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My Internship at the Prototype Development Lab

Chelsea Partridge

Prototype Development Lab

NASA INSPIRE

The Coolest Place at KSC

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KSC PROTOTYPE LAB

My Mentor, Adam "Woodrow" Cofield

Photo of machine shop in PDL

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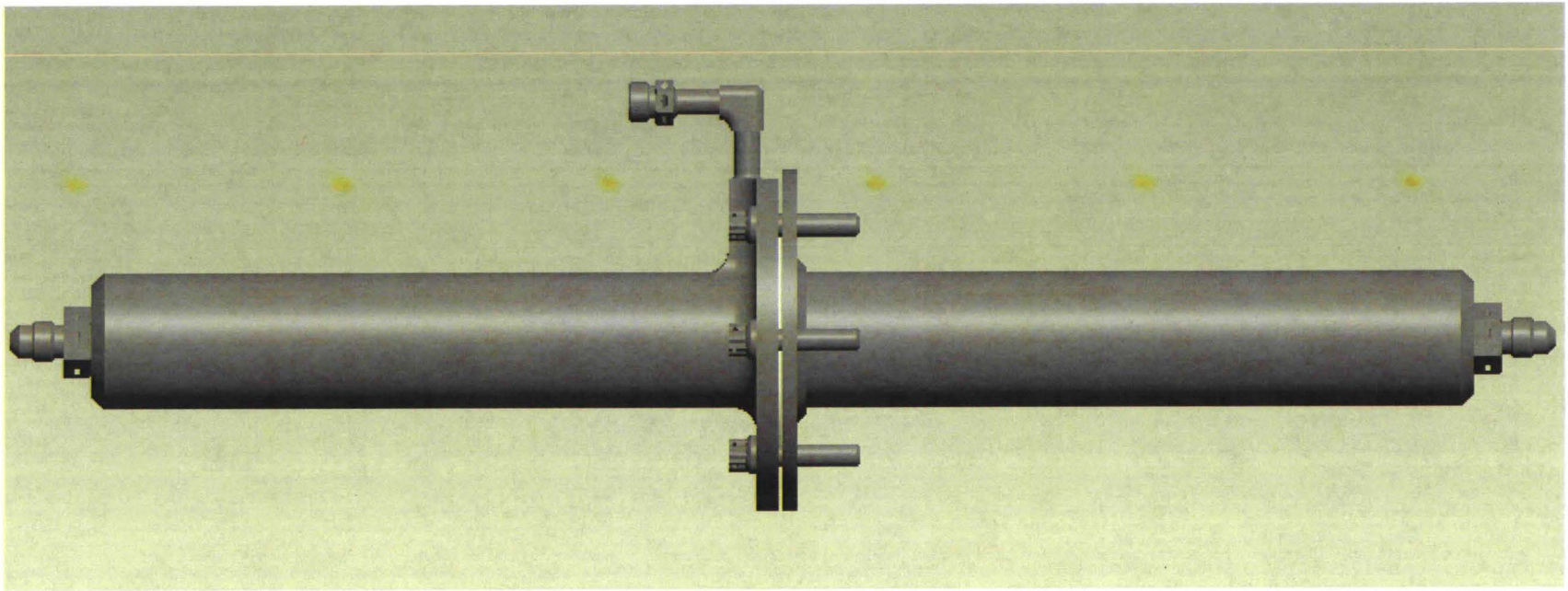
My Projects

- Hypergol Flange Seal Testing



Tensile Stress Calculations

TENSILE STRESS ON RD1-4009-0410 BOLT

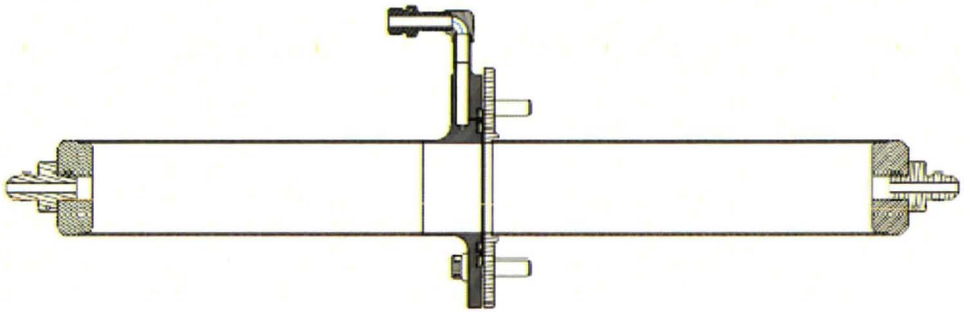


Figure 7: Cross section view of Flange Test Article

The area of the outer seal is being used for this calculation for, that, if in the even that the first seal fails, the inner area of the outer seal will be the greatest area that the force is acting upon.

