

XCOR UPPER-STAGE SHUTTLE VALVES

## Aerospace

Project  
Management



Mechanical  
Engineering



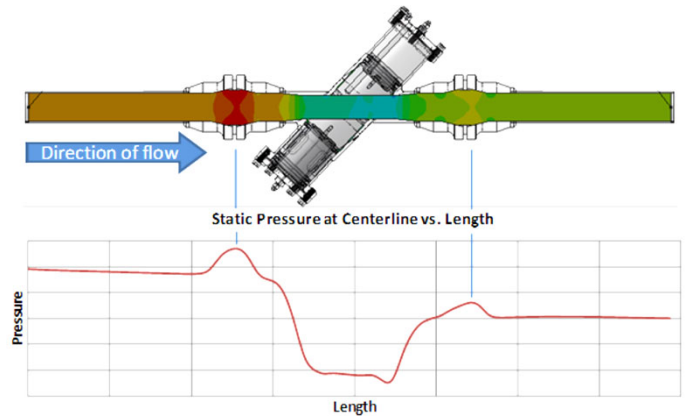
# ANALYZED VALVES USED IN NEXT-GENERATION UPPER-STAGE LH2/LO2 SPACECRAFT ENGINE

## APPROACH

- Performed finite element analysis (FEA) and computational fluid dynamics (CFD) simulations on the family of shuttle valves

## RESULTS

- Specified 2219-T98 aluminum for valve body for direct fuel exposure
- Determined pressure drop across fuel valve assembly for:
  - > Liquid hydrogen @ 30 psia, 20 K [-424°F]
  - > Gaseous hydrogen @ 975 psia, 375 K [215°F]
- Determined yield and safety factors for the given loading conditions
- Made design improvements to meet required safety factors
- Refined finite volume elements in high-gradient regions with solution-adaptive meshing
- Recommended design changes to decrease pressure drop
- Increased client's understanding of valve performance for future designs



## KEY TOOLS & TECHNOLOGIES

- SOLIDWORKS® Simulation and Flow Simulation

ALTEN TECHNOLOGY