

# ORv3 Blind Mate Liquid Cooling Interfaces Update

Glenn P. Charest – Technical Leader, Meta

Nick Goenner – Engr. Manager, SafeWay

Connect. Collaborate. Accelerate.



**OPEN**  
Compute  
Project®





# Overview of Team

- The group members includes liquid cooling component suppliers, solution providers, technical experts, ODMs, and end users.
- We are developing specifications & interfaces for blind mate liquid cooling solutions to be used with the ORv3 rack. Focus areas includes blind mate specific rack frame interfaces & support brackets, manifolds, blind mate valves, hoses & tubing solutions, and IT gear concepts



**OPEN**  
Compute  
Project®



**CoolIT**  
systems™



 **Meta**



Connect. Collaborate. Accelerate.

# Overview of Concept

- Blind mate solution with manifolds installed at the rear of the rack, with hot and cold manifolds split at each rear corner to maximize rear IT gear service access
- IT gear has the plugs
- Manifolds have the socket valves



Connect. Collaborate. Accelerate.



# Updates

- Completed testing of blind mate valves version shared during OCP Summit.
- Improved DFM/DFA verified with new design
- Solid progress on rack level flow distribution, nearly complete and flow variation looks promising
- Passed rack level shipping/distribution testing with full rack
- Revised design of valves and chassis were released and recently received in house
- Testing has begun



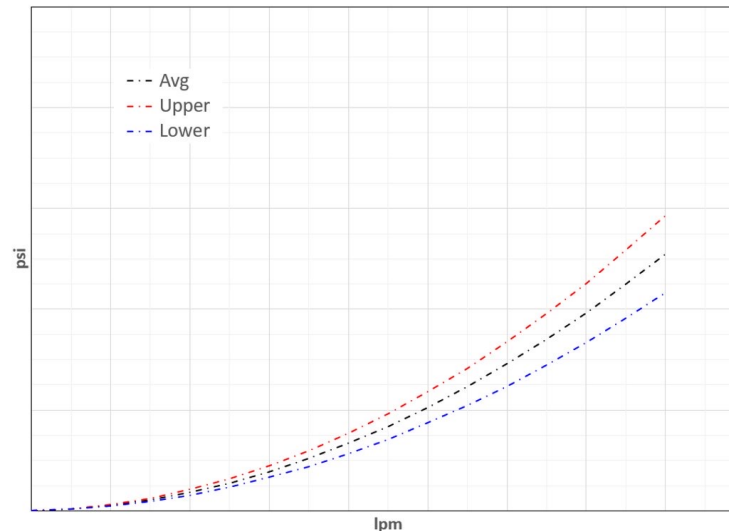
# Blind Mate Valve Updates

- Several valve design changes made based on learnings from last round of testing to improve interoperability, reduce mate & de-mate forces, better align P-Q curves between suppliers, etc.
- Many of the changes were vetted thru quick turn prototypes prior to accepting



# Flow Performance Updates

- QC testing: Adjustments to latest designs based on PQ results of previous spin
- Rack-level testing: Streamlined process and test setup to verify results of previous spin (incl. manifolds) with latest samples
  - We are gaining more knowledge from the rack-level flow testing. Early indications show that the flow variation is dominated by chassis/cold plate pressure, less so by the valves and manifolds.



# Manifolds

- No design changes since OCP Global Summit
- Manifolds with integrated 5mm QCs from all OCP partners have shipped and are currently undergoing validation testing for flow distribution and performance

