Special Operations Forces Industry Conference

Low-Cost Dry Submersible Technology & Dry Combat Submersible Light

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Maritime Systems

Low-Cost Dry Submersible Hull, Mechanical & Electrical Technology Development Objective

- Current status:
  - SOF Combatant Submersibles consist of low-cost wet swimmer delivery vehicles and a larger dry submersible
  - Dry submersible design and construction must meet stringent underwater vehicle and hyperbaric system safety standards overseen by independent certification/classification agencies (e.g. NAVSEA, ABS)
    - Wet vehicle performance is inherently limited by the human factors limits associated with diving
    - USSOCOM's first dry submersible, the ASDS had a design and construction cost of $200-400M, approaching that of a warship; a significant portion of that cost in construction of the HM&E sub-systems

Low-Cost Dry Submersible Hull, Mechanical & Electrical Technology Development Objective

- **Where we want to be:**
  - **SOF is interested in dry submersible HM&E technologies that can be certified/classified and, when integrated, can result in dry combat submersibles that are affordable to design and construct**
  - **SOF will leverage existing technology, practices, and standards used by the International Commercial/ Research Submersible Industry**

Dry Combat Submersible (DCS) Multiple Classes

- Dry Combat Submersible Light (DCSL)
  - Operate from a modified Dry Deck Shelter (DDS)
  - Operable from host ships
  - Design largely constrained by DDS
    - Limits Passengers, Cargo & Battery Size
- Dry Combat Submersible Medium (DCSM)
  - Greater passenger, cargo & battery capacity than DCSL
  - Operable from host ships
  - Potentially operable from future submarine shelters if built by the Navy

DCSL Technology Development Phase

- Milestone A Decision to be approved 3QFY11 to proceed into the Technology Development (TD) phase
- Demonstrate critical technology elements on prototypes
- TD Phase:
  - Multiple Concept Design Study Contracts through Broad Agency Announcement
  - Rapidly design, construct, and test multiple prototypes

DCSL Draft Long-Range Acquisition Strategy

- If successful demonstration of DCSL Key Performance Parameters and System Attributes thresholds on at least one prototype submersible, then Milestone B/C
- Combined EMD/LRIP
  - RFP, Competition
  - Authorize design and construction of the lead DCSL system
  - Convert 1 prototype into an operational system
- Full Rate Production: Up to 6 additional systems

DCSL TD Phase

BAA Opens ~1 Jul	1 Month		2-3 Months		~18 Months	6 Months	
Tech Data Package	BAA Open White Papers	**Down Select**	**Concept Designs**	**Down Select**	**Rapid Prototype Design & Construction**	**DT/EOA**	**DCSL Acquisition Program**
•Top Level Requirement •Draft DCSL Spec •Notional NAVSEA Certification Plan *(P 9290)* •NAVSEA Tech Review Timeframes •Extended DDS Envelope •GFE ICDs •Lessons Learned							• MS B/C (LRIP) •Prototype Modification •NAVSEA Certification •LRIP •FRP

Estimated Draft DCSL Specification Requirements

- Operate from submarines equipped with extended Dry Deck Shelter
  - Maximum length overall <= 24'
  - Maximum vehicle weight <= 30,000 lbs
- Personnel & Cargo (325 lbs, 19.5 ft^3 each):
  - Threshold: Pilot, Co-Pilot, and 4 SOF Operators
  - Objective: Pilot and 8 SOF Operators
- Endurance (continuous speed >= 5 knots)
  - Threshold: Classified, Objective: Classified
- Silver-Zinc or Lead-Acid Batteries Only (CFE)

Safety Certification MOA

- MOA Established with NAVSEASYSCOM (March 2011)
- Submersibles operating with submarines
  - NAVSEA 05 is Technical Authority
  - NAVSEA 07 is Safety Certification Authority
    - DCSL production systems
- Submersibles not operating with submarines
  - USSOCOM is Technical & Certification Authorities
    - User Operational Evaluation System Prototypes

DCSL Work Breakdown Structure (WBS) TD Phase

1. Prime Mission Product (PMP)
    - 100 Hull Structure
    - 200 Propulsion Plant
    - 300 Electric Plant
    - 400 Command Communications and Surveillance
    - 500 Auxiliary Systems
    - 600 Outfit and Furnishings
    - 700 Armament (Not used)
    - 800 Total Submersible Integration/Engineering
    - 900 Submersible Assembly and Support Services
    - 1000 Submersible Classification
    - 1100 Engineering Change Orders
2. System Engineering and Program Management
3. System Test and Evaluation
4. Training
5. Data
6. Support Equipment
7. Initial Spares and Repair Parts
8. Government In-House

TD Phase Design to Cost Goal

- **Draft Cost Goal for DCSL Prototype Design & Construction: $19.2M**
  - For Prime Mission Product (WBS 1.0100-1.1100)
    - Includes overhead and profit
    - Excludes government furnished equipment
  - Does Not Include program management/systems engineering, training, test, data, support equipment, and spares & repair parts
  - GFE Will Be primarily military-unique electronics (WBS 1.400)
    - Maximize Commonality with SWCS I sub-systems

Conclusion

- Integration of "proven" operational prototypes will provide effective risk reduction, and improved capability and safety of operations
- DCSL technology development project will leverage the technologies and equipment developed and lessons learned in other combat submersible programs