5th Annual Assurrance Technology Conference

Presentation: Historic and Current Launcher Success Rates

Technology Topic: Analysis

Presentation Abstract: This presentation reviews historic and current space launcher success rates from all nations with a mature launcher industry. Data from the 1950's through present day is reviewed for possible trends such as when in the launch timeline a failure occurred, which stages had the highest failure rate, overall launcher reliability, a decade by decade look at launcher reliability, when in a launchers history did failures occur, and the reliability of United States human-rated launchers. This information is useful in determining where launcher reliability can be improved and where additional measures for crew survival (i.e., Crew Escape systems) will have the greatest emphasis.

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Historic and Current Launcher Success Rates

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Historic and Current Launcher Success Rates

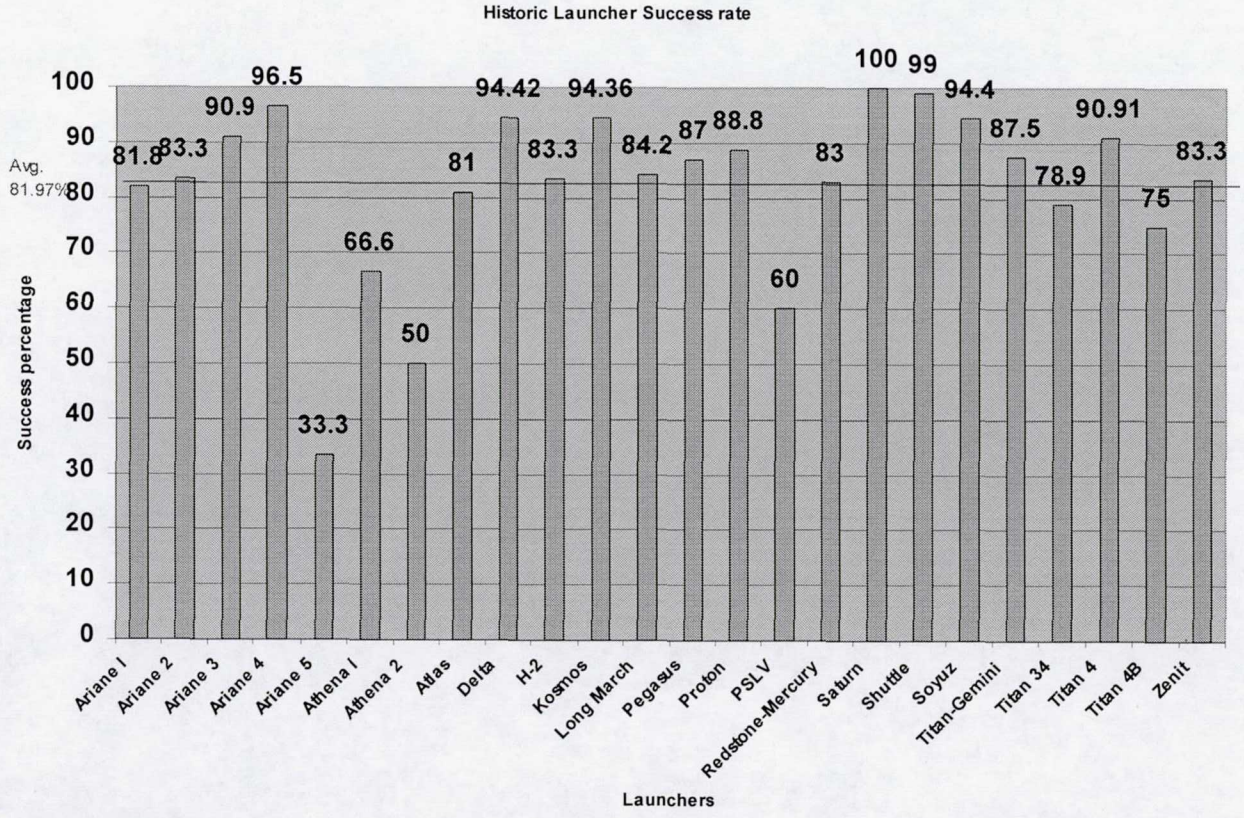
- Johnson Space Center's 2nd Generation Reusable Launch Vehicle Program role
- NASA Unique Task
- Program Requirement of <1 loss of crew per 5,000 missions (.9998)
- Crew Transfer Vehicle
- Study purpose

Historic and Current Launcher Success Rates

This study sought to answer following questions:

- What is the overall success rate of launch boosters (all launchers and the top 10% most successful)?
- On what stage did most of the failures occur (all launchers and the top 10% most successful)?
- At what time in the mission timeline did the failures occur (all launchers and top 10% most successful)?
- When, in the launcher history, did most of the failures occur?
- What is launcher success rate for United States human rated launchers?