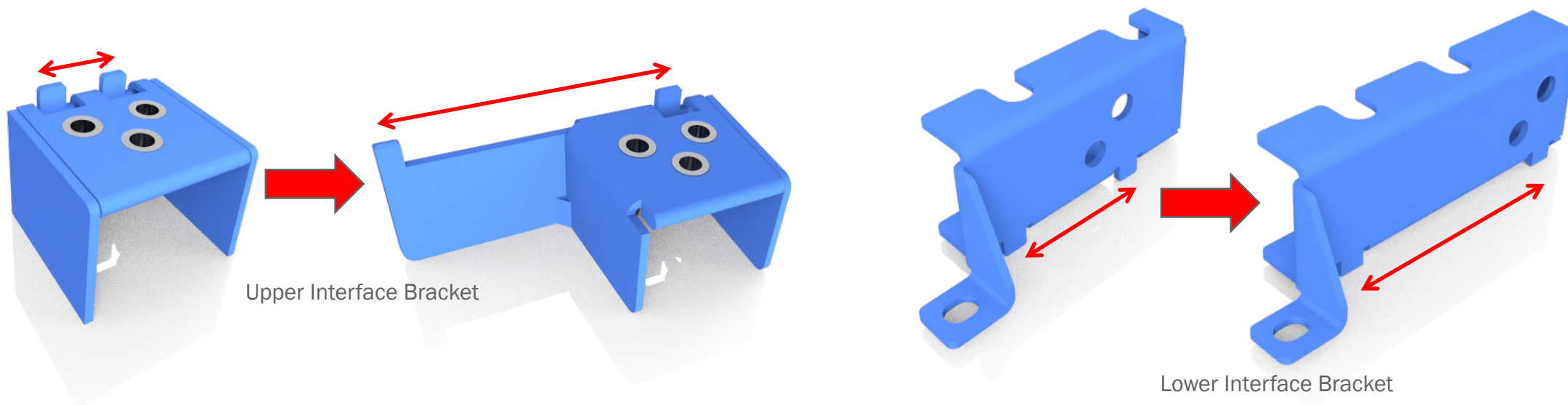
Connect. Collaborate. Accelerate.





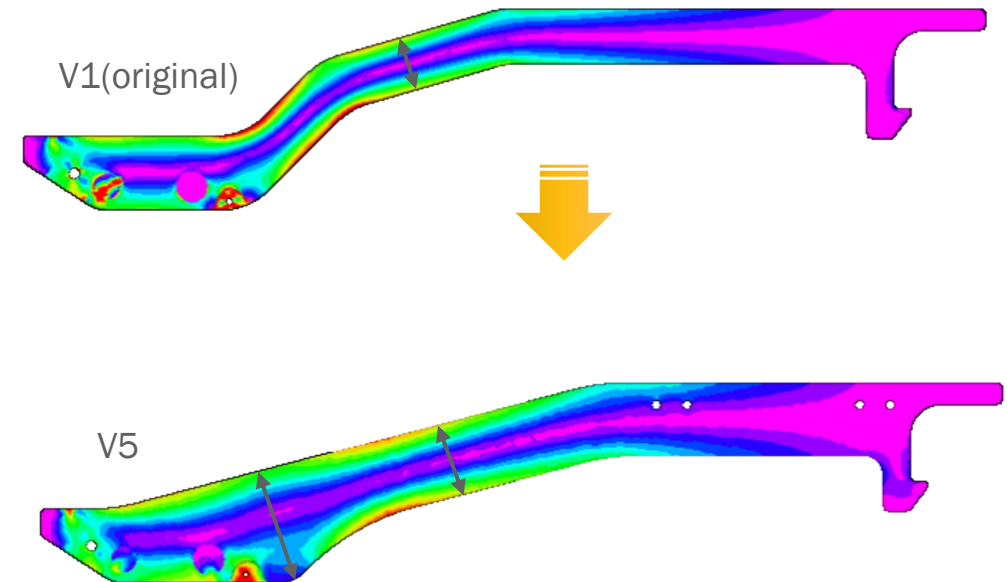
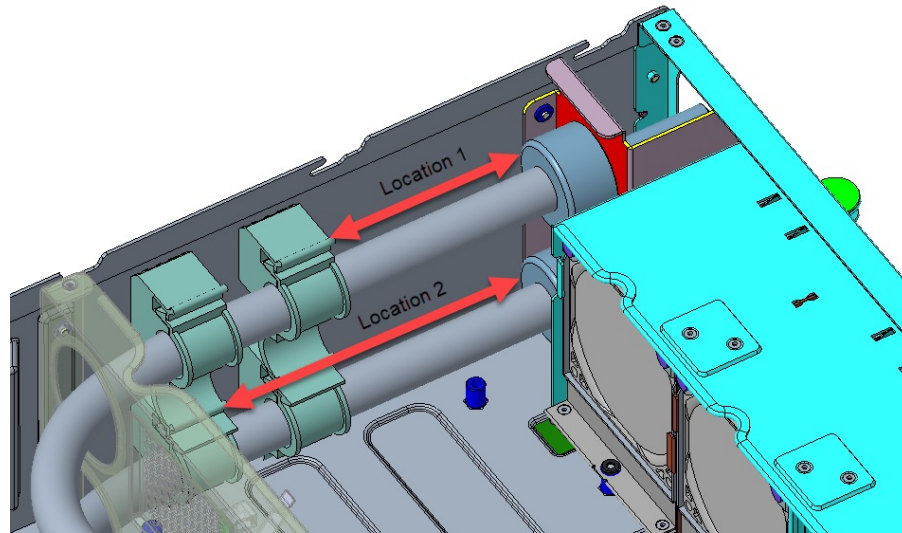
# Frame Updates

