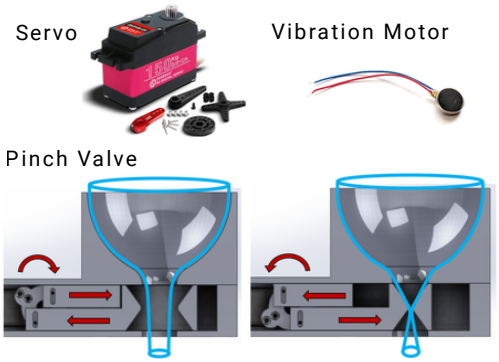
MYLES PRATT

MECHANICAL ENGINEERING AT THE MILWAUKEE SCHOOL OF ENGINEERING

prattm@msoe.edu
www.linkedin.com/in/myles-prattme
414-517-2355

PRECISE METERED SUPPLEMENT DOSAGE

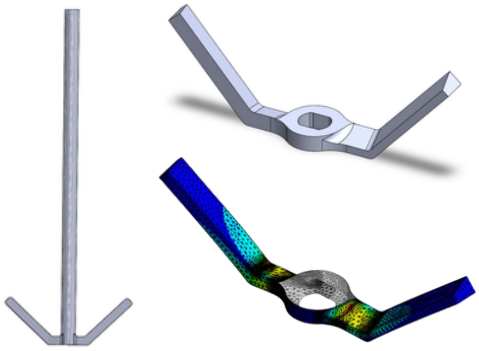
Nutris Rx



Pinch Valve Design with Chosen Actuators

Objective

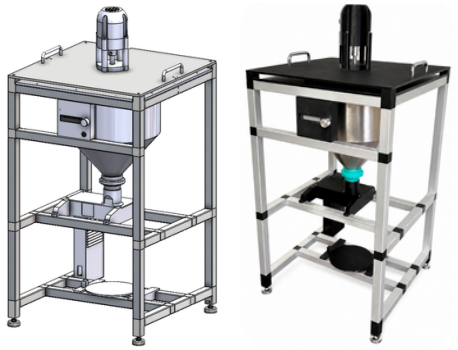
- Design, prototype, and validate an automated powder dispensing system for Nutris RX that improves dosing accuracy and cleanability.
- Meet a target of ±5% mass accuracy across a 48–630 g dispense range while using food-safe, removable powder-contact components.



FEA on Powder Mixing Design

Method

- CAD modeled and iteratively prototyped the servo-actuated pinch-valve to control powder flow while allowing quick disassembly and sanitation.
- Performed FEA on the frame, and support components to ensure stiffness and durability, under dispensing loads.



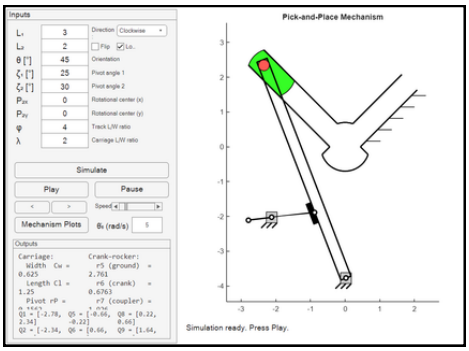
CAD Assembly (Left) and Finished Product (Right)

Results

- Validated the final prototype at ±2.5% mass accuracy, surpassing project requirement and demonstrating repeatable performance.
- Reduced cycle time by 75%, increased powder capacity by 11×, and delivered a cleaner, more production-ready dispensing process.