Historic and Current Launcher Success Rates



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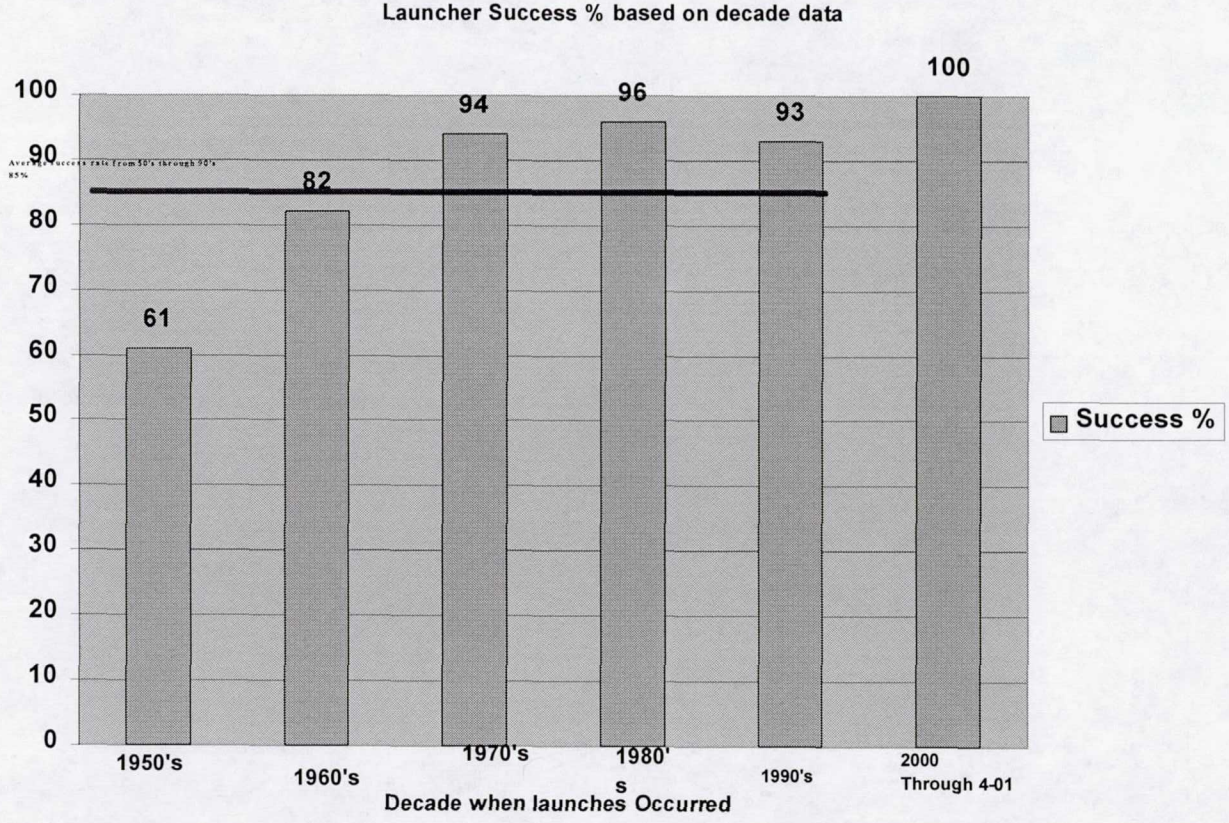

