# Automatic EoAT Changer

Budget: $5000

Recommended Disciplines: ME

Background: The robotics industry is ever evolving and making innovative strides in the realm of End of Arm Tools (EoAT). A wide variety of pneumatically and electrically powered EoATs have been developed for specialized tasks to meet the diverse product handling needs of the material handling industry. Bastian Solutions desires to pursue a Bastian brand automatic EoAT changer that allows a single arm to utilize any specialized EoAT it needs to complete the task at hand.

Scope: U of I will develop a scalable prototype of an automatic tool changer that meets Bastian Solutions criteria and requirements. Any specified IP and UL ratings are to be designed for, but do not need to be tested. High volume manufacturing methods such as injection molding and casting do not need to be considered in the final design phase. Prototype does not need to be tested to failure for validating targeted design life but will need to be validated for meeting static loading requirements. Storage racking for EoAT + Changer does not need to be fully designed, only concepted.
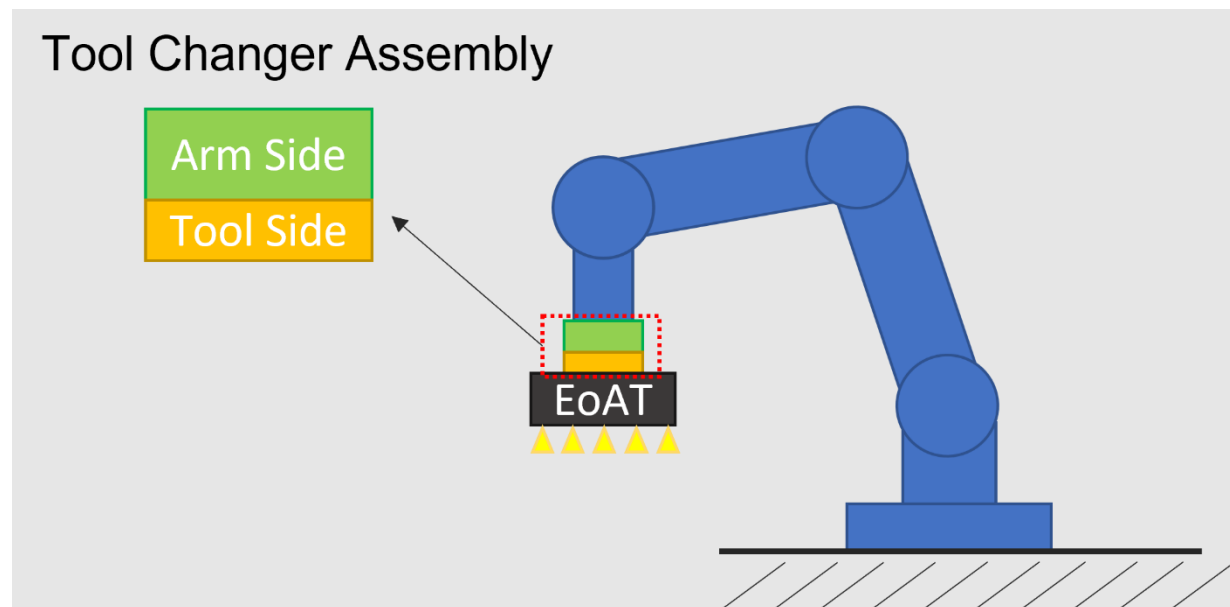
Mechanical Requirements:

- 12 pneumatic pass throughs and 1-2 additional if feasible
  - Rated Flow Rate – 12 scfm @ 76 psi
  - Pressure Rating – 120 psi
- Pneumatic Supply – 130 psi @ 18 scfm
- Payload – 35 kg at center of Tool Flange (Includes EoAT and Tool Changer)
  - Mx – 70 Nm
  - My – 70 Nm
  - Mz – 70 Nm
- ISO mounting patterns for Arm and EoAT
- IP67 when tool changer is mounted and EoAT is attached
- Design Volume – 150 mm OD, 100 mm tall cylinder
- Design Target Life – 10^6 cycles (Connect and disconnect is one cycle)
- Feature interface for storing EoAT + Changer in some kind of racking
- Accuracy – Repeatable within +/- 0.001" and +/- 0.5 Degrees

Electrical Requirements:

- Electrical Power – 24V, 20A
- Communications:
  - 12x IO pass throughs
  - 1x Ethernet IP pass through

Projected Unit Cost: $1000 @ Quantity 100

Deliverables:

- Complete drawing package
- User Manual
- Recommended design improvements
- Fully functional prototype
- Test procedure/results
- Itemized Project Expenditures