RECONFIGURABLE ROBOTIC MECHANISM RESEARCH

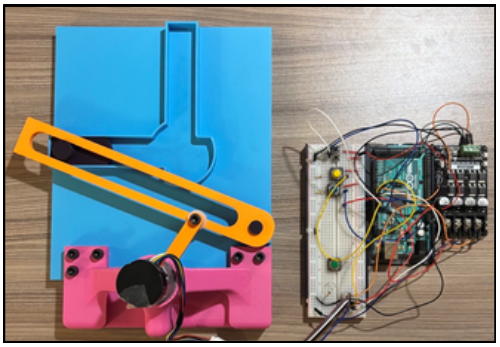
WSGC



Open Source MATLAB Mechanism Tool

Objective

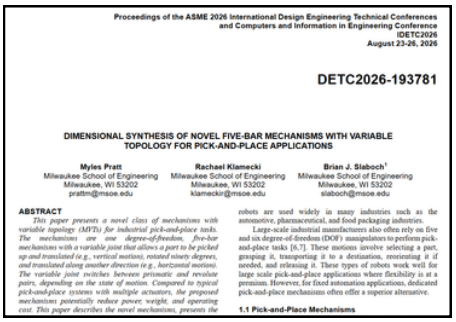
- Develop a novel five-bar variable-topology mechanism capable of achieving both translation and rotation for robotic pick-and-place tasks.
- Reduce actuator count compared to conventional robotic systems to improve mechanical efficiency, and simplify control.



Mechanism Prototype

Method

- Derived the mechanism's kinematic model and analyzed position, velocity, and acceleration to evaluate motion feasibility.
- Built a MATLAB design tool that synthesizes mechanism geometry from user-defined target points and visualizes motion.



Proceedings of the ASME 2026 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference
IDETC2026
August 23-25, 2026

DETC2026-193781

DIMENSIONAL SYNTHESIS OF NOVEL FIVE-BAR MECHANISMS WITH VARIABLE TOPOLOGY FOR PICK-AND-PLACE APPLICATIONS

Myles Pratt, Milwaukee School of Engineering, Milwaukee, WI 53202, prattm@msoe.edu
Rachael Klamecki, Milwaukee School of Engineering, Milwaukee, WI 53202, klameckir@msoe.edu
Brian J. Slaboch, Milwaukee School of Engineering, Milwaukee, WI 53202, slaboch@msoe.edu

ABSTRACT

This paper presents a novel class of mechanisms with variable topology (MVTs) for industrial pick-and-place tasks. The mechanisms are one degree-of-freedom, five-bar mechanisms with a variable joint that allows a part to be picked up and translated (e.g., vertical motion), rotated ninety degrees, and translated along another direction (e.g., horizontal motion). The variable joint switches between prismatic and revolute pairs, depending on the state of motion. Compared to typical pick-and-place systems with multiple actuators, the proposed mechanisms potentially reduce power, weight, and operating cost. This paper describes the novel mechanisms, presents the

robots are used widely in many industries such as the automotive, pharmaceutical, and food packaging industries.

Large-scale industrial manufacturers also often rely on five and six degree-of-freedom (DOF) manipulators to perform pick-and-place tasks [6,7]. These motions involve selecting a part, grasping it, transporting it to a destination, reorienting it if needed, and releasing it. These types of robots work well for large scale pick-and-place applications where flexibility is at a premium. However, for fixed automation applications, dedicated pick-and-place mechanisms often offer a superior alternative.

1.1 Pick-and-Place Mechanisms

ASME IDETC 2026 Conference Paper

Results

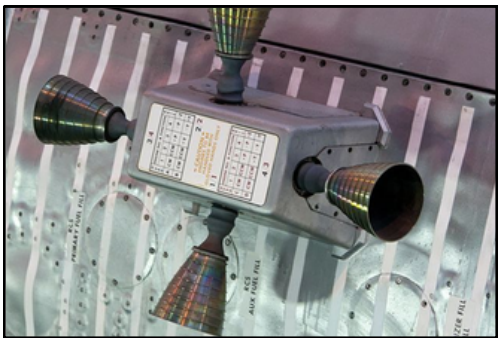
- Validated the kinematic model through SolidWorks CAD design and a 3D-printed prototype.
- Demonstrated a one-degree-of-freedom mechanism concept that can reduce actuator count compared to conventional multi-actuator systems.

