The Space Congress® Proceedings

2007 Space Visions Congress - Growing the Next Generation of Scientists and Engineers

Apr 28th, 10:00 AM

Panel Session II - Sea Launch Overview BCSC Perspective

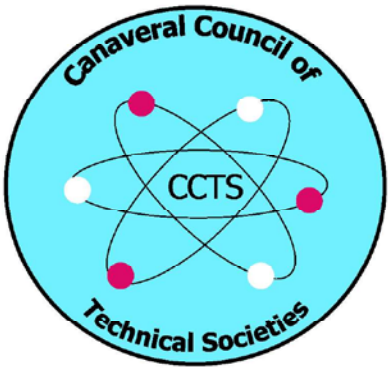
Malcom J. Philips
Boeing Commercial Space Company

SPACE VISIONS CONGRESS 2007

PANEL SESSION 2

"SEA LAUNCH OVERVIEW BCSC PERSPECTIVE"

MALCOLM J. PHILIPS



Sea Launch Overview
BCSC Perspective

Malcolm J. Phillips
Manager, Mission Requirements & Interfaces
Boeing Commercial Space Company

Overview

- **Organization**
- **Key Sea Launch Elements**
- **Launch Campaign Flow**
- **Unique Characteristics of Commercial Launch Business and Sea Launch**

Sea Launch Company
Key Locations and Roles

Sea Launch Partner Locations

Sea Launch Company, LLC

- **Sea Launch Company is a limited liability corporation with headquarters and Home Port in Long Beach, California**
- **Formed in April 1995, with first launch in March 1999**
- **Commercial Launch Services Provider**

Sea Launch Contractor Team
Experienced Industry Leaders
Roles and Relationships

- *Boeing Commercial Space Company*
  - Home Port Operations
  - Payload Fairing & Adapter
  - Mission Integration
  - Mission & Range Operations
- *KB Yuzhnoye/PO Yuzhmash*
  - Zenit Rocket Production
  - Zenit Test & Integration
  - Mission Integration & Launch Support
- *Astrotech Space Operations*
  - Payload Processing Facility
  - Payload Support Services
- *RSC Energia*
  - Block DM Production
  - Block DM Test & Integration
  - Ground Processing Equipment
  - Mission Integration & Launch Support
- *Barber Moss Ship Management*
  - Launch Support Equipment & Support
  - Launch Support
- *KBTM*
  - Launch Vehicle Erector
  - Ground Processing Equipment
  - Launch Support

Sea Launch Company

Our Past and Momentum Forward…

- Sea Launch has successfully completed 22 missions to-date
  - 20 consecutive mission successes prior to NSS-8
- Successfully have flown or are integrating every major spacecraft platform

Sea Launch – 12th Year Since Inception!

- Launch tempo
  - Successfully demonstrated six launches from June 03 to June 04
  - Three in 2003, four in 2004, four in 2005, five in 2006
- One of Industry's most proven heavy-lift vehicles

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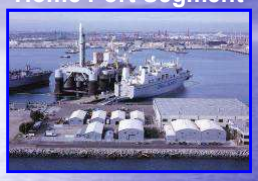
Sea Launch System

Salient Features for today's commercial customers

- Boeing quality oversight & integration
  - Ensures high reliability and mission assurance
  - Quarterly reviews conducted by Sea Launch at major contractors and subcontractors
- Processed in major metropolitan area – Long Beach, CA
  - Conveniently close to airports, immense supplier base, most US sat makers
  - Other launchers process in remote locations
  - Vessels never enter a foreign jurisdiction during a mission
- Compelling Value Proposition
  - Creative business terms and conditions
  - Low cost base a function of international sourcing, unique & efficient operations and good management

Sea Launch Company
Facilities & Assets

Home Port Segment



- Systems integration
- Rocket segment processing
- Payload processing and encapsulation
- Pier and marine provisioning
- Support engineering
- Logistics support
- Rocket segment storage

Marine Segment

- Rocket integration and test
- Mission control
- Launch team accommodations
- Range support and helo operations

- Launch vehicle checkout
- Launch vehicle fueling
- Launch complex
- Launch vehicle transit

Rocket Segment

BOEING

ENERGIA

Yuzhnoye Design Office

YUZHMASH

- Sea Launch Zenit rocket
- Sea Launch Block DM upper stage
- Payload accommodations

BCSC Payload Accommodations

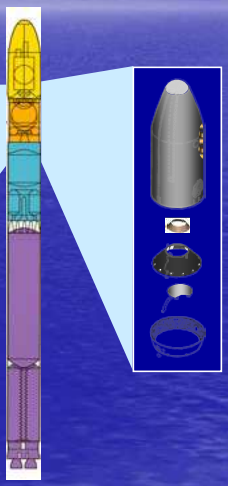
BOEING

- Produced in Seattle, Washington
- Graphite/epoxy fairing
- Shipped to Home Port by road
- Processed and integrated at Home Port

Encapsulated Payload

Booster Adapter

Graphite/epoxy Fairing



Typical Launch Campaign

Spacecraft arrival at Home Port
(about 45 days before launch)

Payload Unit (PLU) transfer to Assembly Command Ship (ACS)
(24 days before launch)

PLU to Block-DM-SL Mate
(19 days before launch)

Integrated Launch Vehicle (ILV) Transfer to Launch Platform (LP)
(18 days before launch)