$d_{outer\_seal} := 2.5in$

$$\sigma_{bolt\_286} := \frac{p\left(\frac{d_{outer\_seal}}{2}\right)^2}{3\left(\frac{d_{bolt}}{2}\right)^2} = 15.05\,ksi$$

MARGIN OF SAFETY

$$MoS_5 := \frac{\sigma_{all\_bolt\_286}}{\sigma_{bolt\_286}} - 1 \qquad MoS_5 = 7.556$$

Margin of safety (MoS) is positive, therefore stress is acceptable.

FORCES ON SEAL AND BOLT

$$F_{outer\_seal} := p \cdot \pi \left(\frac{d_{outer\_seal}}{2}\right)^2 \qquad F_{outer\_seal} = 2.209\,kip$$

$$F_{outer\_seal\_bolt} := \frac{F_{outer\_seal}}{6} = 0.368\,kip$$

MINIMUM BOLT PRELOAD

$T_{min} := 85lbf \cdot in \quad k := .2 \quad d_{bolt} := .25in$

$$F_{p\_min} := \frac{T_{min}}{(k \cdot d_{bolt})} \qquad F_{p\_min} = 1.7\,kip$$

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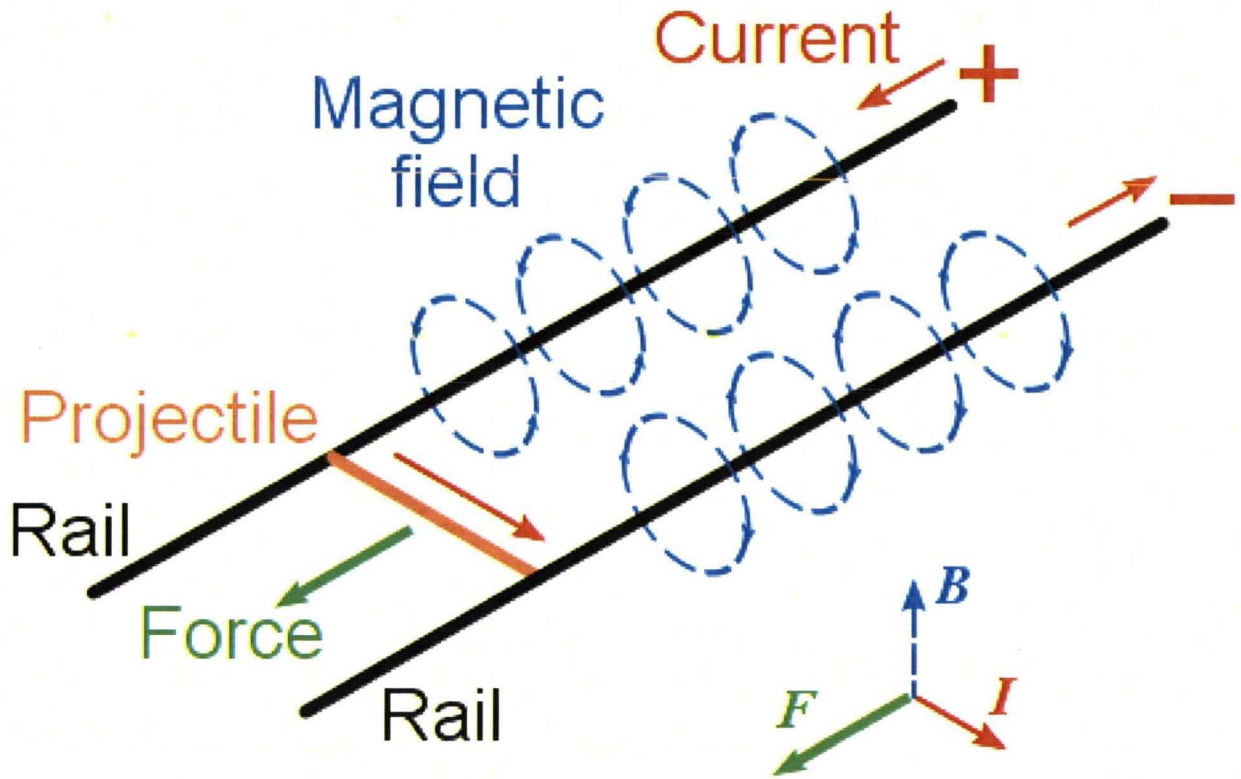
Rail Motor: Lorentz Force



