

Preliminary Design Review (PDR) Vehicle and Payload Experiment Criteria

The PDR demonstrates that the overall preliminary design meets all requirements with acceptable risk and within the cost and schedule constraints and establishes the basis for proceeding with detailed design. It shows that the correct design options have been selected, interfaces have been identified, and verification methods have been described. Full baseline cost and schedules, as well as all risk assessment, management systems, and metrics, are presented.

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.

Preliminary Design Review Report

I) Summary of PDR report (1 page maximum)

Team Summary

- School name
- Location
- Team official/Mentors

Launch Vehicle Summary

- Size
- Motor choice
- Recovery system

Payload Summary

- Summarize experiment

II) Changes made since Proposal (1-2 pages maximum)

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

- Changes made to vehicle criteria
- Changes made to payload criteria
- Changes made to activity plan

III) Vehicle Criteria

Selection, Design, and Verification of Launch Vehicle

- Include a mission statement, requirements, and mission success criteria.
- Include a major milestone schedule (project initiation, design, manufacturing, verification, operations, and major reviews).
- Review the design at a system level, going through each system's functional requirements (includes sketches of options, selection rationale, selected concept, and characteristics).
- Describe the subsystems that are required to accomplish the overall mission.
- Describe the performance characteristics for the system and subsystems and determine the evaluation and verification metrics.

- Describe the verification plan and its status.
- Define the risks and the plans for reducing the risks through analysis or testing for each system. A risk plot that clearly portrays the risk mitigation schedule is highly encouraged. Take all factors that might affect the project including risks associated with testing, delivery of parts, adequate personnel, school holidays, budget costs, etc. Demonstrate an understanding of all components needed to complete the project and how risks/delays impact the project.
- Demonstrate planning of manufacturing, verification, integration, and operations. (Include component testing, functional testing, or static testing).
- Describe the confidence and maturity of design.
- Include a dimensional drawing of entire assembly.

Recovery Subsystem

- Demonstrate that analysis has begun to determine size for mass, attachment scheme, deployment process, and test results with ejection charge and electronics.

Mission Performance Predictions

- State mission performance criteria.
- Show flight profile simulations, altitude predictions with simulated vehicle data, component weights, and simulated motor thrust curve.
- Show stability margin, simulated Center of Pressure (CP)/Center of Gravity (CG) relationship and locations.

Payload Integration

- Describe integration plan with an understanding that the payload must be co-developed with the vehicle, be compatible with stresses placed on the vehicle, and integrate easily and simply.

Launch Operation Procedures

- Determine what type of launch system and platform will be used.
- Develop an outline of final assembly and launch procedures.

Safety and Environment (Vehicle)

- Identify a safety officer for your team.
- Provide a preliminary analysis of the failure modes of the proposed design of the rocket, payload integration, and launch operations, including proposed and completed mitigations.
- Provide a listing of personnel hazards and data demonstrating that safety hazards have been researched, such as material safety data sheets, operator's manuals, and NAR regulations, and that hazard mitigations have been addressed and enacted.
- Discuss any environmental concerns.

II) Payload Criteria

Selection, Design, and Verification of Payload Experiment

- Review the design at a system level, going through each system's functional requirements (includes sketches of options, selection rationale, selected concept, and characteristics).
- Describe the payload subsystems that are required to accomplish the payload objectives.
- Describe the performance characteristics for the system and subsystems and determine the evaluation and verification metrics.
- Describe the verification plan and its status.
- Describe preliminary integration plan.
- Determine the precision of instrumentation, repeatability of measurement, and recovery system.

Payload Concept Features and Definition

- Creativity and originality
- Uniqueness or significance
- Suitable level of challenge

Science Value

- Describe science payload objectives.
- State the payload success criteria.
- Describe the experimental logic, approach, and method of investigation.
- Describe test and measurement, variables, and controls.
- Show relevance of expected data and accuracy/error analysis.
- Describe the preliminary experiment process procedures.

Safety and Environment (Payload)

- Identify safety officer for your team.
- Provide a preliminary analysis of the failure modes of the proposed design of the rocket, payload integration, and launch operations, including proposed and completed mitigations
- Provide a listing of personnel hazards and data demonstrating that safety hazards have been researched, such as material safety data sheets, operator's manuals, and NAR regulations, and that hazard mitigations have been addressed and enacted.
- Discuss any environmental concerns.

IV) Activity Plan

Show status of activities and schedule

- Budget plan
- Timeline
- Educational engagement

V) Conclusion