

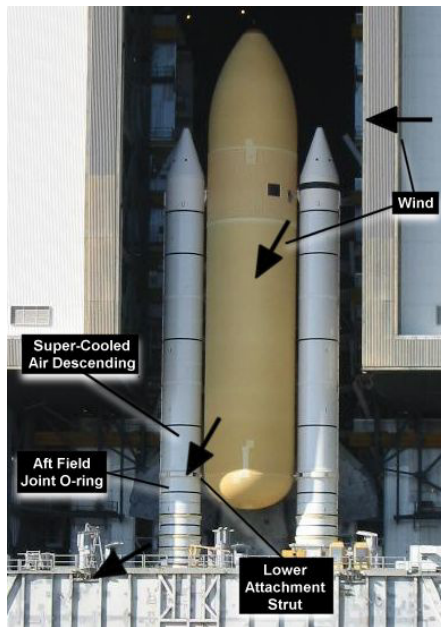
ETHICS LECTURES

The Space Shuttle Challenger Tragedy – An Overview

MAE 175a
3rd ethics lecture

Sources: <http://www.tsgc.utexas.edu/archive/general/ethics/shuttle.html>
<http://www.engineering.com>
 Presidential commission report
<http://www.aerospaceweb.org>
<http://onlineethics.org/moral/boisjoly/RB-intro.html>

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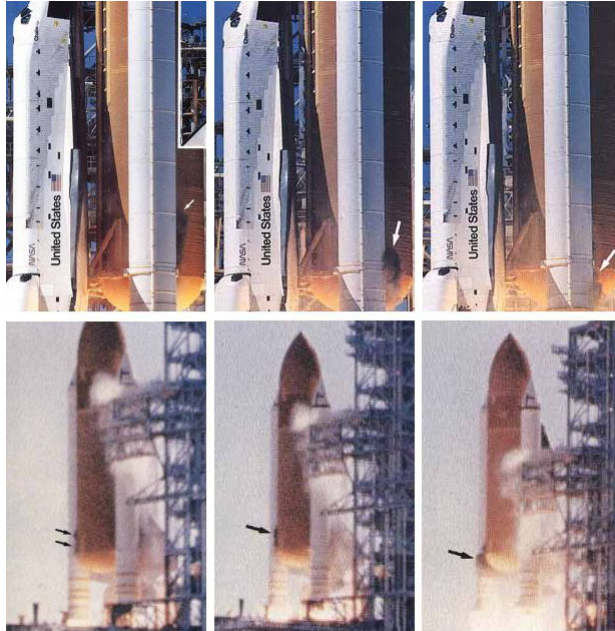
Despite concerns, under pressure of media and management: Launch

- Wind blowing down and along liquid hydrogen tank is very cold
- Engineers at launch point thermal imaging camera at aft field joint, measure temperature of -13°C (8°F)
- Ice inspection team also concerned
- These people were unaware of teleconference before launch

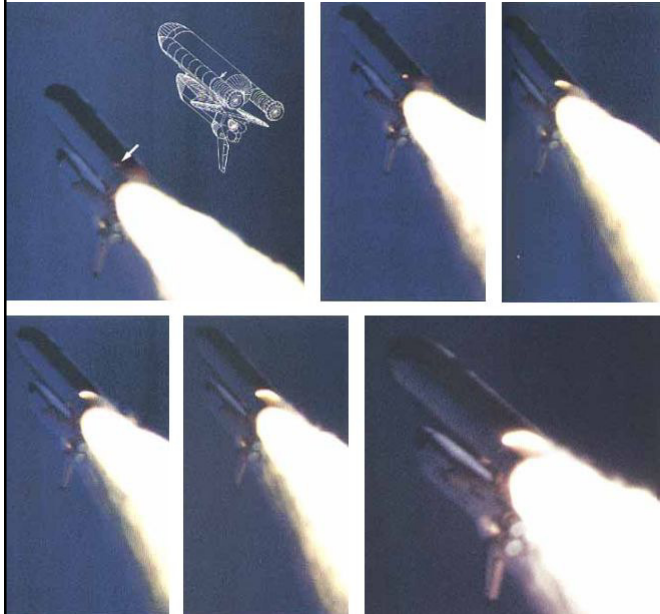
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Partial failure during launch

- Black puffs of smoke from right aft SRB joint
- Sealed up with Al_2O_3 after a very short leak



