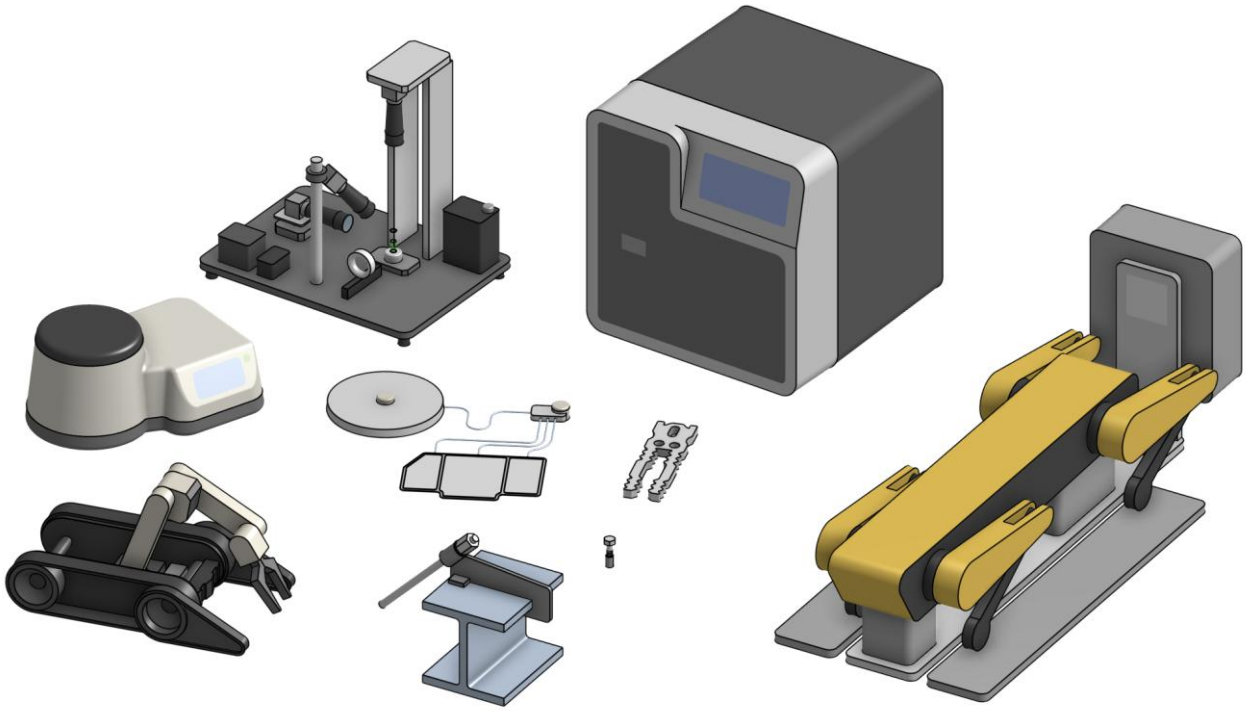
PORTFOLIO



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CAD

I apply robust modeling and assembly practices across a variety of CAD packages, including SOLIDWORKS, Onshape, and Creo. I understand the strengths and weaknesses of these platforms and continue to find and learn better ways of capturing design intent.

Capabilities:

- Appropriate application of detail to speed up concept modeling and improve performance in large assemblies.
- Proactive approach to collaborative design environments using revision control, interface specs, and top-down modeling.
- MCAD/ECAD management using common origins, keep out zones, and mounting for rigid and rigid-flex boards.
- Clear design intent through well-documented feature trees.
- Effective application of ASME Y14.5 Dimensioning and Tolerances.

Certificates:

- Certified SOLIDWORKS Professional (CSWP) [Sep 2020]
- Certified Onshape Professional [Mar 2022]

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ANALYSIS

I use a first-principles approach to all engineering analyses, starting with the basics before adding complexity. Simulations and calculations can quickly become rabbit holes, so goals and estimates must be established ahead of time and weighed against the possible benefits of build and test.

Capabilities:

- Ability to quickly learn new tools and workflows.
- Structural hand calculations using mechanics of materials, Roark's equations, AISC joint formulas, and weld design per AWS D1.1.
- Matching analysis rigor with project and regulatory needs to reduce overhead in low-risk designs and ensure safety in critical ones.
- Trained and demonstrated use of ANSYS Mechanical and SOLIDWORKS Simulation to gain design confidence and suggest changes before prototyping.
- Statistical tolerance stack analysis experience in complicated assemblies.
- Efficient and clear documentation of analysis inputs, assumptions, methods, results, and recommendations.
- Analysis scripting and automation using VBA, Python, and Mathcad to reduce errors and speed up iteration times.