- Upper and lower manifold interface brackets have been updated to provide better rotational constraints and reduce angular tolerance of the manifolds. This change helps reduce angular tolerances on the socket valves on the manifolds.



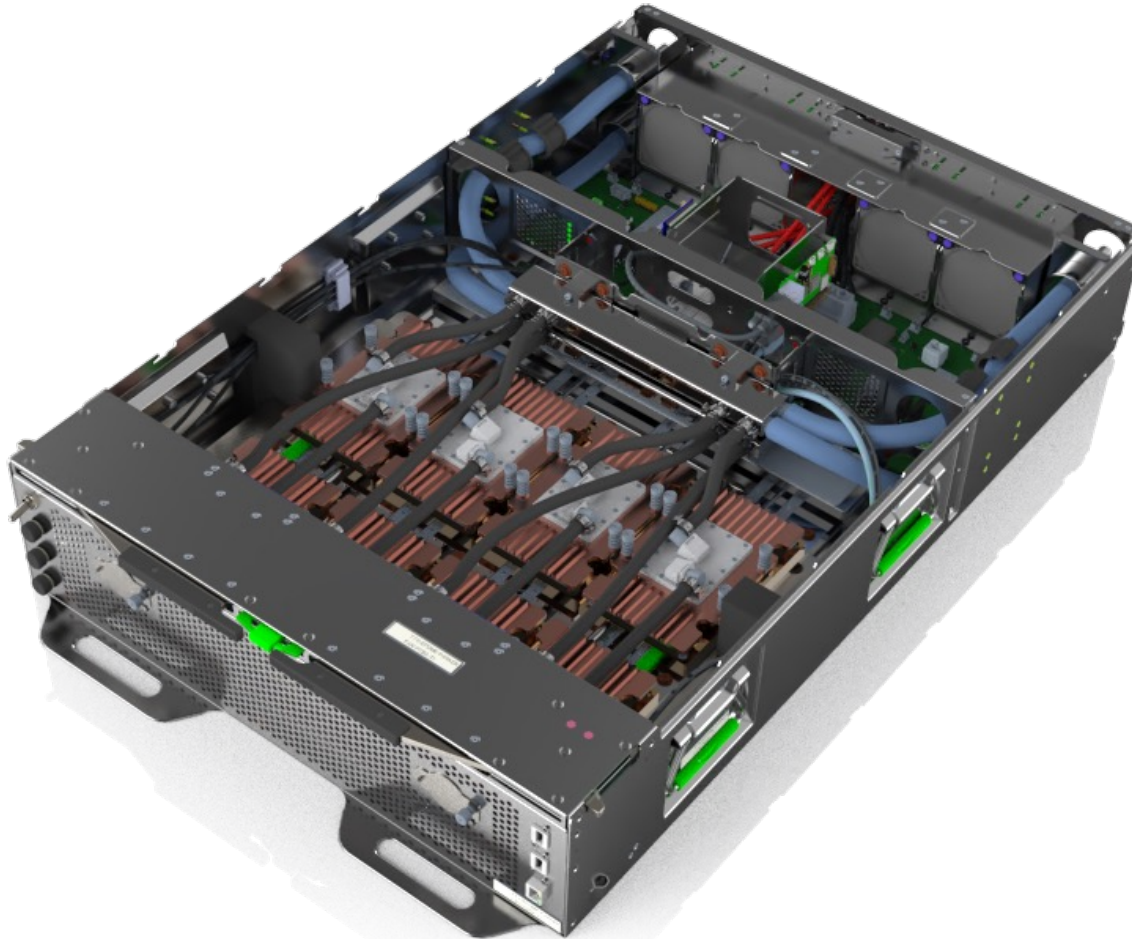
# IT Gear Design Updates

- Injector lever & mechanism strengthened
- Additional hose guide locations added to reduce hose affect on valves