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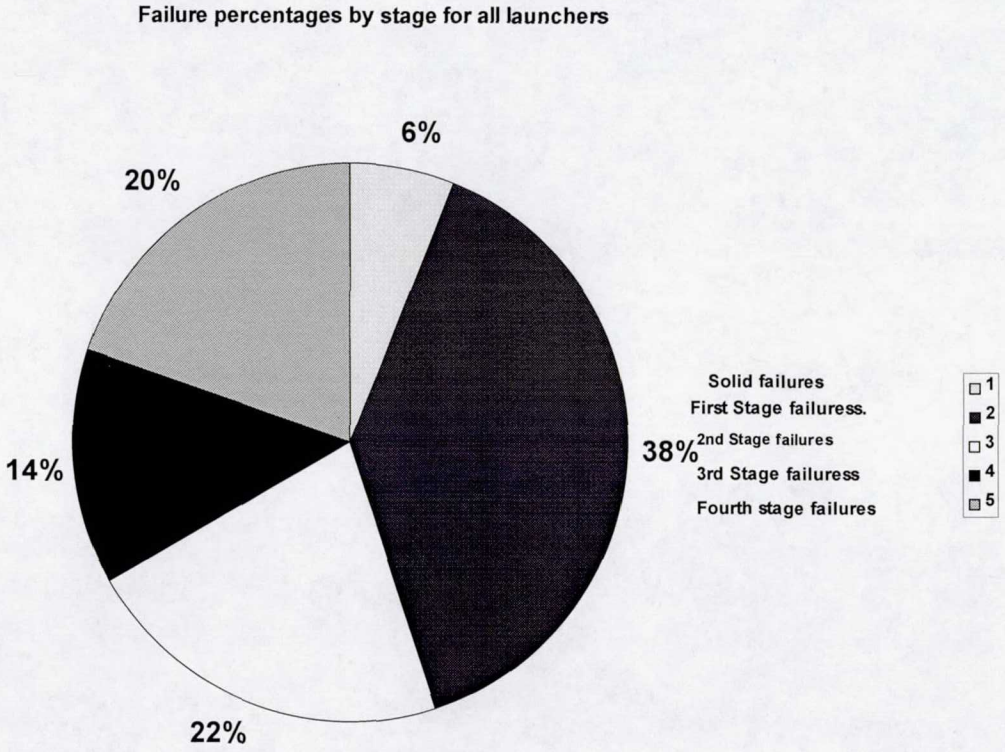

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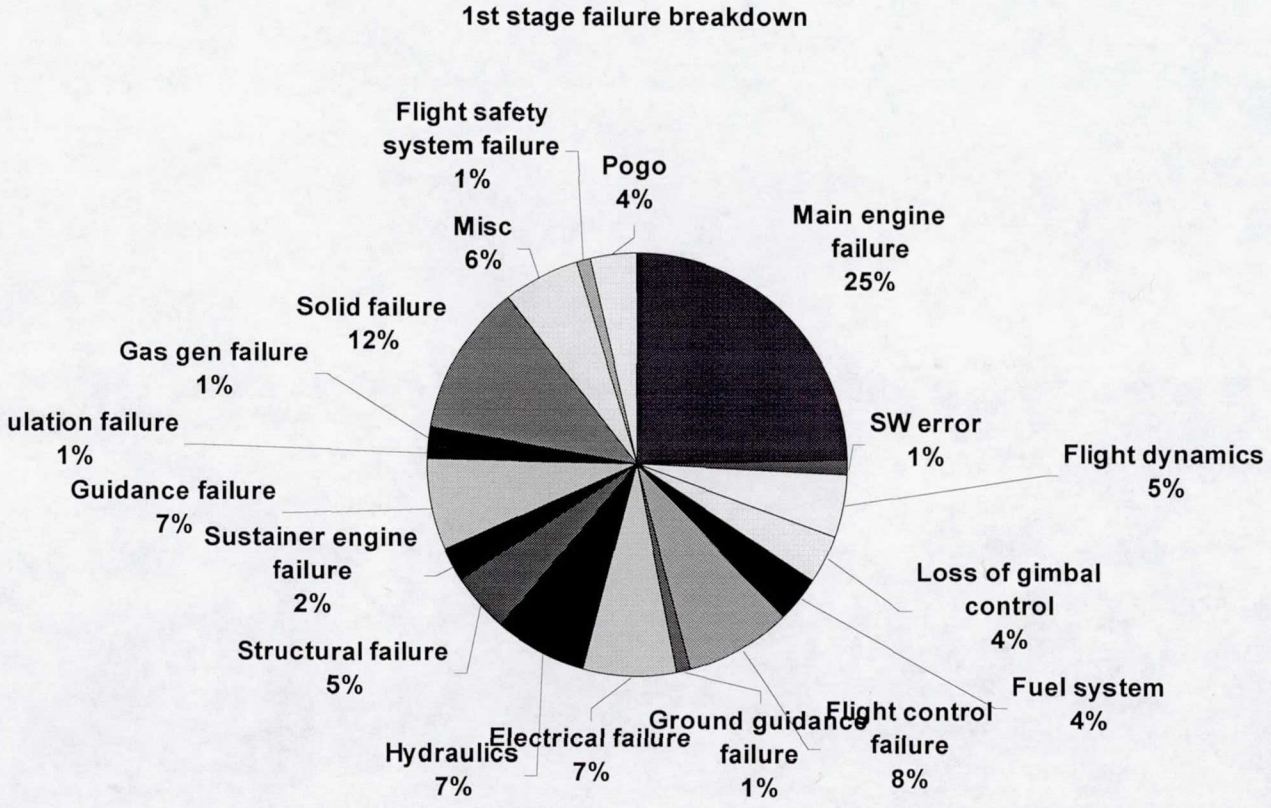

