



SRB

ORBITER WING

FUEL TANK MOUNTING

COLD WEATHER

An inspection of the launch pad revealed large quantities of ice collecting due to unusually cold overnight Florida temperatures.



WHAT DESTROYED SPACE SHUTTLE CHALLENGER

MTI ASSESSMENT OF TEMPERATURE CONCLUSION ON SRB-25 (SIRL) LAUNCH

- CALCULATIONS SHOW THAT SRB-25 O-RINGS WILL BE 20° COLDER THAN SRB-15 O-RINGS
- TEMPERATURE DATA NOT CONCLUSIVE ON PREDICTING PRIMARY O-RING BEHAVIOR
- ENGINEERING ASSESSMENT IS THAT:
 - COLDER O-RINGS WILL HAVE INCREASED EFFECTIVE BURSTERS ("HAARDEN")
 - "HAARDEN" O-RINGS WILL TAKE LONGER TO "SEAT"
 - "HAARDEN" O-RINGS WILL TAKE LONGER TO "SEAT" BEFORE THE PRIMARY SEAL SEATS
 - "HAARDEN" O-RINGS WILL TAKE LONGER TO "SEAT" BEFORE THE SECONDARY SEAL SEATS
 - IF THE PRIMARY SEAL DOES NOT SEAT, THE SECONDARY SEAL WILL SEAT
 - IF THE SECONDARY SEAL DOES NOT SEAT, THE TERTIARY SEAL WILL SEAT
 - IF THE TERTIARY SEAL DOES NOT SEAT, THE QUATERNARY SEAL WILL SEAT
 - IF THE QUATERNARY SEAL DOES NOT SEAT, THE QUINQUARY SEAL WILL SEAT
 - IF THE QUINQUARY SEAL DOES NOT SEAT, THE SEXTARY SEAL WILL SEAT
 - IF THE SEXTARY SEAL DOES NOT SEAT, THE SEPTARY SEAL WILL SEAT
 - IF THE SEPTARY SEAL DOES NOT SEAT, THE OCTARY SEAL WILL SEAT
 - IF THE OCTARY SEAL DOES NOT SEAT, THE NONARY SEAL WILL SEAT
 - IF THE NONARY SEAL DOES NOT SEAT, THE DECARY SEAL WILL SEAT
- MTI RECOMMENDS STS-51-L LAUNCH PROCEED ON 29 JANUARY 1986
- SRB-25 WILL NOT BE SIGNIFICANTLY DIFFERENT FROM SRB-15

Morton Thiokol, Inc. President
MORTON THIOKOL, INC.
 Waltham Division

POOR DECISION-MAKING

NASA had no experience launching the shuttle in temperatures as cold as on the morning of Jan. 28, 1986. The coldest temperature of a previous launch was 20 degrees warmer.

Morton Thiokol, the builder of the solid-rocket boosters, advised NASA that they believed the O-ring seals in the solid-rocket boosters would perform adequately in the cold.

WHAT HAPPENED?

RUBBER O-RINGS

To make each solid-rocket booster, the Morton Thiokol factory built four hull segments filled with powdered aluminum (fuel) and ammonium perchlorate (oxidizer).

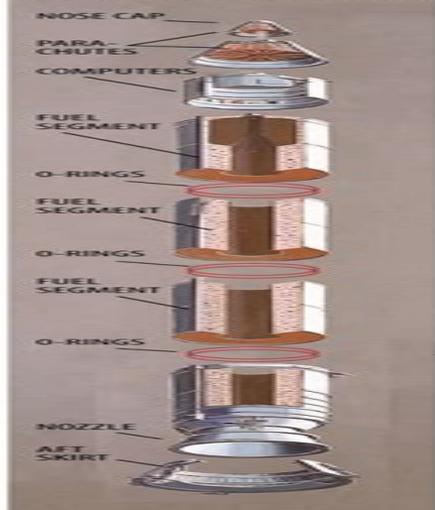
At the launch site, the fuel segments were assembled vertically. Field joints containing rubber O-ring seals were installed between each fuel segment.

The O-rings were never tested in extreme cold. On the morning of the launch, the cold rubber became stiff, failing to fully seal the joint.



LEAKING SRB

SOLID ROCKET BOOSTER



PLUME

RUPTURED FUEL TANK

As the shuttle ascended, one of the seals on a booster rocket opened enough to allow a plume of exhaust to leak out. Hot gases bathed the hull of the cold external tank full of liquid oxygen and hydrogen until the tank ruptured.

DISASTER

At 73 seconds after liftoff, at an altitude of 9 miles (14.5 kilometers), the shuttle was torn apart by aerodynamic forces.

The two solid-rocket boosters continued flying until the NASA range safety officer destroyed them by remote control.

The crew compartment ascended to an altitude of 12.3 miles (19.8 km) before free-falling into the Atlantic Ocean.



U S Space Program After Challenger

Yi-Tong Ma



U S Space Program After Challenger:

U S Space Program After Challenger Book Review: Unveiling the Magic of Language

In a digital era where connections and knowledge reign supreme, the enchanting power of language has are more apparent than ever. Its capability to stir emotions, provoke thought, and instigate transformation is actually remarkable. This extraordinary book, aptly titled "**U S Space Program After Challenger**," published by a very acclaimed author, immerses readers in a captivating exploration of the significance of language and its profound affect our existence. Throughout this critique, we will delve into the book is central themes, evaluate its unique writing style, and assess its overall influence on its readership.

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