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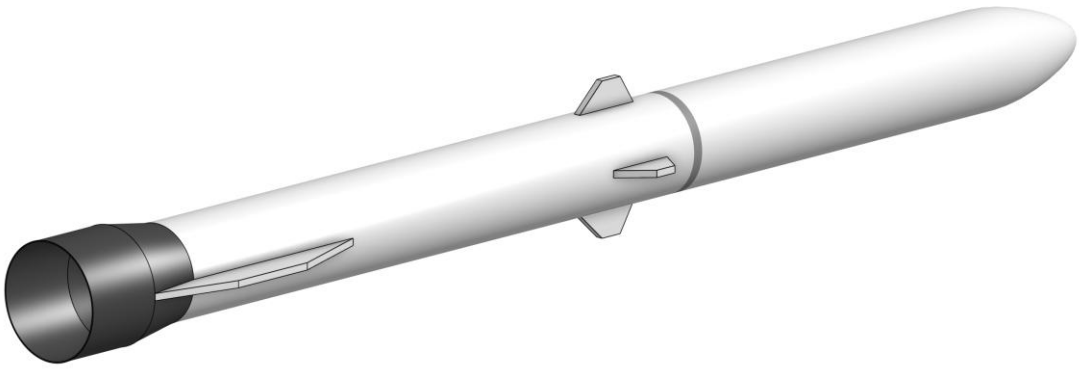
LAUNCH PAD

Design and analysis of heavy-lift ground support equipment and structures.

- Top-down design in Creo/Windchill.
- Optimized hydraulic lock design for safety based on simulation of large bolted joints and deformations due to loads in the millions of pounds.
- De-risked blast shield architectures through thermal hand calcs and ANSYS simulations of engine plume.
- Maintained detailed journals for all design intent, hand calculations, FEM models, and decision history.
- Led design of the rocket interface, accounting for stiction under high compression, and allowing flexibility in all degrees of freedom.
- Specified exotic metals to overcome harsh saltwater environments and direct rocket plume exposure.
- Designed in accordance with internally developed standards that reference NASA, AISC, and AWS, under an AS9100 certified quality system.

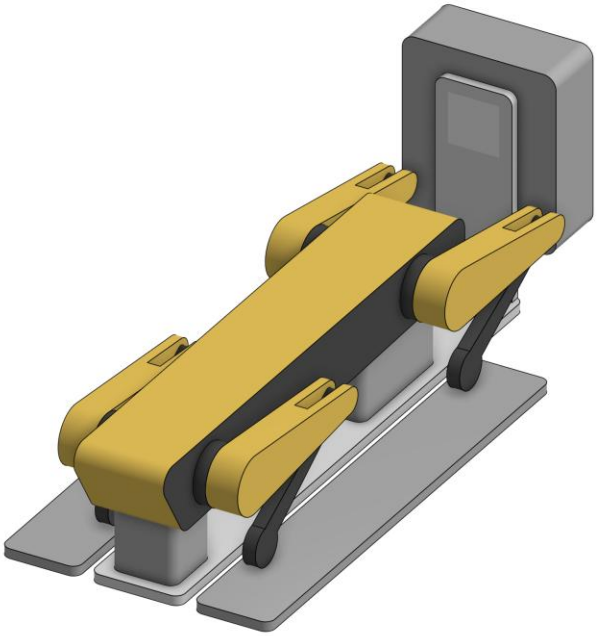


QUADRUPED

Mechanical design lead for first two iterations of the power and data transfer station for an autonomous robotic quadruped.

Sole mechanical designer utilizing CNC, MJF, waterjet, sheet metal, 3D printed silicone, and other processes to accelerate development time during challenging logistic constraints.