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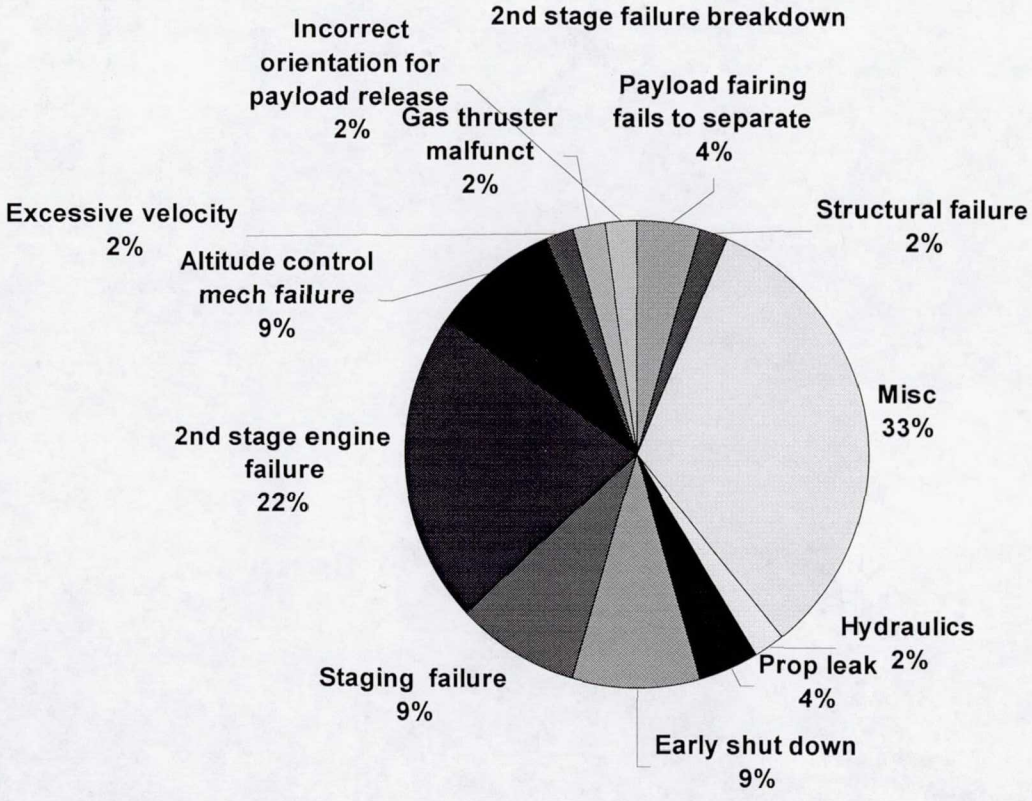

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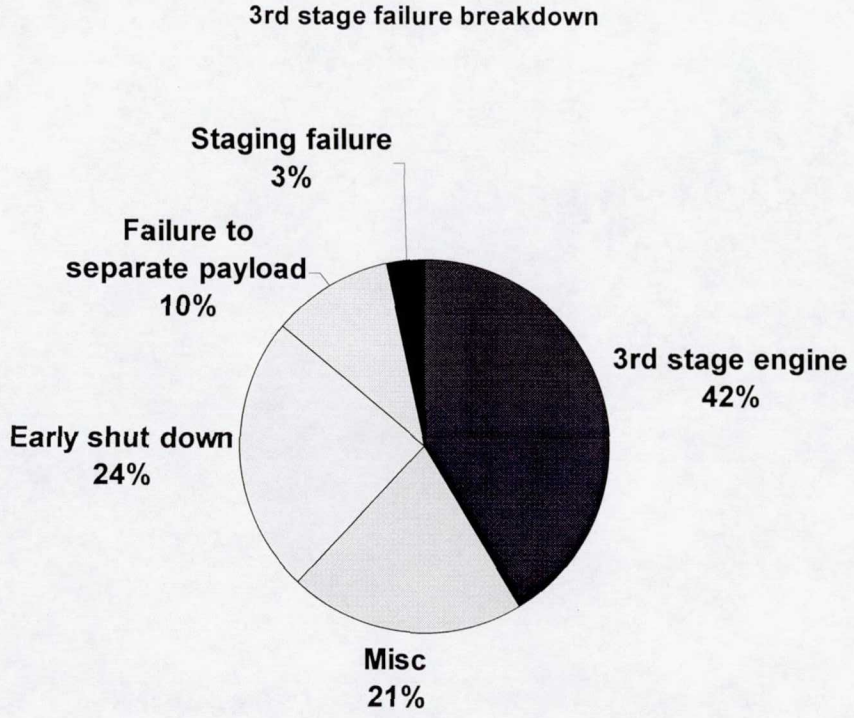

