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LAUNCH SERVICES PROGRAM

Jason-3

Launch Service Status

Armando Piloto

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Jason-3 Launch Vehicle Configuration

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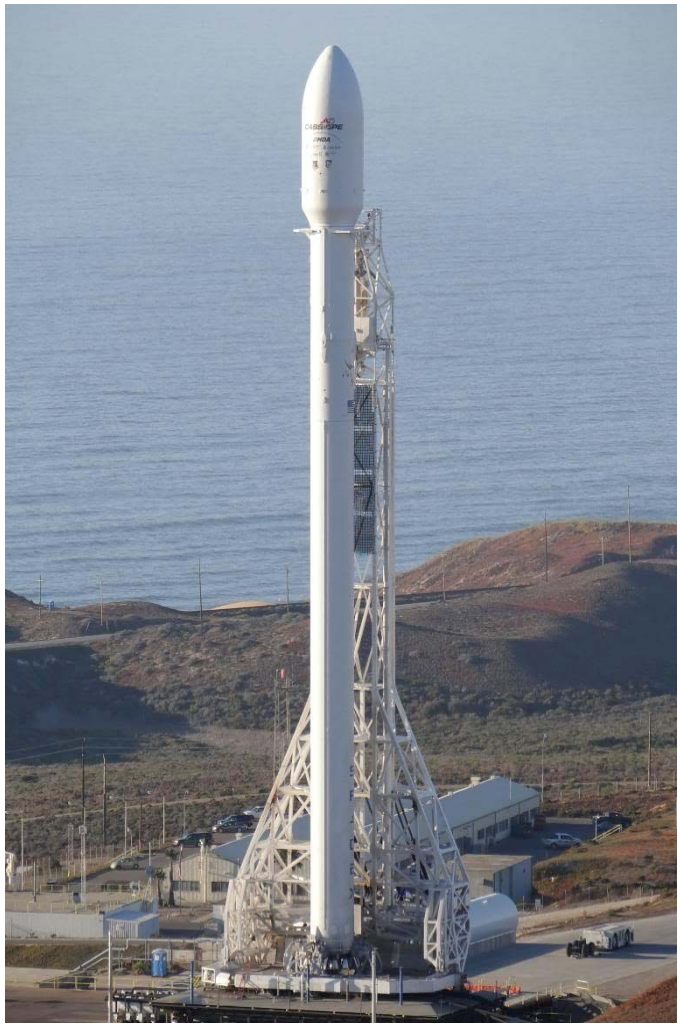
- **Vehicle: Falcon 9 v1.1 with a payload fairing (certified to Cat 2) and reusability package**
- **Mission requirement:**
  - **Launch Site: VAFB**
  - **Launch Date: July 22, 2015**
  - **Orbit Requirements:**
    - » **1336 km circular orbit altitude**
    - » **66 deg inclination**
  - **S/C Mass: 540 kg (max)**
- **Mission Unique Services**
  - **Ruag 937S Payload Adapter with clampband separation system**
    - » **Mounting brackets for electrical connectors**
    - » **4 separation springs**
  - **Isolation system to mitigate loads**
  - **37 pins Deutsch electrical (CNES Provided)**
  - **SpaceX Payload Processing Facility**



Since SQR

Flight experience

- **SpaceX has executed 5 successful launches in 2015**
  - **13 total consecutive successful flights of the v1.1 since Sept 2013**
  - **1 additional F9 v1.1 flight planned prior to Jason-3**

- **Launch date revised to July 22, 2015**
  - **New launch date takes into consideration**
    - » **LV production**
    - » **open work from certification**
    - » **LV software risk mitigation**
    - » **Reusability vehicle configuration change (fins and legs) Range availability**
    - » **Some schedule margin**

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Status of Jason-3 LV Hardware

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- **Stage1 at McGregor Texas- completed full duration test and is expected at the launch site in mid-May**
- **Stage 2 arrived to the launch site on May 1st**
- **Payload fairing arrived at launch site on April 24**
- **Interstage estimated to ship out of Hawthorne on 6/10/15**
- **Isolation system has been at the launch site since Feb 2015**
- **PAF and Ruag Payload Adapter at the launch site**
- **Launch Vehicle Systems Readiness Review planned for May 28th at SpaceX – objective is to review all hardware assigned to Jason-3 and wrap up hardware pedigree reviews**

Assessment: Jason-3 Hardware is on track to support the July 22 launch date

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Falcon 9 Certification

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- **The following elements of Certification for Category 2 have been completed successfully:**
  - » **Management Systems, Systems Engineering, Launch Vehicle Analysis, Risk Management, System Safety, Design Reliability, and Quality, Manufacturing and Operations**
- **DCR reconvene held in Jan, April, and May**
- **Detailed status presented to the NASA Flight Planning Board on Feb 13, 2015 and NASA Administrator on April 10, 2015**
  - » **Certification accomplishments and overall certification status was very well received by both audiences and stakeholders**
- **Remaining Open work from certification is minimal and expected to be closed by end of May:**
  - » **Evaluation of 3 propulsion components – ECD 5/29**
  - » **Flight margin verification spinoff ERB to address a flight observation – ECD 5/22**

Assessment: Certification activities are on track to support the July 22, 2015 launch date

