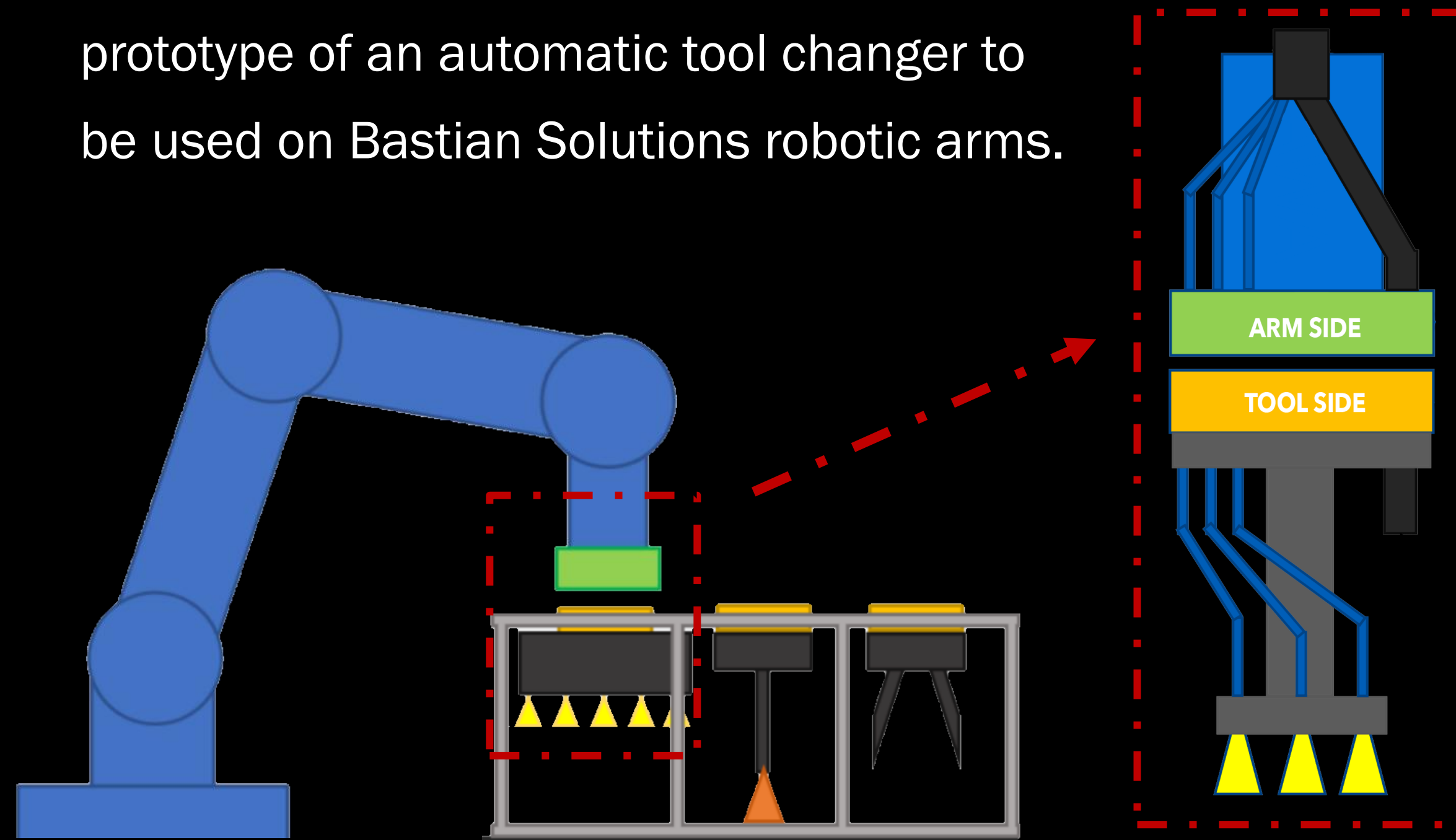


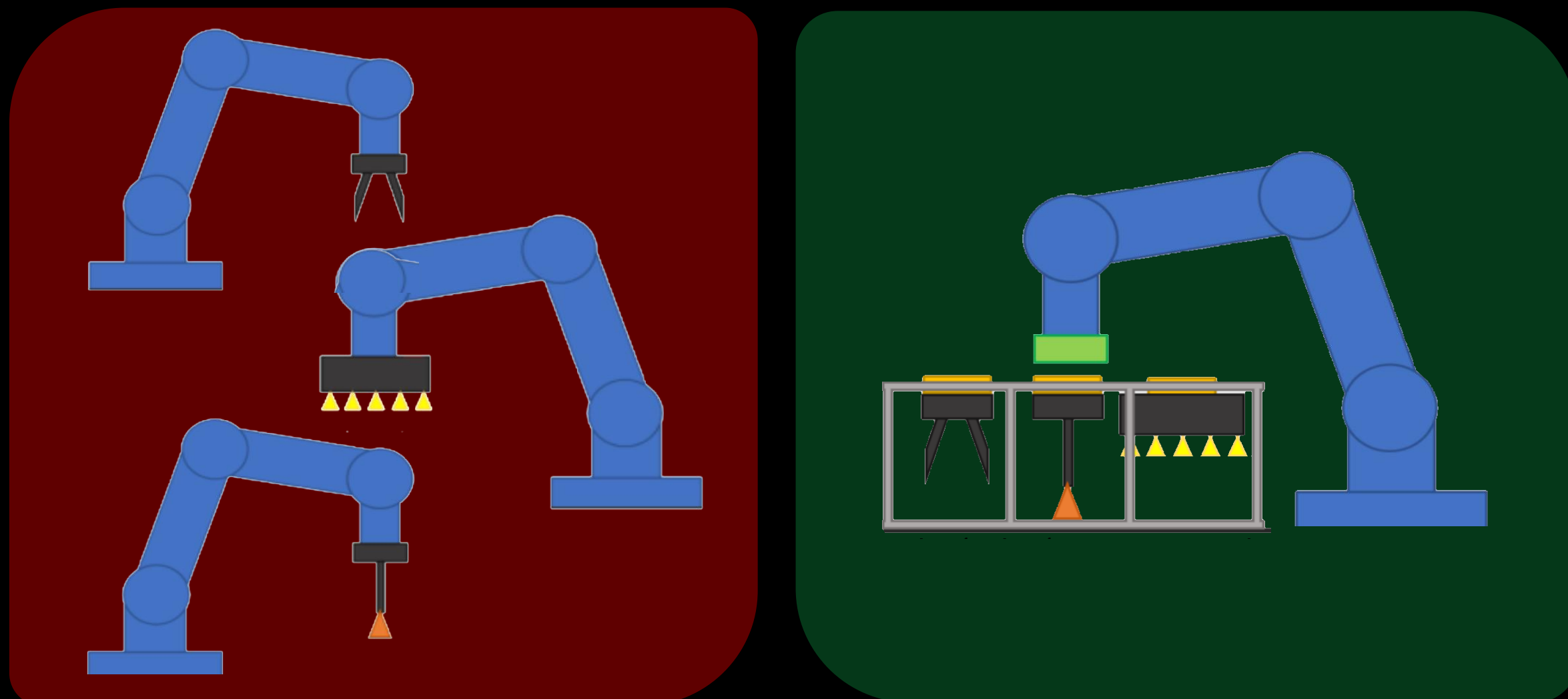
OBJECTIVE + BACKGROUND

Complete a feasibility study by developing a prototype of an automatic tool changer to be used on Bastian Solutions robotic arms.



VALUE PROPOSITION

- Increase utility and capability of each robotic arm
- Reduce cost and increase profit by maximizing value



KEY REQUIREMENTES

- Support 35 kg
- Support 70 N-m load
- Seal with IP-67 rating
- 150mm diam., 100mm height
- Pneumatic, electric, and data passthroughs