Integrated Systems Test
(17 days before launch)

LP to Transit Launch Site
(Departs 15 days before launch)

ACS Transit to Launch Site
(Departs 12 days before launch)

Launch Operations *(Begins 3 days before launch)*

Launch *(day 0)*

Sea Launch Advantages

- *Proven launch system*
  - **Mature launch vehicle – no new upgrades or major changes planned**
- *Competitive Business Terms & Insurance Rates*
- *Schedule Assurance - Dedicated launch system*
  - **No Co-passenger impacts**
  - **Benign launch site weather, Onboard spares, No range conflicts & Robust launch system.**
- *US only personnel involved in spacecraft processing*
  - **Secure/Dedicated state-of-the art spacecraft processing facility**
- *Mission Management with Sea Launch/Boeing interface*
  - **Proven Mission Processes**
- *Insight and Oversight in Zenit-3SL and Payload Hardware*
  - **Insures high reliability and mission assurance**
  - **Quarterly reviews conducted by Sea Launch at major contractors and subcontractors**
- *Excess vehicle performance and equatorial launch site provides superior orbit and spacecraft lifetime expectations*
- *Veteran Leadership and Launch Support Personnel will insure mission objectives are met*

Unique Aspects of Commercial Launch Business

- Multiple Domestic & International Customers
- Schedule (Cash Flow) Driven
- Intense Competition, Cyclical Demand
- Reliability, Affordability & Flexibility are Key Discriminators

Unique Aspects of Sea Launch

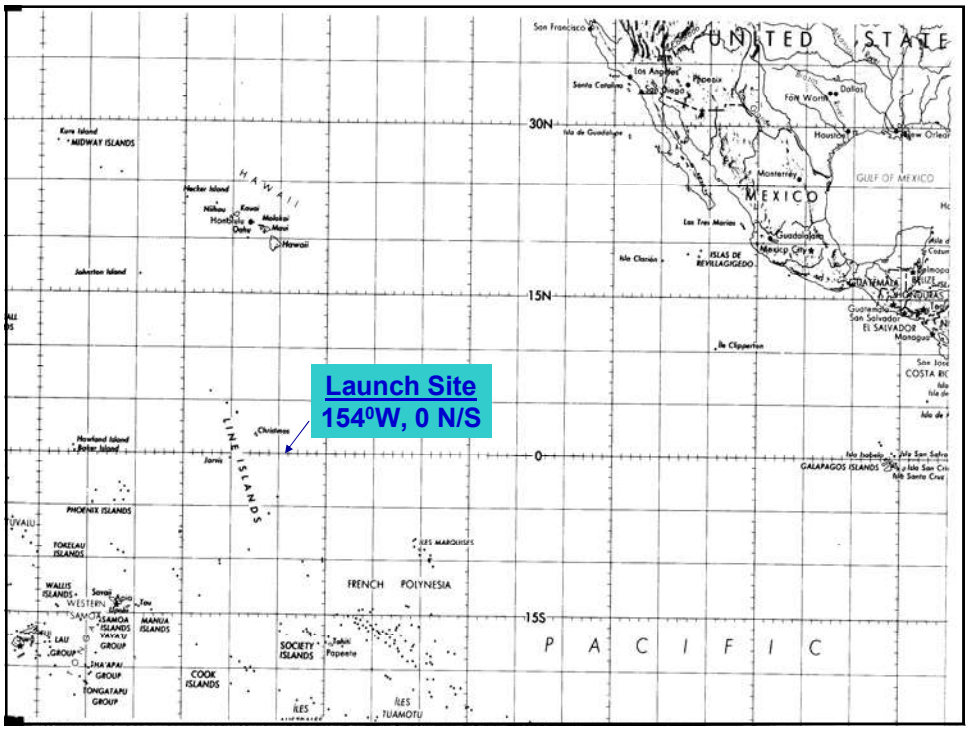
- Compliant with U.S. ITAR Regulations
- Serial & Sequential, but Adaptable and Flexible
- International, "Virtual" Enterprise
- Small, Entrepreneurial, Dedicated Team

Sea Launch Mission Integration

- Mission Integration is a collaborative effort amongst the partners
  - Sea Launch, BCSC, RSC Energia, SDO Yuzhnoye
- Team Based, supported by matrixed organizations within each partner organization
  - Mission Team
    - Lead by Sea Launch Mission Manager, Supported directly by Mission Integrator (BCSC) and Payload Integration Manager (Sea Launch Operations), and indirectly by other Sea Launch, BCSC, and partner personnel
  - Responsible for:
    - Spacecraft requirements integration
    - ICD requirement definition and verification
    - Execution of program specific requirements
    - Program and customer coordination

Summary

- Unique, International Consortium Specifically Developed to Support Commercial Launch
- Experienced Team
- Proven Launch System Comprised of Pedigreed Components
- "Virtual", Team Based Integration Approach
- Best Value Solution for Commercial Launch Customers.


Launch Site
154⁰W, 0 N/S
30N
15N
0
15S
UNITED STATES
MEXICO
GULF OF MEXICO
HAWAII
MIDWAY ISLANDS
LINE ISLANDS
PHOENIX ISLANDS
FRENCH POLYNESIA
SOCIETY ISLANDS
COOK ISLANDS
GALAPAGOS ISLANDS
P A C I F I C