

Flight Readiness Review

Vehicle and Payload Experiment Criteria

The FRR examines tests, demonstrations, analyses, and audits that determine the overall system (all projects working together) readiness for a safe and successful flight/launch and for subsequent flight operations. It also ensures that all flight and ground hardware, software, personnel, and procedures are operationally ready. (NPR 7120.5D p.30)

The panel will be expecting a professional and polished report. Please use Arial, size 12 font for your PDR Report. It is advised to follow the order of sections as they appear below.

Flight Readiness Review Report

I) Summary of FRR report (1 page maximum)

Team Summary

- School name
- Location
- Teachers/Mentors

Launch Vehicle Summary

- Size
- Motor choice (Final)
- Recovery system
- Rail size

Payload Summary

- Summarize experiment

II) Changes made since CDR

Highlight all changes made since CDR and the reason for those changes.

- Changes made to Vehicle Criteria
- Changes made to Payload Criteria
- Changes made to Activity Plan

III) Vehicle Criteria

Testing and Design of Vehicle

Flight Reliability confidence. Demonstrate that the design can meet mission success criteria. Discuss analysis, component testing, functional testing, or static testing

- Describe proper use of materials in fins, bulkheads, and structural elements.

Explain composition and rationale behind selection.

- Explain strength of assembly, proper attachment and alignment of elements, solid connection points, and load paths. (Looking for optimum assembly quality.)

- Shows sufficient or exemplary motor mounting and retention.

- Integrity of design- used analysis to improve design. Suitability of shape, fin style for mission.

- Specify approach to workmanship as it relates to mission success. Neatness of workmanship, quality of appearance, attractiveness

Safety and failure analysis. Include table with failure modes, causes, effects, and risk mitigations.

Recovery Subsystem

Suitable parachute size for mass, attachment scheme, deployment process, test results with ejection charge and electronics

Safety and failure analysis. Include table with failure modes, causes, effects, and risk mitigations.

Mission Performance Predictions

State the mission performance criteria

Flight profile simulations, altitude predictions with real vehicle data, component weights, and actual motor thrust curve. Include real values with optimized design for altitude. Include sensitivities.

Thoroughness and validity of analysis, drag assessment, scale modeling results. Compare math analysis and models to measured values.

Stability margin, actual CP CG relationship and locations. Include dimensional moment diagram **or** derivation of values with points indicated on vehicle. Include sensitivities.

Safety and failure analysis. Include table of failure models, causes, effects, and risk mitigations.

Safety and Environment (Vehicle)

Identify Safety Officer for your team

Update the Preliminary analysis of the failure modes of the proposed design of the rocket, payload integration and launch operations, including proposed and completed mitigations.

Update the listing of personnel hazards, and data demonstrating that Safety Hazards have been researched (such as Material Safety Data Sheets, operator's manuals, NAR regulations), and that hazard mitigations have been addressed and mitigated.

Discuss any environmental concerns.

Payload Integration

Describe integration plan

Compatibility of elements- show fit at interface dimensions.

Payload housing integrity- describe and justify.

Demonstration of integration- show diagram of components and assembly with documented process.

IV) Payload Criteria

The approach for evaluating the SLI science payloads will be similar to judging a 'science fair' project. The payload will also be evaluated on actual flight worthiness as the rocket is; however, the majority of the payload evaluation focuses on experiment value and potential scientific results.

Experiment Concept

This concerns the quality of science. Give clear, concise, and descriptive explanations.

Creativity and originality

Uniqueness or significance

Suitable level of challenge

Science Value

Describe Science Payload Objectives in a concise and distinct manner

- State the mission success criteria

- Describe the experimental logic, scientific approach, and method of investigation

- Explain how it is a meaningful test and measurement, explain variables and controls

- Relevance of expected data, accuracy/error analysis (include: tables and plots)

- Detailed experiment process procedures.

Experiment Design of Payload

Review the design at a system level, describe integration plan, and demonstrate that the design can meet all mission goals.

- Precision of instrumentation, repeatability of measurement. (Include calibration with uncertainty included.)

- Application of engineering, functionality, feasibility

- Flight performance predictions (flight values integrated with detailed experiment operations.)

- Flight preparation procedures

- Specify approach to workmanship as it relates to mission success

- Discuss completed component testing, functional testing, or static testing

Assembly

Give clear details of how it is put together.

- Integration and compatibility simplicity

- Structural integrity for flight

- Quality of construction

Safety and Environment (Payload)

This will describe all concerns, research, and solutions to safety issues related to the payload.

- Identify Safety Officer for your team

- Update the Preliminary analysis of the failure modes of the proposed design of the rocket, payload integration and launch operations, including proposed and completed mitigations.

- Update the listing of personnel hazards, and data demonstrating that Safety Hazards have been researched (such as Material Safety Data Sheets, operator's manuals, NAR regulations), and that hazard mitigations have been addressed and mitigated.

- Discuss any environmental concerns.

V) Launch Operations Procedures

Checklist

Provide detailed procedure and check lists for the following.

- Recovery preparation

- Motor preparation

- Igniter installation

- Setup on launcher

- Launch procedure

- Troubleshooting

- Post flight inspection

Safety and Quality Assurance

Provide detailed safety procedures for each of the categories in the Launch Operations Procedures. Include the following:

- Provide data demonstrating that risks are at acceptable levels.
- Risk assessment for the launch operations, including proposed and completed mitigations.
- Discuss environmental concerns.
- Identify individual that is responsible for maintaining safety, quality and procedures checklist.

VI) Activity Plan

Show status of activities and schedule

- Budget plan
- Timeline
- Outreach summary

Flight Readiness Review Presentation

Please include the following information in your presentation

- Rocket flight stability in Rocksim static margin diagram
- Thrust to weight motor selection in flight simulation
- Rail exit velocity
- Parachute sizes and descent rates
- Test plans and procedures
- Scale model flight test
- Dual deployment avionics test
- Ejection charge amount test
- Payload integration feasibility

The Flight Readiness Review will be presented to a panel that may be comprised of any combination of scientists, engineers, safety experts, education specialists, and industry partners. It is expected that the **students** deliver the report and answer all questions. The presentation of the FRR shall be well prepared with a professional overall appearance. This includes but is not limited to: easy to see slides; appropriate placement of pictures, graphs, and videos; professional personal appearance of the presenters; speaking clearly and loudly; looking into the camera; referring to the slides not reading them; and communicating to the panel in an appropriate and professional manner.