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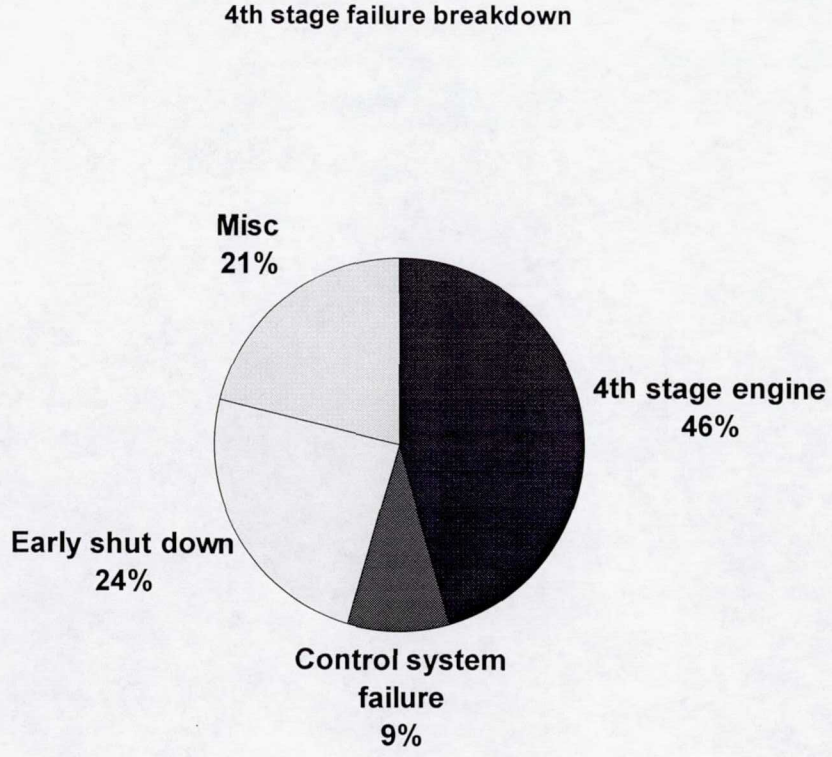

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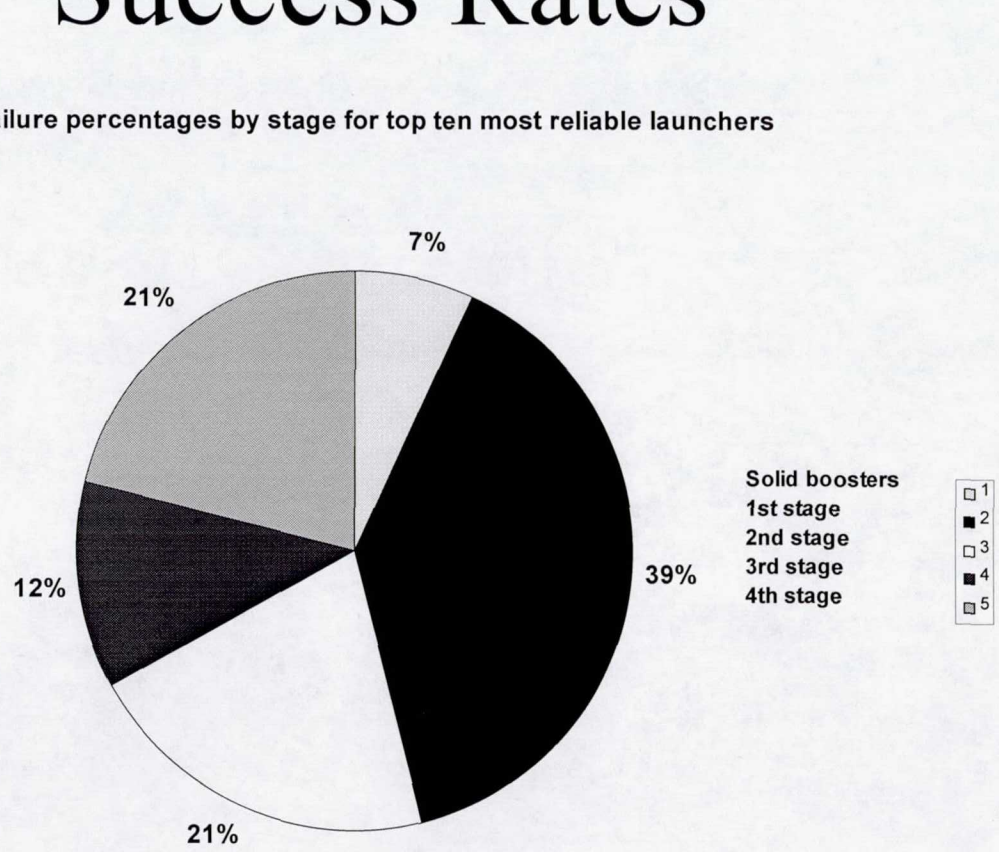