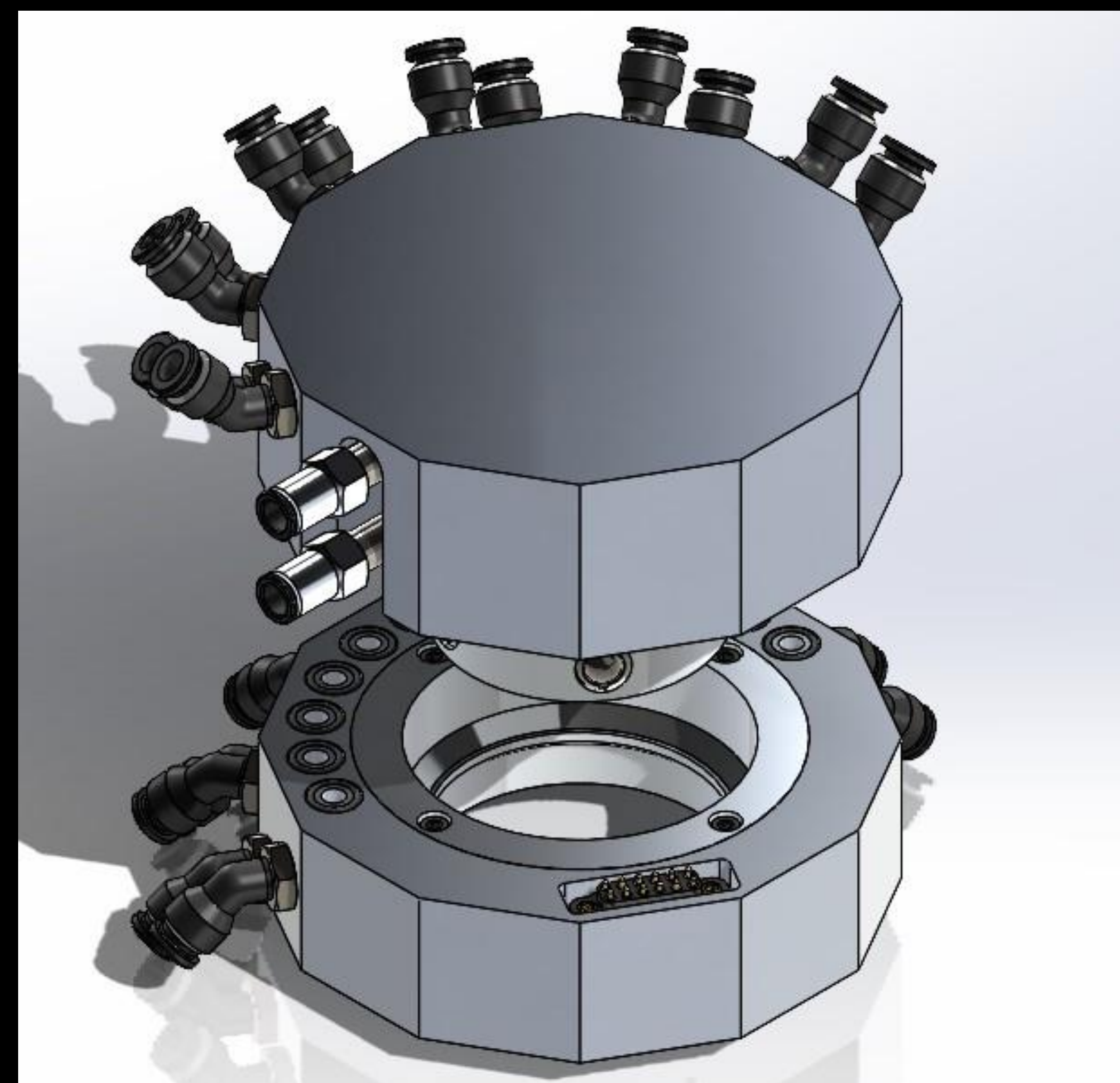
CONCEPT DEVELOPMENT

Category	Function	Locking Force Power	Locking Force Direction	Clamping Mechanism	Clamping Force Direction	Guiding Features	Disengagement Mechanism	Score	Rank
Feasibility	Electric	1	2	1	2	1	2	1	1
Cost	Pneumatic	2	1	2	1	2	1	2	2
Reliability	Arm Powered (Pneumatic)	3	3	3	3	3	3	3	3
Stability	Rotational	1	1	1	1	1	1	1	1
Maintainance	Vertical	2	2	2	2	2	2	2	2
Reliability	Horizontal	1	1	1	1	1	1	1	1
Total		10	10	10	10	10	10	10	10

