



Engineering Portfolio

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PUMP AND ACCUMULATOR SYSTEM FOR CREWED SPACEFLIGHT CAPSULE

Summary

- An electromechanical system controlling fluid pressure
- Bellow accumulator with centrifugal pumps

Contributions

- Engineering direction and manufacture/assembly documentation
- IPD Team
 - Implementing engineering changes
- Led root cause investigations
 - Accumulator leak
 - Presence of FOD in accumulator tank



PUMP AND ACCUMULATOR SYSTEM FOR CREWED CAPSULE

Challenges

- Accumulator leaks
- Foreign Object Debris (FOD) inside accumulator tank
- Improving system efficiency

Solutions

- Removed FOD while preserving accumulator tank
 - Created repair instructions FOD removal
 - New instructions obviated need to destroy tank
- Prevented further risk of FOD entry during assembly
 - Mandated additional assembly inspections
- Minimized risk of leakage
 - Reduced welded surface area
- Innovate highly efficient two-phase design (in progress)



THREE-WAY MODULATING VALVE

Summary

- Electromechanical system controlling flow of hydrofluoroether (HFE)
- Control balance between two flow paths simultaneously

Contributions

- Built valve prototype
 - Proof of concept and manufacturability
 - Identified and resolved design problems:
 - > HFE ingress into sensitive components
 - > Precise, real-time flow modulation
- Engineering direction and manufacture/assembly documentation
- IPD Team
 - Implementing engineering changes
- Real time assembly floor oversight and support



valvesolutions.com/product/3-way-flanged-globe-valve-with-belimo-actuator

THREE-WAY MODULATING VALVE

Challenges

- Precise, real-time flow modulation
- HFE contamination of ESD components
- Complex assembly process
- Defective components (supplier error)

Solutions

- Custom spool and actuator design
- Magnetic drive shaft design
- Prototype identified assembly challenges
 - Addressed in final assembly instructions
- Assembly involved live collaboration with shop floor
- Navigated part shortage issues
 - Identified alternate components



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AIR DROP PLATFORM STRUT SUPPORT SYSTEM

Summary

- Mechanical system to manage impact forces during airdrop

Contributions

- Designed innovative strut support system
 - Research, calculations, CAD models
 - Identified and resolved design problems
 - > Material flexibility
 - > Weight reduction
- Manufacture/assembly documentation
- Created working prototype
 - Led Cross-Functional team to create prototype
 - > Design, Manufacturing and Procurement



www.army.mil/article/254684/devcom_tests_airdrop_system_for_rapid_deployment_in_the_field

AIR DROP PLATFORM STRUT SUPPORT

Challenges

- Unique design, distinct from competitors
- Hardware durability
- Payload weight

Solutions

- Custom spring-loaded design
 - More compression on impact
 - High durability
 - Distinct from competitor solutions
 - > Mechanical over material
- Deliberate material choice
 - Maximized durability/weight considerations
 - Calculated requirements based on exerted forces



www.army.mil/article/254684/devcom_tests_airdrop_system_for_rapid_deployment_in_the_field

MECHANICAL AIR PRESSURE RELEASE VALVE

Summary

- Designing a reusable air bag system for air drop platform
 - Moved to reusable mechanical system

Contributions

- Designed air pressure release valve
 - Research, calculations, CAD models
 - Identified and resolved design problems
 - > Deployment timing
 - > Reusability
- Manufacture/assembly documentation
- Created working prototype
 - Led Cross-Functional team to create prototype
 - > Design, Manufacturing and Procurement



www.aerotechnews.com/blog/2022/03/17/devcom-tests-airdrop-system-for-rapid-deployment-in-the-field

MECHANICAL AIR PRESSURE RELEASE VALVE

Challenges

- Reusability
 - Common design is single-use (bursting air bag)
- Timed deployment
 - Must deploy at certain payload velocity
- Must withstand turbulent air flow

Solutions

- Custom valve design featuring sturdy, re-closable valve
 - Survived multiple impacts
- Magnetic locking mechanism
 - Valve deployed at defined air pressure threshold
 - Locking mechanism withstood turbulent air flow
- Created and tested working prototype
 - Simulation and field-based testing
 - > Test utilized military-grade air drop platform



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About Me

- Trilingual: English, Polish, Spanish
- Love building cool stuff
 - (Boeing Starliner field service at NASA)
- 3D printing (Ender 3 V2)
- Indoor rock climbing enthusiast