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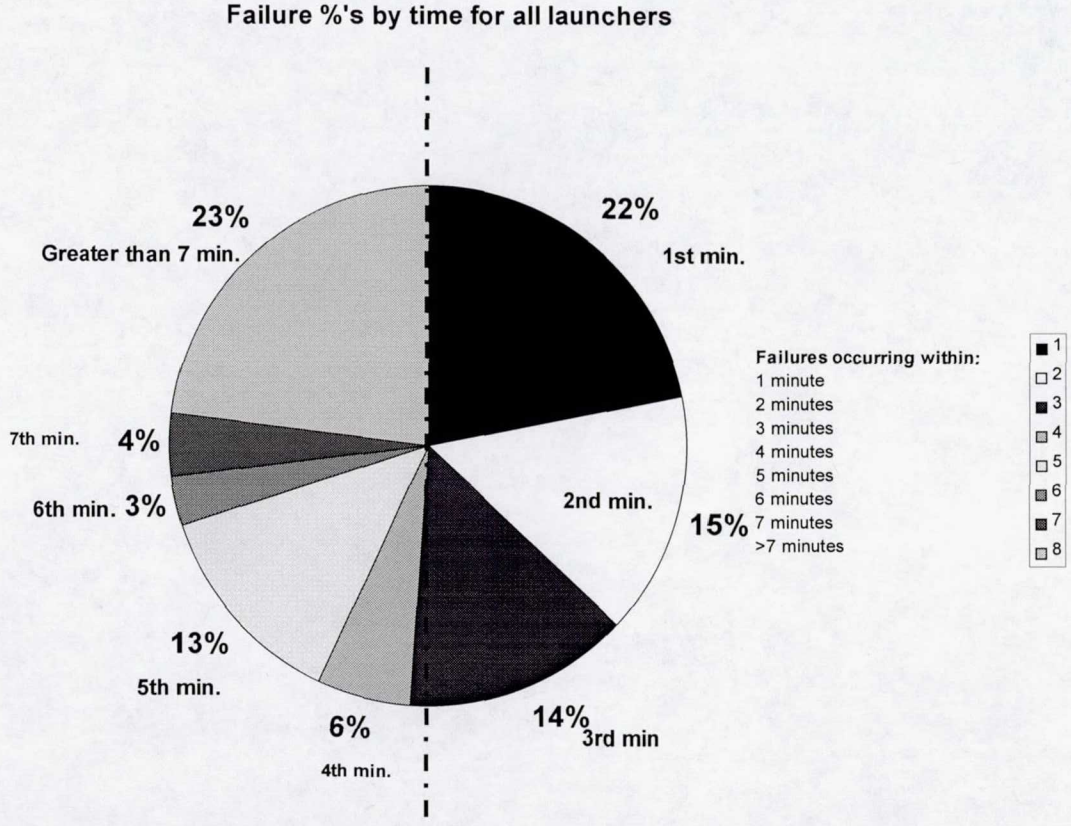

