

Integrate RCS and OMS

Space Propulsion Technology
Assessment Workshop

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Current Baseline

Integrate RCS and OMS

- Separate RCS and OMS Systems
 - OMS (Example from STS)
 - Two 6,000 lbf thrust engines
 - Two sets of one NTO, one MMH, one GN2, and one GHe tanks with supporting feed systems
 - RCS (Example from STS)
 - One forward module
 - 14 primary and two vernier thrusters
 - One set of one NTO, one MMH, one GHe tank with supporting feed systems
 - Two aft modules
 - 12 primary and two vernier thrusters
 - One set of one NTO, one MMH, one GHe tank with supporting feed systems in each module
 - Some integration already exists
 - Same propellants
 - Can cross feed for functional redundancy
 - RCS can perform OMS function

Goal

Integrate RCS and OMS

- Desired gains
 - Fewer tanks
 - One less system to develop, certify, produce, and maintain
 - Reduced process manufacturing specifications
 - Reduced logistics train
 - Four fewer feed system modules
- No impact on actual engines
- Drawbacks
 - Increased feed line weight to reach one RCS set
 - Some increase in valving per each remaining propellant line to insure propellant feed
 - Overall, fewer valves

Potential Solutions

Integrate RCS and OMS

- Fully integrate RCS and OMS feed systems
 - Independent of using same propellants as main propulsion system
 - Result
 - One ox, one fuel, one GN2, and one GHe tank
 - One set of supporting feed lines
 - More extensive than any current set
 - Saved
 - Four tankage sets
 - One large
 - Three small
 - Some cross feed propellant feed lines and valves
 - Drawbacks
 - Loss of redundancy in feed lines
 - Add valving to retain redundancy into feed lines


Technology to Implement Solutions (TRLs)


Integrate RCS and OMS

- There is no new technology needed
 - This is a design decision
 - There is development cost, but probably much less than using separate systems
 - Dynamics demonstration of integrated system would be useful

Cost to Mature Technology

Integrate RCS and OMS

\$100K	
\$500K	
\$1M	
\$5M	
\$10M	
\$30M	
\$50M	
\$100M	
\$500M	

6 Mo	
1 Yr	
18 Mo	
2 Yr	
3 Yr	
4 Yr	
5 Yr	
5 Yr+	