MYLES PRATT

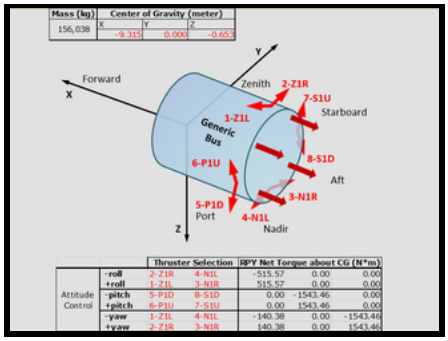
MECHANICAL ENGINEERING AT THE MILWAUKEE SCHOOL OF ENGINEERING

prattm@msoe.edu
www.linkedin.com/in/myles-prattme
414-517-2355

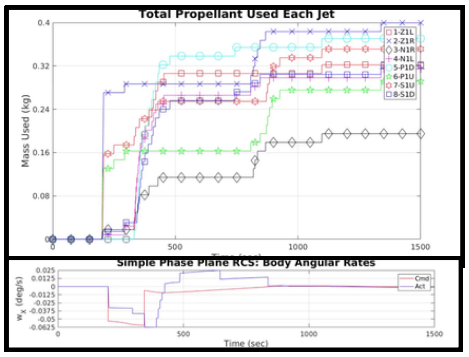
SPACE STATION THRUSTER SIMULATION TOOL



Reaction Control Thruster



Thruster Arrangement Example



Fuel Use and Angular Velocity Metrics

Objective

- NASA needs a simulation tool to evaluate RCS thruster proposals for future commercial space stations in 2031.
- Commercial partners provide NASA with space station specs and performance data to be modeled and simulated for evaluation.

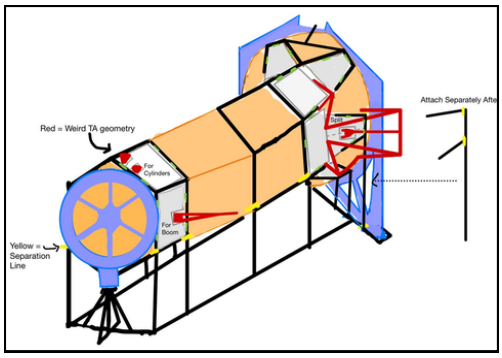
Method

- Built a simulation tool using Simulink Aerospace Toolbox and MATLAB to simulate Guidance, Navigation, and Control (GN&C) of space stations in orbit.
- Enabled rapid scenario testing by adjusting mass distribution, thruster configuration, and control parameters.

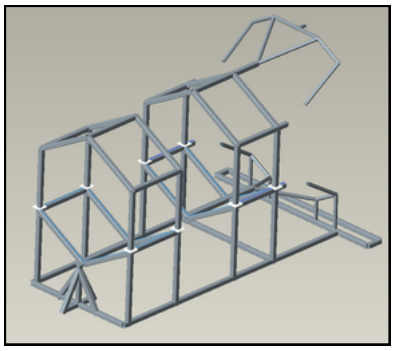
Results

- Produced accurate metrics showing how simulated space stations respond to thruster inputs and disturbances.
- Demonstrated fuel depletion effects, attitude control, and gravity gradient behavior from thruster use.

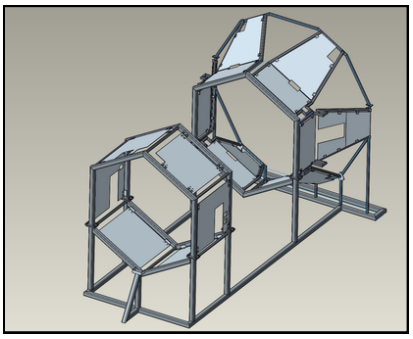
FLIGHT ARTICLE THERMAL VACUUM FIXTURE



Design Sketch



Conceptual Design



Presented Design

Objective

- NASA needs a fixture to support thermal vacuum testing of a 15 ft Blue Origin flight article in a 20 ft vacuum chamber.
- The fixture has to securely hold the test article while simulating space operating conditions with 18 heater plates near radiator surfaces.

Method

- Created an initial sketch and concept layout before developing the final fixture design using CAD (Creo).
- Divided the fixture into five weldments to accommodate complex boom and antenna geometries while supporting quick setup.

Results

- Presented the final fixture design to Blue Origin team, confirming it met thermal test requirements and chamber constraints.
- Ensured precise heater plate positioning and fixture stability to protect flight hardware during vacuum testing.