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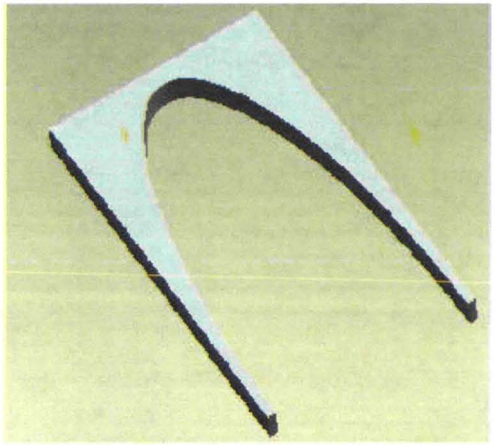
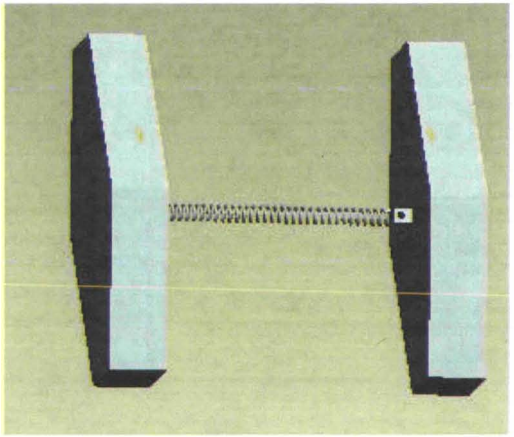
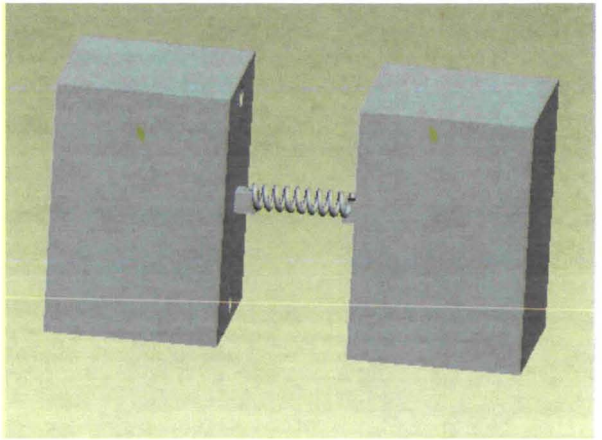
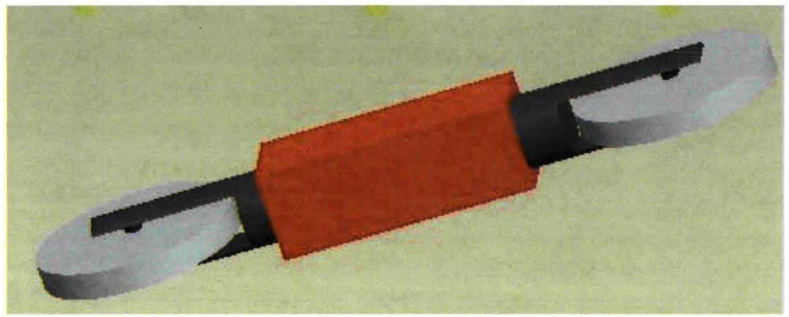
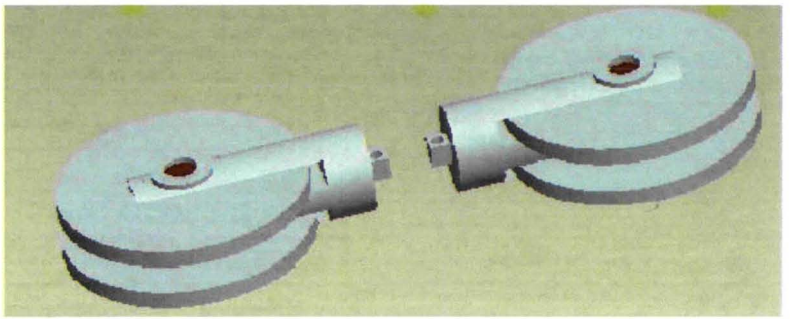
Rail Motor Assembly