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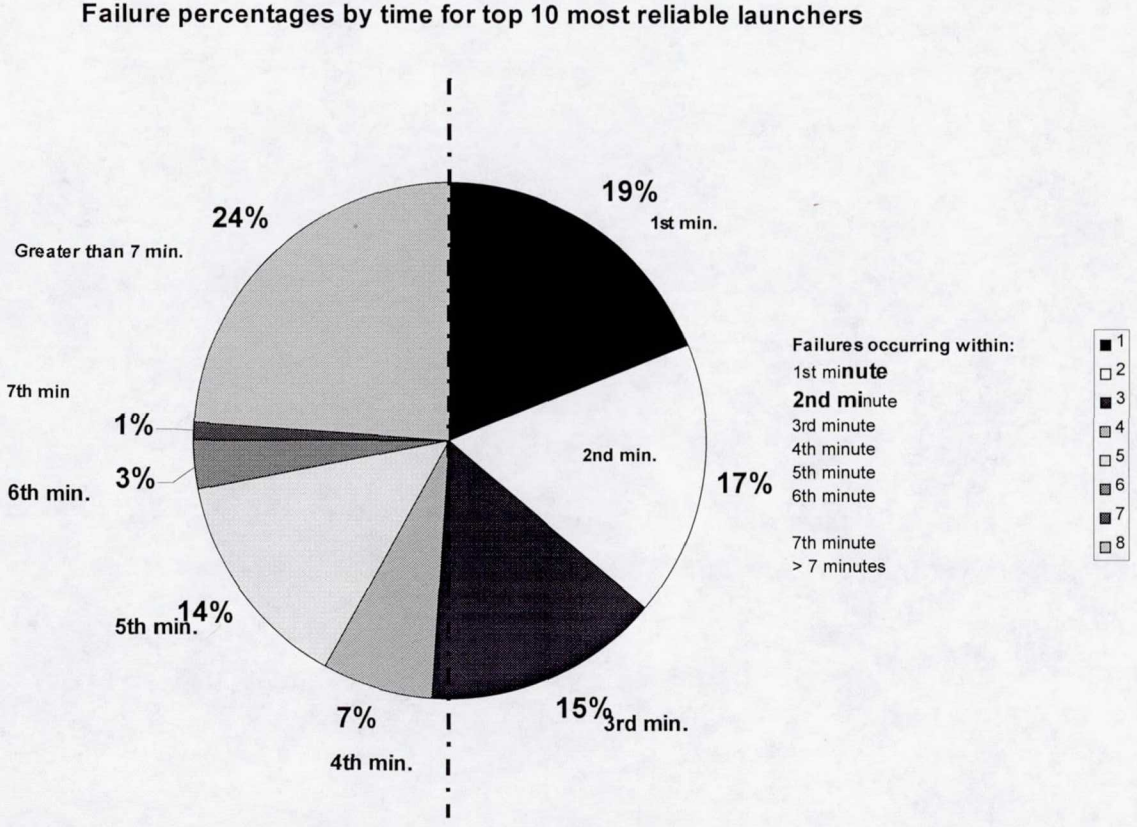

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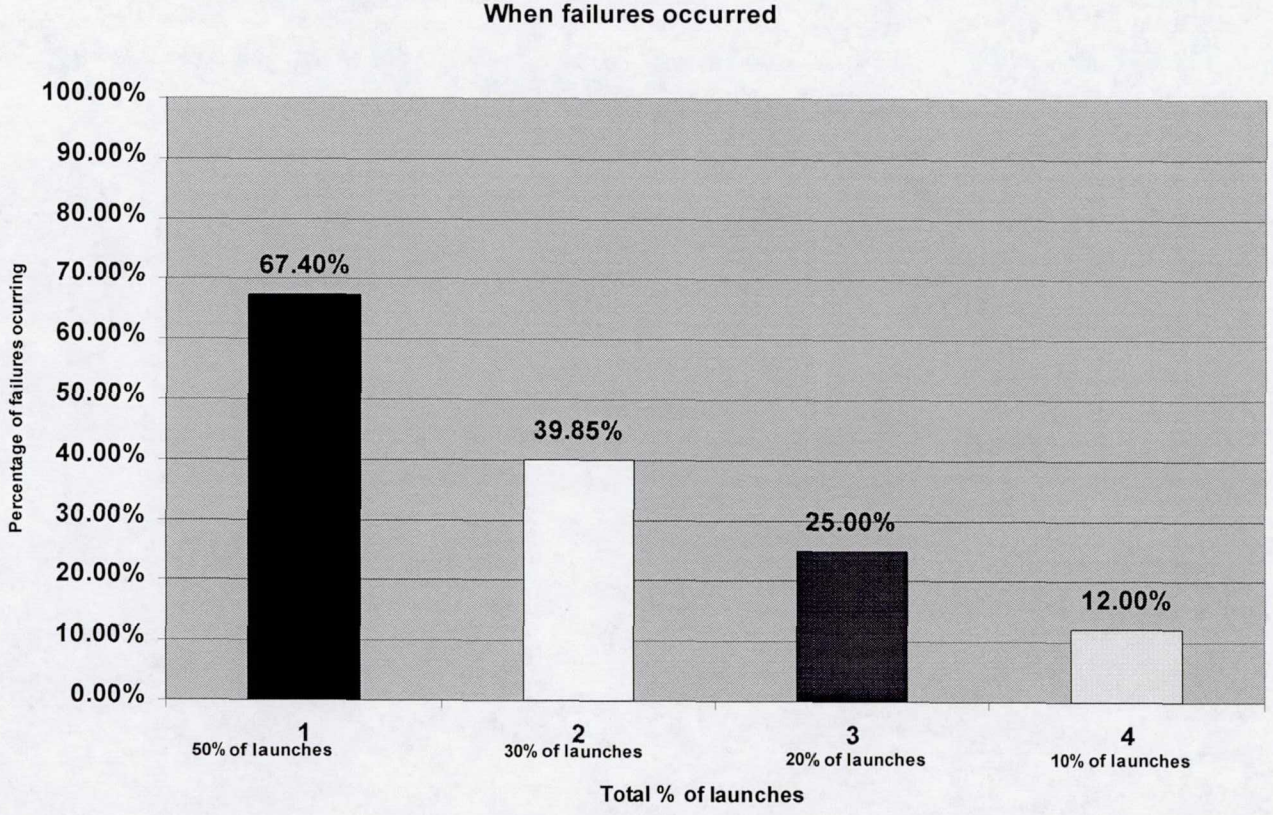