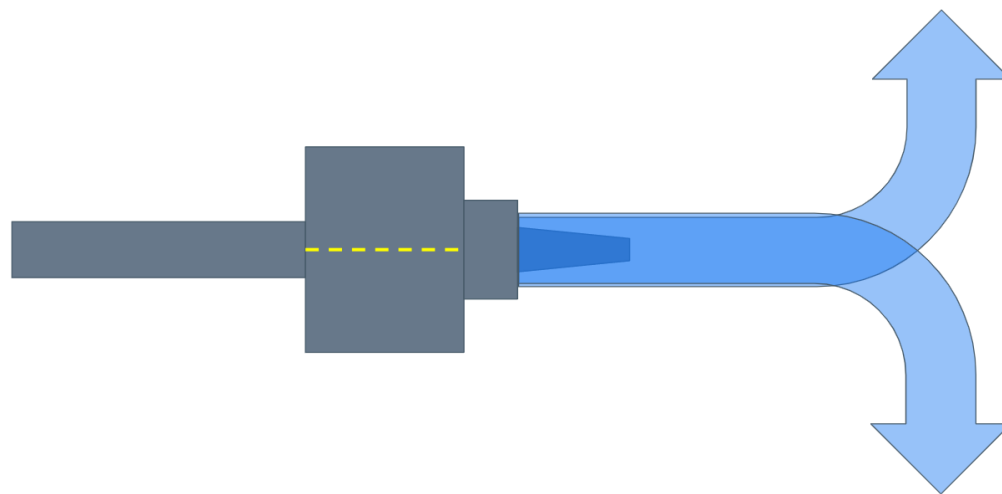
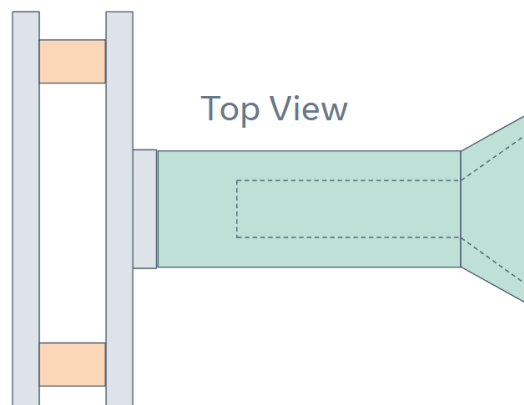
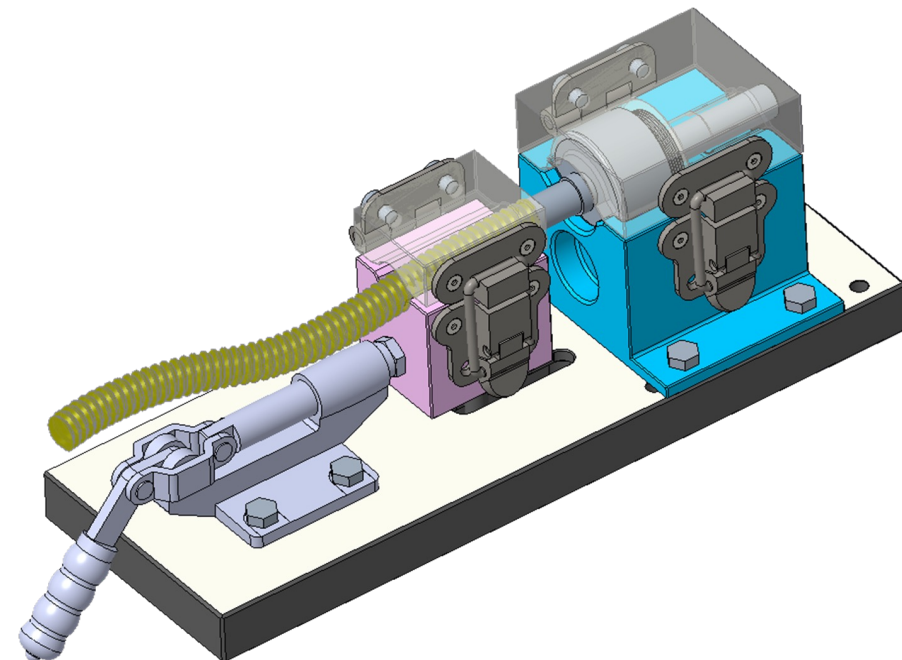
# IT Gear Design Updates



Connect. Collaborate. Accelerate.