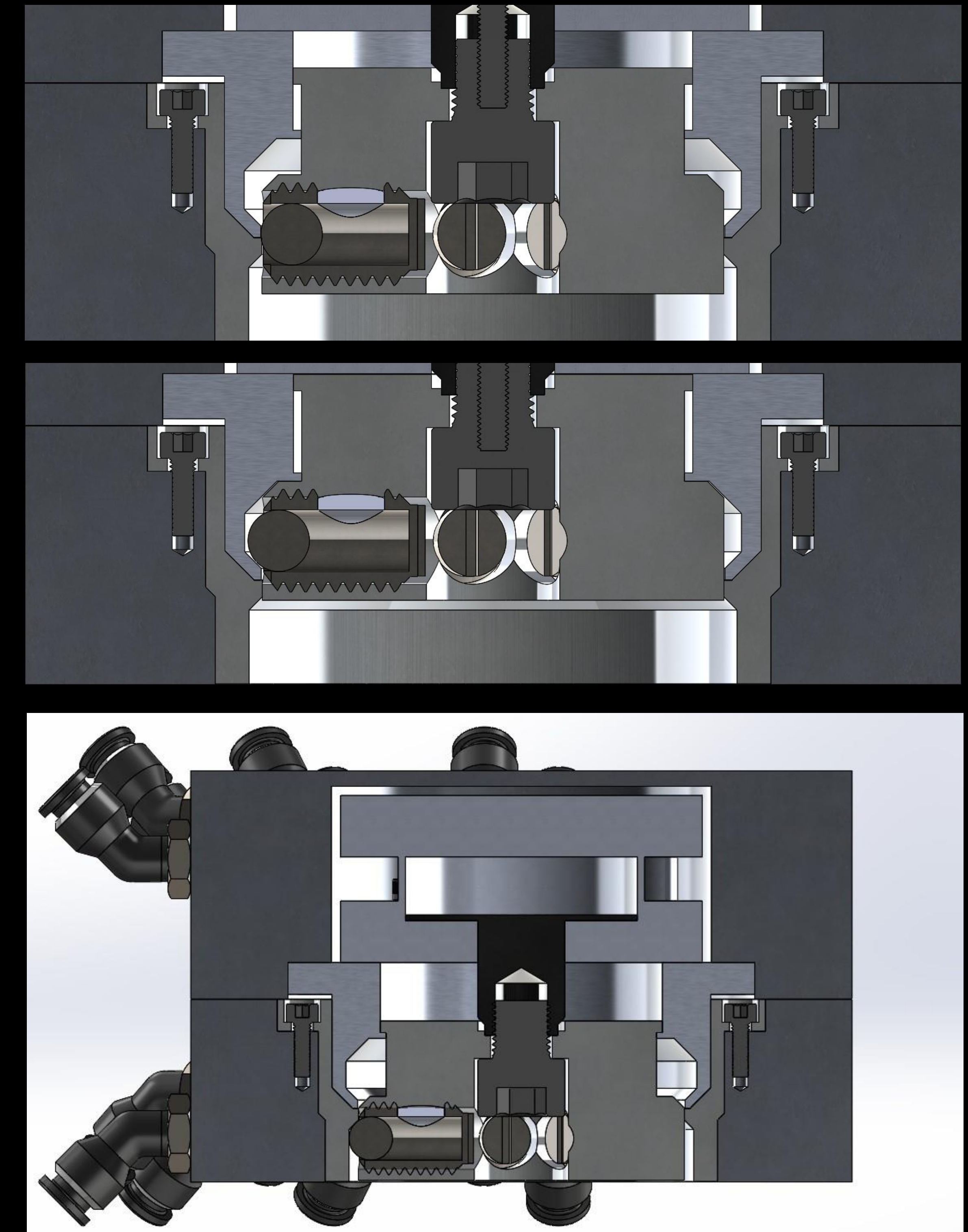
- 22+ unique, potential solutions were explored and assessed before settling on current design.

THE FINAL DESIGN

A piston internal to the arm side has spring plungers attached facing outward. Internal profiles on the arm and tool side cause the plungers to compress then extend into the tool side as the piston actuates down. The force from the spring plungers lock the two sides together requiring the retraction of the piston to free them.



LOCKING MECHANISM



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Lead Instructor: Dr. Swenson
Capstone Mentor: Keenan Bryan
Client Rep: Gabe Riggs



2024 Capstone Project

9 INDUSTRY, INNOVATION AND INFRASTRUCTURE



8 DECENT WORK AND ECONOMIC GROWTH