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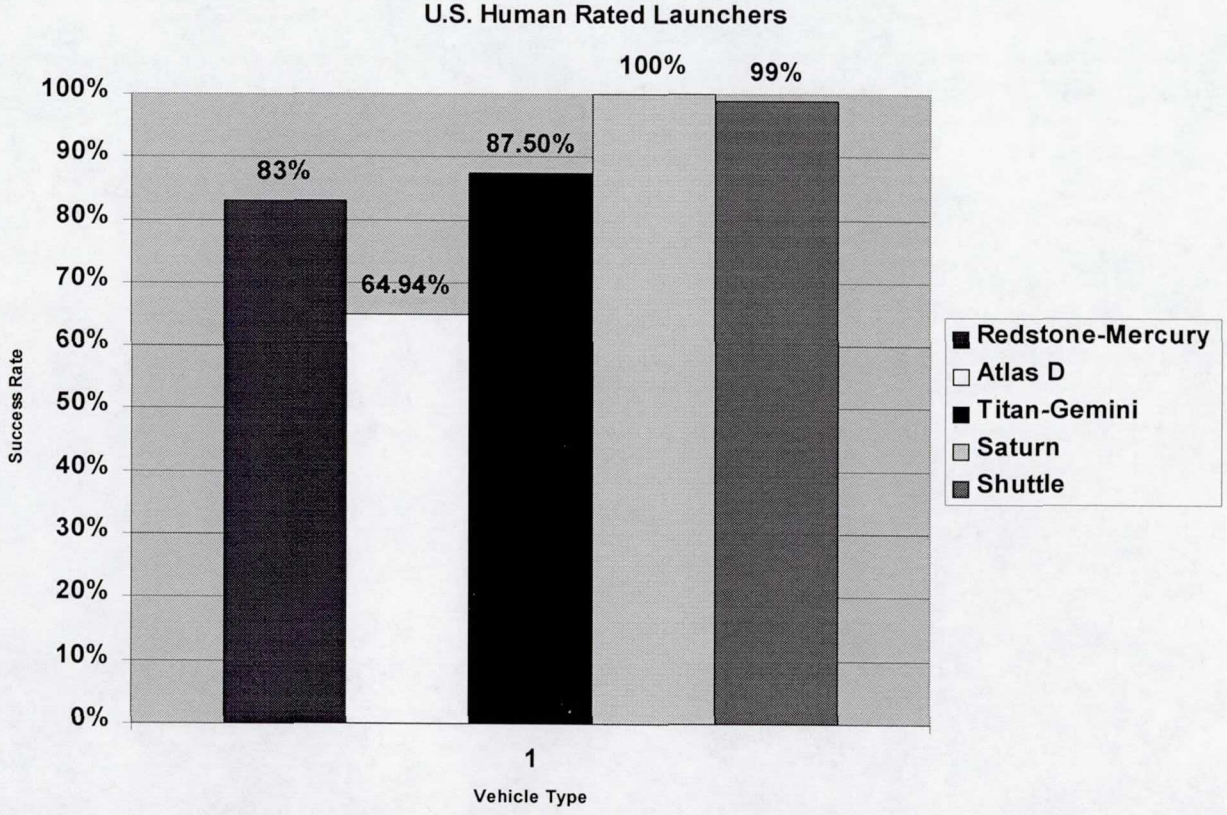

Historic and Current Launcher Success Rates

Conclusions:

- The average historic launcher success rate is less than 99%, however success rates as high as 100% have been achieved.
- The majority of failures for both all launchers in this study and the top ten most successful launchers occurred on the first stage. Most of these failures occurred on the main engines.
- Over 50% of all launcher failures occurred within the first three minutes of the launch, and 70% within the first five minutes of the launch.

Historic and Current Launcher Success Rates

References:

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