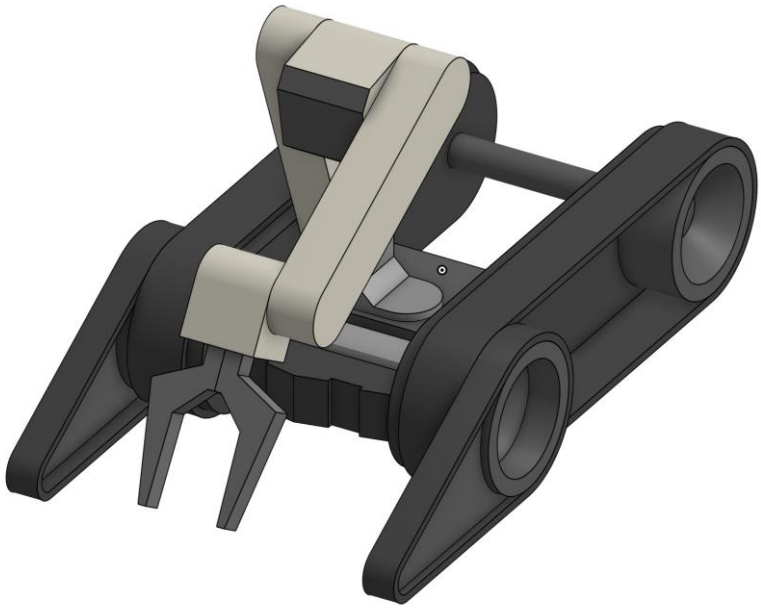
- Exceeded dock reliability margins with 99% success across thousands of tests.
- Planned and executed a tolerance study of the robot's positioning biases to reduce package size in the dimension of highest precision.
- Designed highly integrated indexing and connector enclosures under tight volume and mass budgets.
- Created custom high-cycle, self-cleaning electrical connector assemblies and actuation mechanisms to meet IP54 ingress protection and safely cover hot contacts.
- Collaborated with software engineers to separate changes worth solving in the behavior versus the dock to minimize project timeline.



UGV

Designed, tested, and assembled high-density, injection molded, and submersible optics and communications modules for a backpack sized unmanned ground vehicle (UGV).

- Implemented flow-down requirements for industrial design, ingress projection, keep-outs, and camera FOVs, while tracking mass as a KPI.
- Mitigated camera and flood light heat generation through conductive bridges, novel heat spreaders, and thermal chamber testing.
- Designed plastic injection-molded IP67 enclosures in Creo using skeleton modeling and sealing best practices.
- Optimized the design for the use of carbon-fiber reinforced materials, increasing thermal dissipation but requiring additional electrical insulation.
- Reduced mass, improved ease of assembly, and increased sealing reliability from the initial proof of concept.



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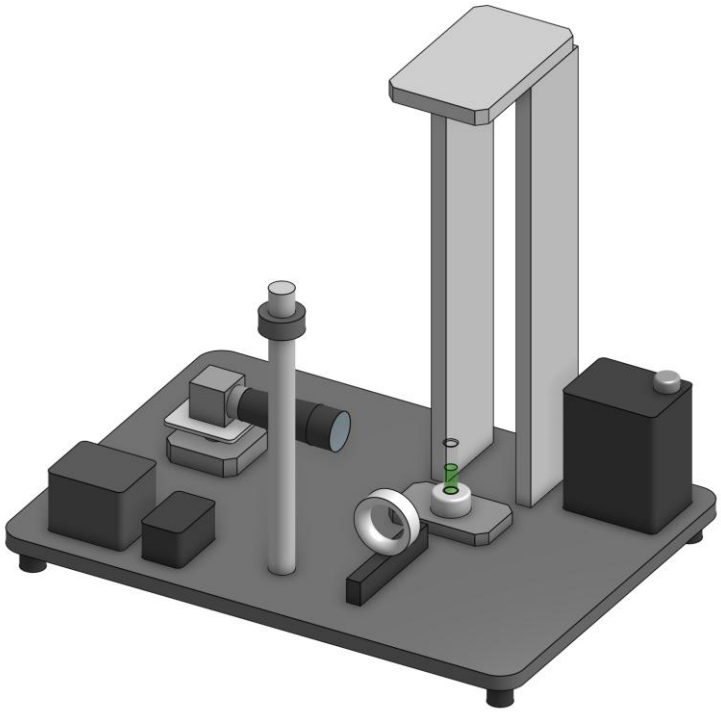
INSPECTION

Built, upgraded, and performed initial testing on a camera-based drug container inspection system.

