

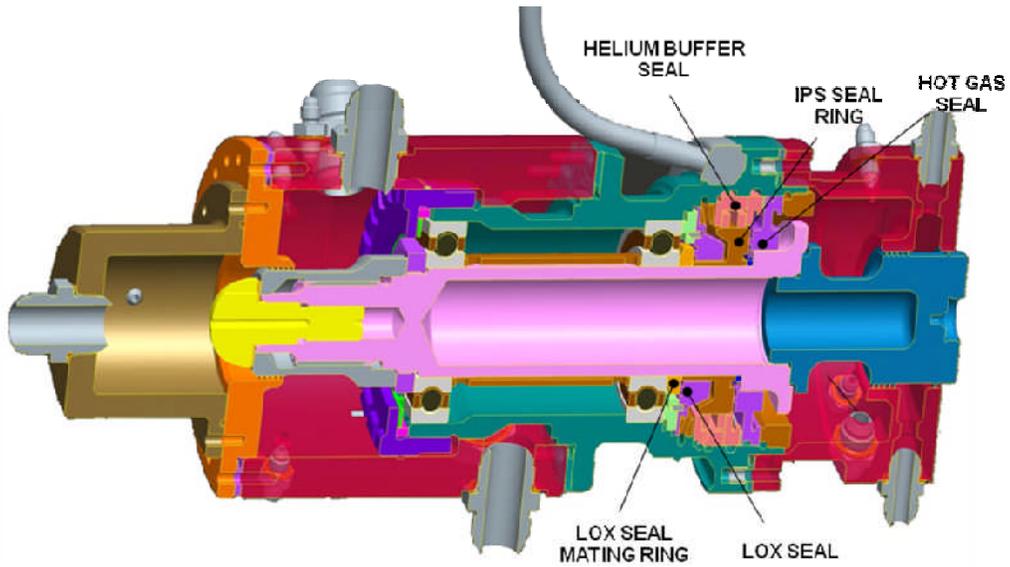
## ABSTRACT

40<sup>TH</sup> Aerospace Mechanisms Symposium

### TURBOPUMP SEAL TESTING AT THE MARSHALL SPACE FLIGHT CENTER

The new ARES space flight program has presented many challenges to aerospace engineers and designers. One of the areas for consideration are the seals in the turbopumps that supply cryogenic propellants to the combustion chamber in the upper stage. Heritage face seals that worked in the past might not be sufficient in the newer turbopumps with increased speeds, pressures across the seals, and loads. New seal materials, engineering designs, and analysis techniques have been developed since the early use of these heritage seals, however, rub conditions and surface degradation at the sliding contact cannot be reliably predicted. Testing is required to determine the safe operating limits and verify seal wear life over the operating range. Rocketdyne in Canoga Park California entered into a task agreement with MSFC to design, fabricate, build, test, disassemble, and inspect hardware after tests of carbon materials and wear resistant coatings. The purpose of testing would be to determine the safe operating limits, empirically iterate the design, and select the best combination of materials for face seals and mating rings. This paper summarizes the many hours and efforts of individuals and teams to get the program operating successfully and presents the test results that were obtained.

**J2X SEAL TESTER DIAGRAM**



**SEAL RIG ON TEST STAND SHOWING COOLANT PIPING AND INSTRUMENTATION**

