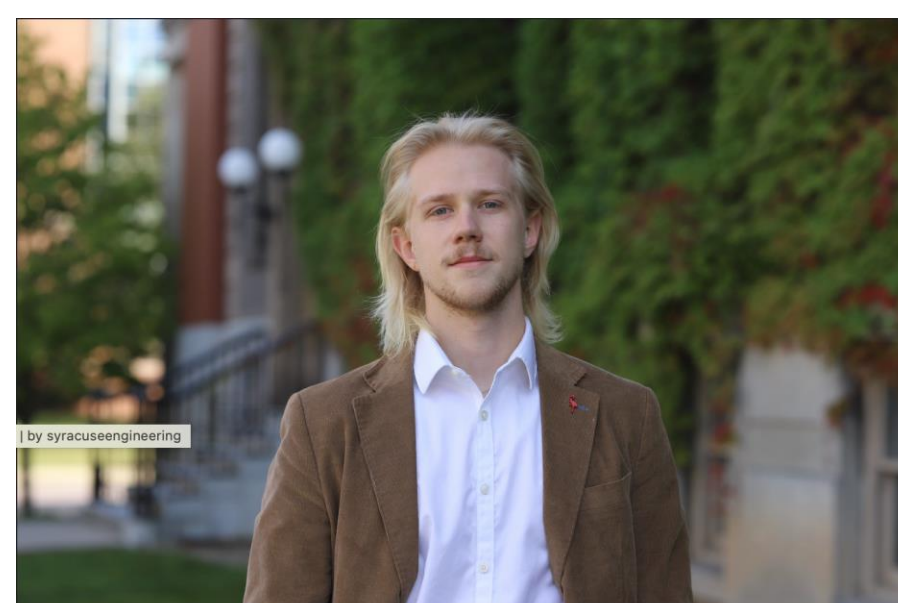
1. Manufacturing ready design for clamping system with 3D models and drawings
2. Prototype clamping system and testing to be performed on site at Pursuit

### Possible solutions:

1. **Design Idea #1 Bell Crank:** This design utilizes a double action hydraulic piston (purple) tilted 45 degrees upward from the horizontal. The bell crank (green) is then used to translate the motion of this piston 90 degrees, so that the motion of the clamp end (green) and follower (yellow) is perpendicular to the motion of the piston. This will allow the clamp to retract down and out from the part.
2. **Design Idea #2 Lever Arm:** This concept also requires the use of a double action hydraulic piston; however, the piston (purple) is oriented horizontally. As the piston extends, the bottom of the lever arm (black) moves to the right causing the opposite end of the arm attached to the clamp (green) to move to the left. To restrict the motion of the piston to one direction, we have also modeled this idea with a slot that allows the bottom pin to slide lengthwise with respect to the lever arm.



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