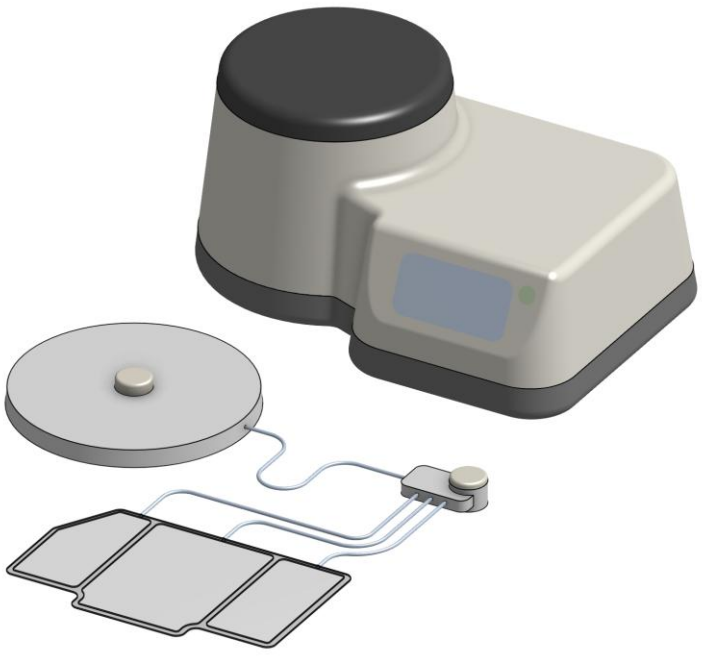
- Upgraded common off-the-shelf optics fixtures, 8020, custom CNC aluminum, and 3D printed jigs to create a breadboard-style system capable of easy reconfiguring.
- Modified a MATLAB app to reconfigure camera parameters, timing, motor controls, and UI elements.
- Seeded and sealed prototype drug containers in a laboratory environment for use in testing.
- Created a protocol and proctored an initial confidence test of the machine against the human method defined per USP <790>.



CENTRIFUGE

Research and development of mechanical upgrades to a centrifuge and disposable tube-set.

- Investigated the root-cause of acoustic noise using in-house and large-scale testing to improve patient and doctor experience.
- Prototyped and tested bearing and rotational sealing fixtures to characterize acoustic and thermal performance based on decibel output and vibration magnitude.
- Designed injection molded components, predicting flexure behavior with the BASF plastic design guide.
- Trade study of tubing connections, plastic bonding, and radiation/sterilization compatibility.
- Assisted systems engineers in writing requirements, DFMEAs, verification testing, design reviews, and risk analyses per ISO 13485.



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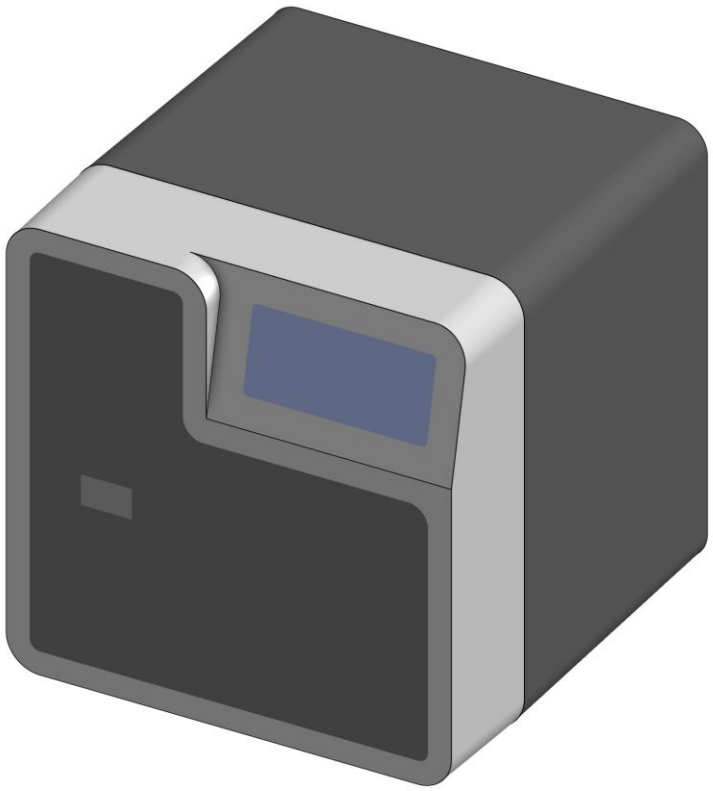
INSTRUMENT

Design and fabrication of electronics enclosures, camera cooling, and pneumatic conditioning systems for a micro-fluidics-based early sepsis detection device.

- Designed sheet metal main computer chassis, cable entryways, and cooling ducts in SOLIDWORKS inside large assemblies.
- Precision hand assembly of sub-micron motion and optical systems for testing, DFA improvements, and assembly documentation.
- Executed verification testing and associated design updates.
- Analyzed complex tolerance stacks to characterize assembly variance, motion limits, and optical requirements.