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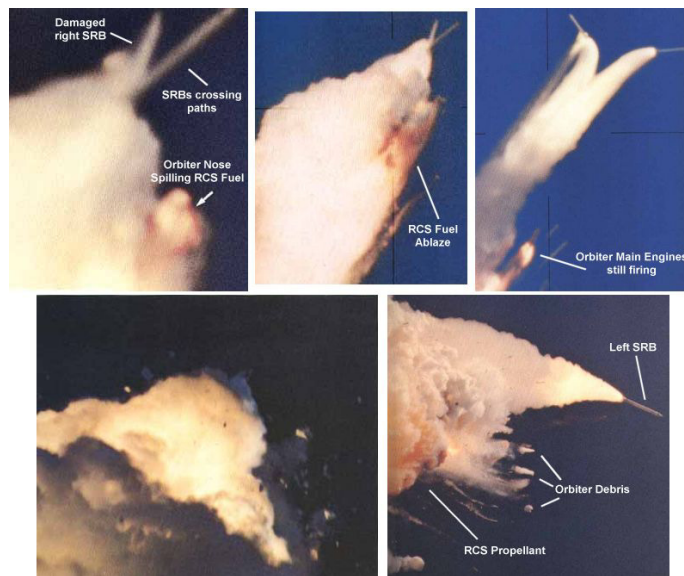
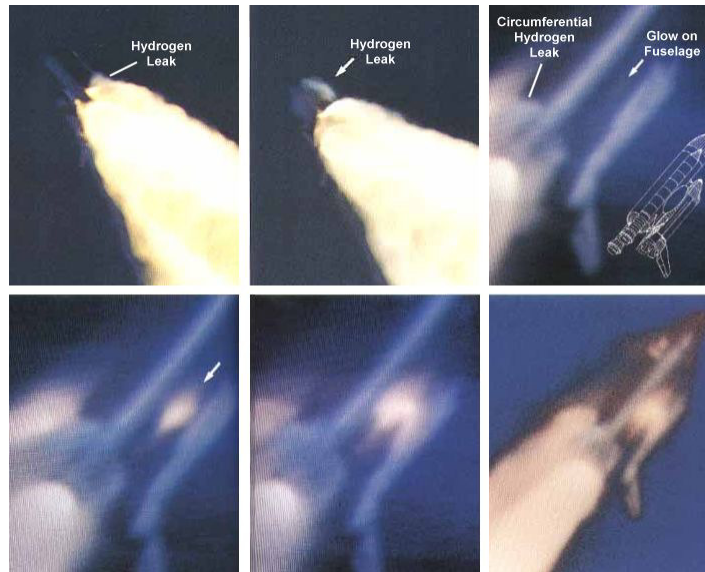
Excessive wind shear dooms mission

- Highest wind shear ever recorded ~ 1 minute into flight
- Attitude control and wind lurch vehicle
- Seals re-open, allowing flame to jet from SRB

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Hot gases impinge on H₂ tank

- Tank melts, liquid H₂ vaporizes
- O₂ tank fails, orbiter engulfed in flame
- Orbiter spins, loading causes structural failure



**Ethics lecture focus: Challenger Disaster,
Mission-51L**

Showing of 3rd video

**Ethics lecture focus: Challenger Disaster,
Mission-51L**

Wrap up after 3rd video

Reflections

- **Role of the engineer**
- **Role of the manager-engineer (important)**
 - Can sometimes best translate engineering judgment and experience into decisions
- **Organization and Communication**
 - Complicated, closed- and open- meetings in levels
- **NASA management decision to proceed due to LACK of data (and possibly lack of judgment?)**
 - Reversal of older cautionary procedures
 - Pressure of superiors (white house, media)

The ethical dilemma

- What could NASA management have done differently?
- What, if anything, could their subordinates have done differently?
- Does it change your opinion to know that NASA was considering a new vendor for the SRBs (and Morton Thiokol knew this)?
- What should Roger Boisjoly have done differently (if anything)?
In answering this question, keep in mind that, at his age, the prospect of finding a new job if he was fired was slim. He also had a family to support.
- What do you (the students) see as your future engineering professional responsibilities in relation to both being loyal to management and protecting the public welfare?

Bibliography

(to go with suggested references at the beginning)

- Feynman, Richard Phillips. *What Do You Care What Other People Think: Further Adventures of a Curious Character*. Bantam Doubleday Dell Pub, ISBN 0553347845, Dec 1992. Reference added by request of Sharath Bulusu, as being pertinent and excellent reading - 8-25-00.
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