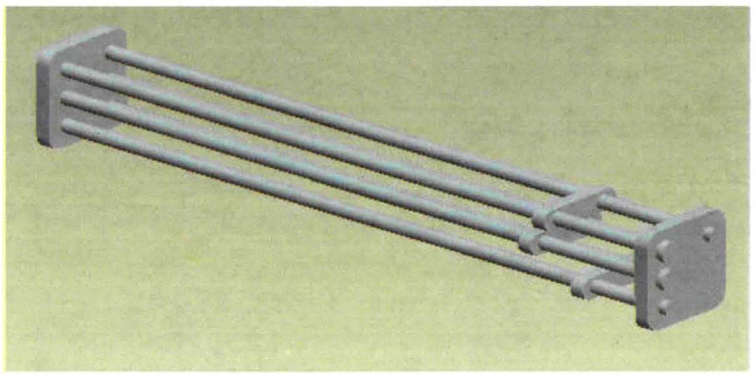












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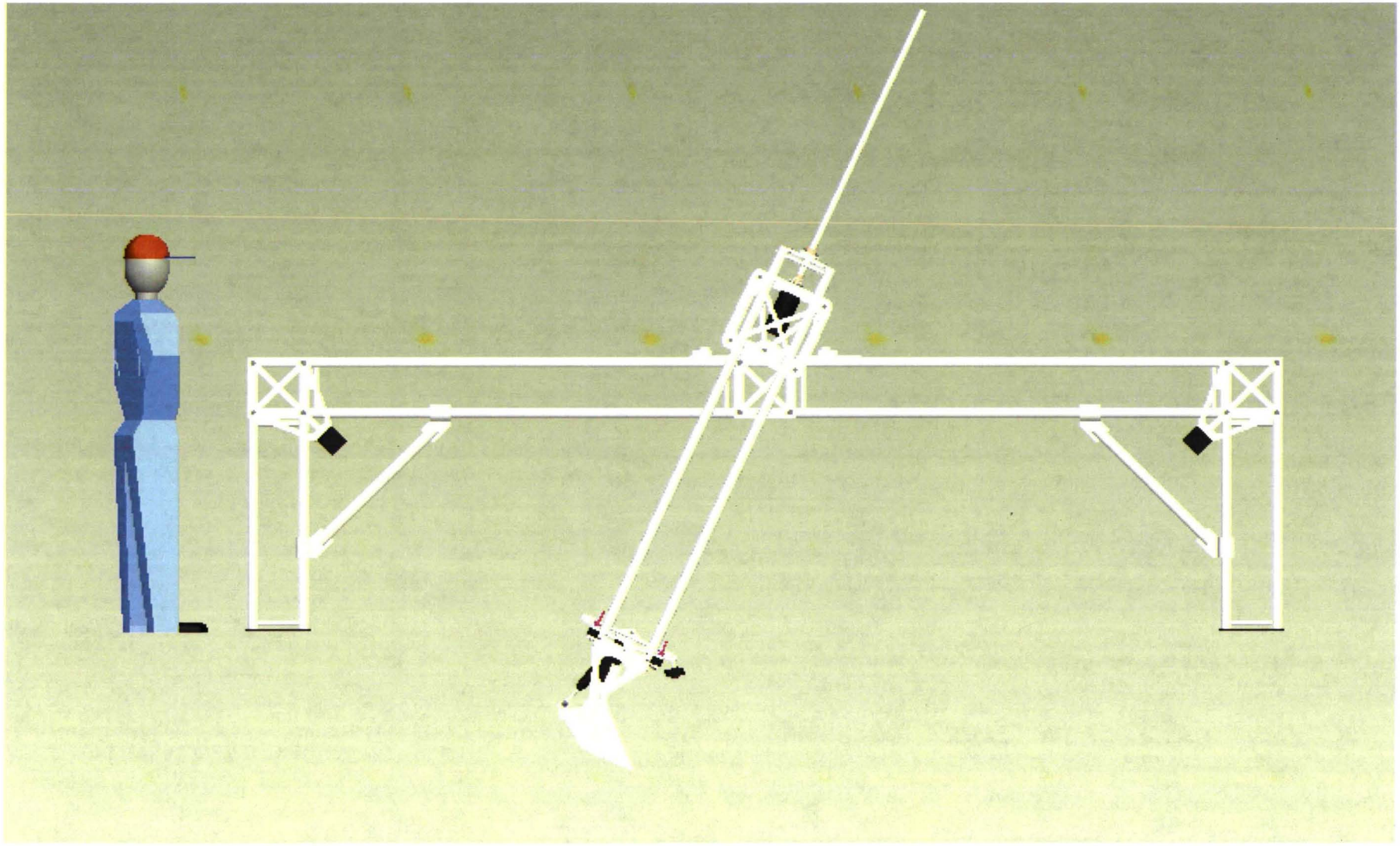
VIPER Test Stand