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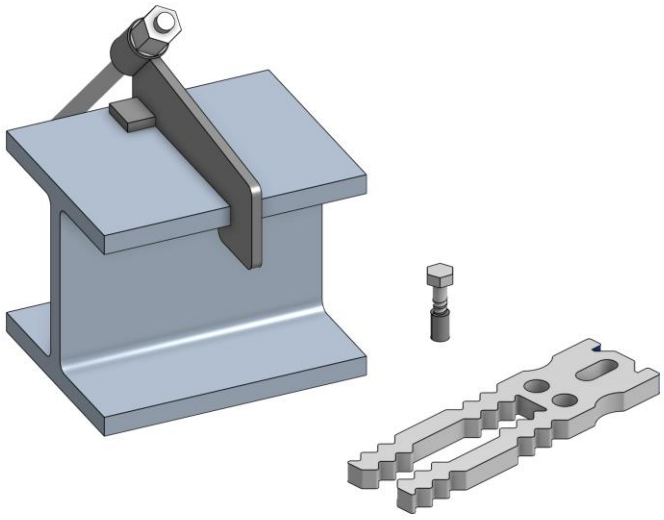
CONSTRUCTION

Research and developments of concrete construction accessories from ideation to launch.

- Led early brainstorming sessions and patent discovery for new product development.
- Created mechanical designs and modeled elastic behavior in SOLIDWORKS .
- Attended formal design reviews and coordinated with marketing on product launches.
- Managed large scale destructive concrete testing.
- Assembled formwork, placed rebar, poured, vibed, and screeded concrete panels.
- Designed large steel test fixtures.
- Gravity casted prototypes to vet long lead processes on accelerated timelines.
- Created SOLIDWORKS configurators for made-to-order designs to improve documentation consistency and eliminate mistakes.



PRO BONO

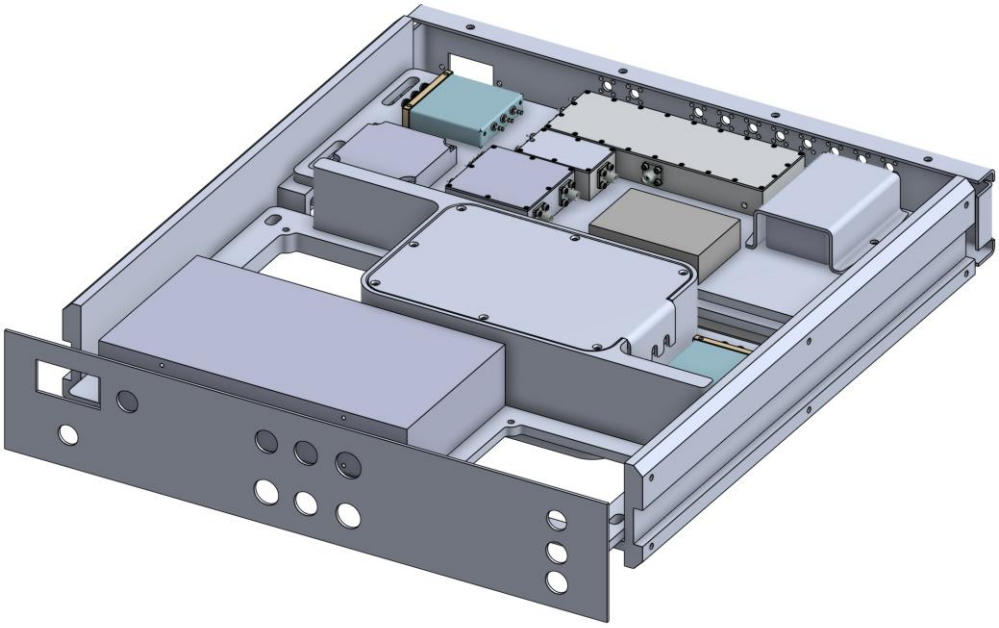
Provided product development consulting for a Boulder, CO startup. Vessel Works distributes, tracks, collects, and cleans sharable double-wall stainless mugs to reduce single-use plastics for food and beverages.

- Assembled cross-disciplinary team to execute a one week no-CAD retrofit on a non-functioning existing kiosk prototype, contributing to a successful demo at their next launch city.
- Continued long-term relationship in a ground-up redesign effort.
- Created concept CAD for multiple alternative architectures, focusing on cost reduction and waste fluid management.
- Designed mechanical enclosure for RFID scanner based on industrial design requirements.
- Led team of electrical, software, and systems engineers in design and fabrication of the most recent iteration.

CHASSIS

Converting an existing rack-mount equipment case into an ovenized, modular chassis for a GPS timing system.

- Designed CNC and sheet metal frames, trays, covers, and brackets for various RF modules.
- Considered cable routing and bend radii to avoid pinch points and allow for individual trays to be removed.
- Created and assembled in SOLIDWORKS.
- Improved shielding and ovenization for key components using an additional sealed enclosure with removable strain relief.



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