Software Risk Mitigation status

- **Developed a risk mitigation strategy for the Jason-3 mission that involves two key elements:**
  - **LSP to perform independent stress testing of the Jason-3 mission specific configuration files utilizing LSP's Hardware Out Of The Loop (HOOTL) simulation testbed**
  - **SpaceX to perform traceability of configuration files to source documentation**
- **Requires SpaceX to lockdown and deliver the Jason-3 software and configuration files by L-60 days to enable tests, data review, resolution of findings, etc**

Status

- **Weekly telecons with SpaceX software team has yielded very positive results**
- **LSP's HOOTL capability is fully operational**
- **Peer review of the software test plan is complete**
- **Flight 8 stress tests of core software and configuration files complete- no major findings identified**
- **Some additional testing performed on Flight 15 and Flight 18 with no issues/findings**
- **Jason-3 software and mission specific configuration files expected to be delivered to LSP on May 11, 2015**
- **LSP team is postured to start HOOTL testing of the Jason-3 software and configuration files as soon as delivered**
- **LSP contracted Aerospace to conduct some HITL (hardware in the loop) tests for added confidence**
- **Parameter traceability of configuration files progressing on schedule**

Assessment: Plans and resources are in place to enable completion of this effort by FRR (July 10th), HOOTL testing of software/config files of Flight 8 did not identified any significant issues

- **LSP is tracking a schedule risk for software since the potential still exists for late findings from the stress tests and/or late changes that SpaceX decides to introduce after the software lockdown**

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F9 Reusability Package

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- **Falcon 9 vehicle "reusability" (legs and fins) configuration option- detailed assessment via LSP's Engineering Review Process is complete**
- **ERB's held on 1/9/15, 4/8/15 and 4/24/15**
  - **LSP board deemed technical solution acceptable and determined that solution does not pose increased technical risk to Jason-3 mission**
  - **Effects of the reusability vehicle configuration on the Jason-3 environments are understood, flight validated, and are within the spacecraft qualification levels**
    - » **LSP loads and environments team has reviewed all applicable flight data and has determined that Jason-3 CLA results remain valid**

- **Jason-3 will be the 5th mission with reusability package**

Assessment: Vehicle change approved and all analytical and hardware products are on track to support July 22, 2015 launch date

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Launch Vehicle Readiness Reviews

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Mission Specific Acceptance Readiness Review	27 May	Hawthorne
Launch Vehicle Systems Readiness Review	28 May	Hawthrone
Launch Vehicle Readiness Review	11 June	KSC
Safety & Mission Success Review	19 June	HQ
Flight Readiness Review	10 July	VAFB
Launch Mgt. Coordination Meeting / Mission Dress Rehearsal	17 July	VAFB
Launch Readiness Review	20 July	VAFB

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Summary

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- **Most of the launch vehicle hardware is at the launch site and final processing and checkouts have started**
  - **Stage 1 expected to arrive at VAFB on 5/13 and interstage on 6/10**
- **LV Certification activities are wrapping up- expect to be fully completed by end of May**
- **Software- resources and capabilities ready to initiate final phase of testing on May 12**
- **F9 Reusability configuration- assessments complete and approved for Jason-3**
- **All launch vehicle elements are tracking on schedule to support LRD**
  - ✓ Launch Vehicle Production
  - ✓ Certification
  - ✓ Software mitigation
  - ✓ F9 reusability configuration

Launch Vehicle ICD Compliance

JASON3 Pre Shipment Review
12 May 2015

Jason3 / Falcon 9 ICD compliance matrix status (2/2)

Requirement	Compliance status	Document	SpaceX Reference
Fairing compatibility	Compliant	Jason-3 Fairing Final Clearance Analysis	Jason-3 Fairing clearance analysis 2015-03-09
Mechanical interfaces (MICD)	Compliant	Jason-3 Compatibility Drawing	Drawing Number 00130339-523
Electrical Interfaces (EICD)	Compliant	Jason-3 Payload Interface Control Document	AV2115
Orbit insertion parameters	Compliant	Falcon9 PGAA#3 Update for Jason3	GNC-TRAC-02426 Rev 64014
Separation parameters	Compliant	Separation Analysis Final	Jason-3 Final Separation Analysis 3 Feb 2015 Rev4
Mechanical/ structural loads	Compliant	Coupled Load Analysis Report	Jason-3 CLA Rev6 Results 20141204 Intl Version, LSWG#13_LSP Intl, Jason-3 ICD Waiver 01
Separation shock	Compliant	Jason3 Shock Test Report	PL 1010 Jason-3 Separation Shock Test Report
RF compatibility	Compliant	Jason-3 EMC/RF/EED Compatibility Report	ES9008-900 Rev F, Jason-3 EMC/EMI Intl Version
Thermal	Compliant	Integrated Thermal Analysis	Jason-3 ITA Results – Intl Version 4 May 2015
Payload fairing venting	Compliant	Fairing venting analysis	Jason-3 Fairing Venting Analysis 2013-05-21
Fit check	Compliant	Fit Check Test Report	STR-00022503 Jason-3 Shock Test/Fit Check Report

ICD Verification Status Summary

  - **All Jason-3 SC data has been received to support ICD verification closures through SC Pre-ship**
  - **International versions of Analysis/Reports have been delivered to CNES/Thales for review**
  - **Final verification for many requirements will be accomplished during launch site checkouts and integrated operations (i.e. payload mate to adapter/PAF, encapsulation, mate to LV, and PLF closeouts)**

- **ICD requirement verifications are on track to support the launch campaign operations for Jason-3**