

Minimize Cryo Conditioning to Start Engine

Space Propulsion Technology
Assessment Workshop

April 2001

Current Baseline

Minimize Cryo Conditioning to Start Engine

- Currently conditioning fluids supplied from ground and vented through an umbilical
 - Small amount of final conditioning from propellant tanks
 - Also vented
- Desire
 - Eliminate umbilical vents
 - Save some tanked propellant

Potential Solutions and Technologies (TRL)

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- Place pumps in tanks (3)
 - Turbine exhaust duct weights could be excessive unless also change tank placements
- Parallel tanks (6+)
- Use liquid He as part of conditioning (5)
- Lower NPSH boost pumps (4)

Potential Solutions and Technologies (TRL) (Cont'd)

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- Integrate flare stack into vehicle (4/5)
- Use a regenerative cooled inlet and pump (3)
 - Add a dual walled inner line or use part of vacuum jacket
 - Could be a passive thermal system
 - Could use a small pump
 - Could leave fluid in jacket
- or
- Could use valve and end with He purge and close off system
- No venting needed

Cost to Mature Technology

Minimize Cryo Conditioning to Start Engine

\$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+	