# Hose & Tubing

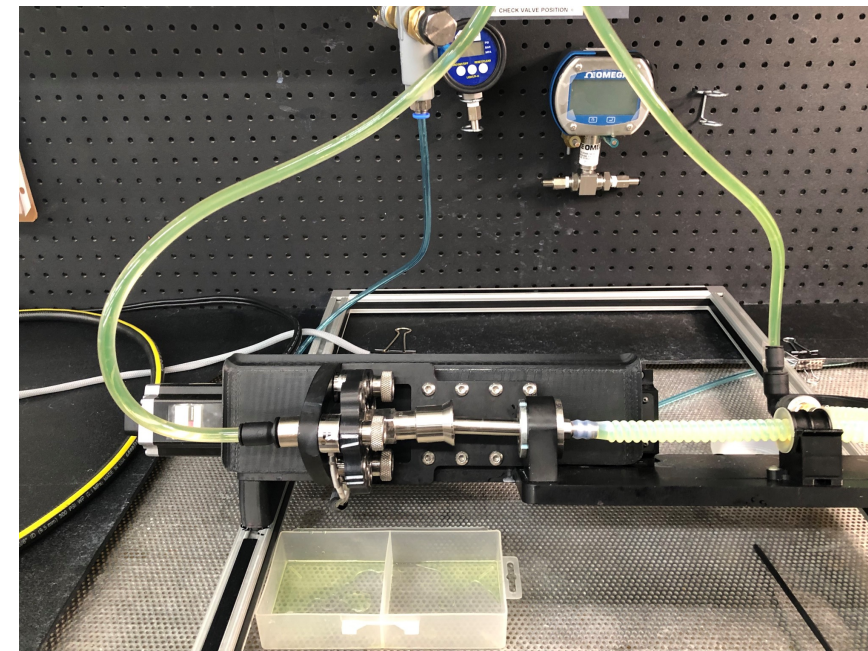
- Designed and built PTFE tube installation tool after feedback from suppliers
- Hose bias and routing have big effect on valve performance
- Added flexibility to test fixture to validate different scenarios





# Fixture Design Alignment

- During initial testing, the team realized that having an aligned blind mate valve fixture design across all supplier test locations was needed to ensure consistent results
- A fixture guideline was developed that documents agreed to key design parameters, design features, and component requirements.
- Examples include mechanical motion and orientation, load cell layout & ratings, adjustment capability, and allowable variation.





# Fixture Design Alignment

- All four suppliers and Meta made new fixtures for this new round of testing
- This is a great example of the growth and increased collaboration as the team has become more open. Best practices and tribal knowledge from all the suppliers contributed to the design guideline.





# Interoperability Testing

- This round of testing is the first time that suppliers will share and test each other's designs. Previous testing consisted of the suppliers testing their own designs. This level of testing and collaboration is not a common occurrence in the fluid component industry.
- There were concerns about IP in the beginning. However, the team developed enough trust in each other and worked out their concerns enough to develop basic terms for sharing and testing.
- Having tests performed by everyone spreads the work evenly across all the suppliers, adds confidence in the design, and is a more efficient way to execute the test plan the team has developed.

Connect. Collaborate. Accelerate.



# Test Planning & Optimization

Team developed raw data templates and test results templates mimicking the testing requirements and recommended test order from the Blind Mate Spec document

Goals were to:

- Clarify and standardize data collection and reporting (parameters, terminology, format)
- Simplify aggregation and interpretation of data from multiple test sites
- Distribute and minimize the burden of collecting and reporting the combined ~14,000 data points for the current test phase.





# Test Examples

- Valve Testing (mechanical, mate cycles, spillage, P-Q, etc.)
- Hose & tubing (pressure, fluid compatibility, etc.)
- Rack Level Flow Distribution
- Rack Level Mate Force and Mate Cycles
- Rack Shipping/Distribution testing



# Call to Action

## Join the mailing lists

- Advanced Cooling Solution: <https://ocp-all.groups.io/g/OCP-ACS>
- Cold Plate Work Stream: <https://ocp-all.groups.io/g/OCP-ACS-Cold-Plate>

## Project Wiki:

- [Main ACS Wiki](#)
- [ACS Cold Plate Wiki](#)