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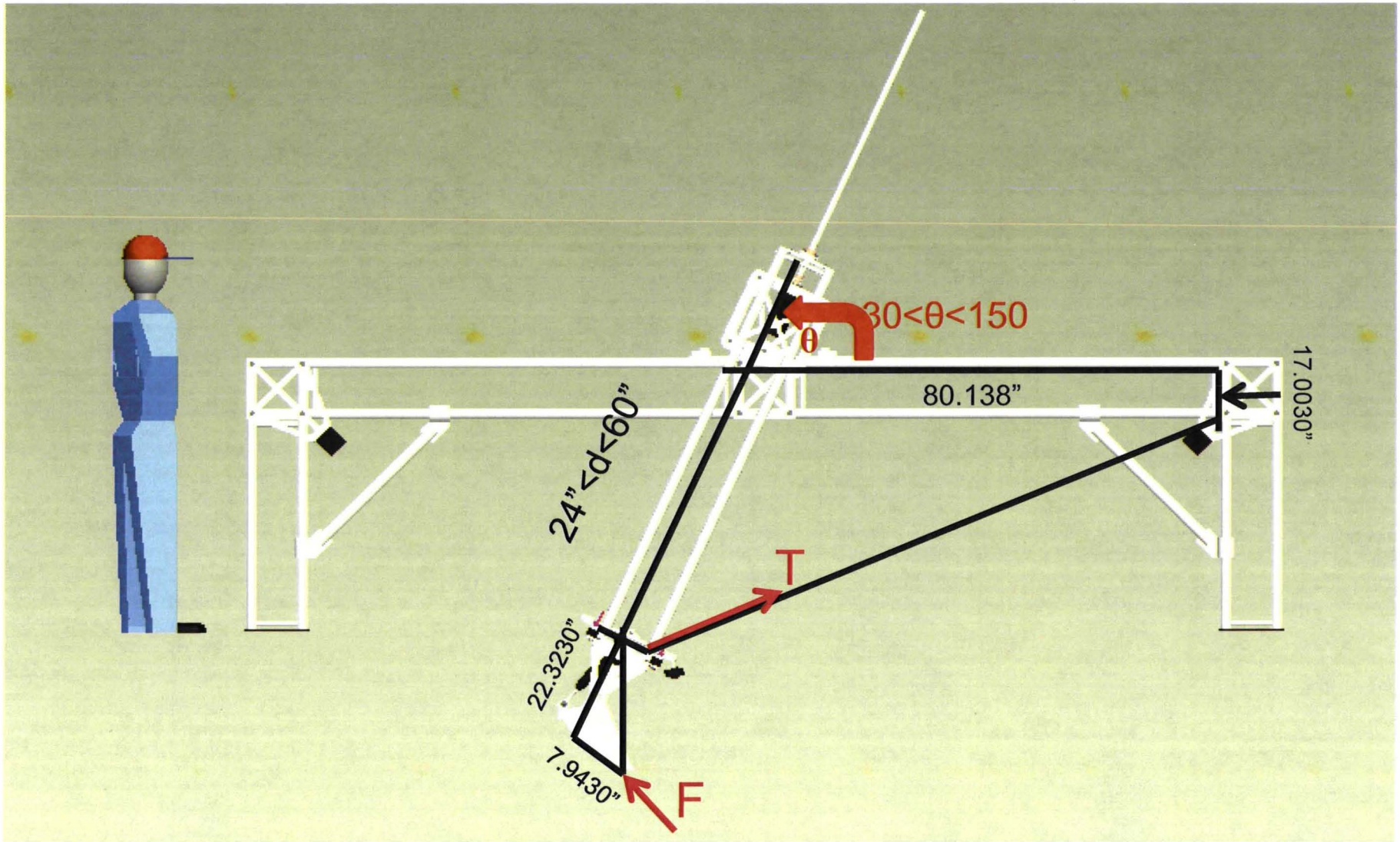

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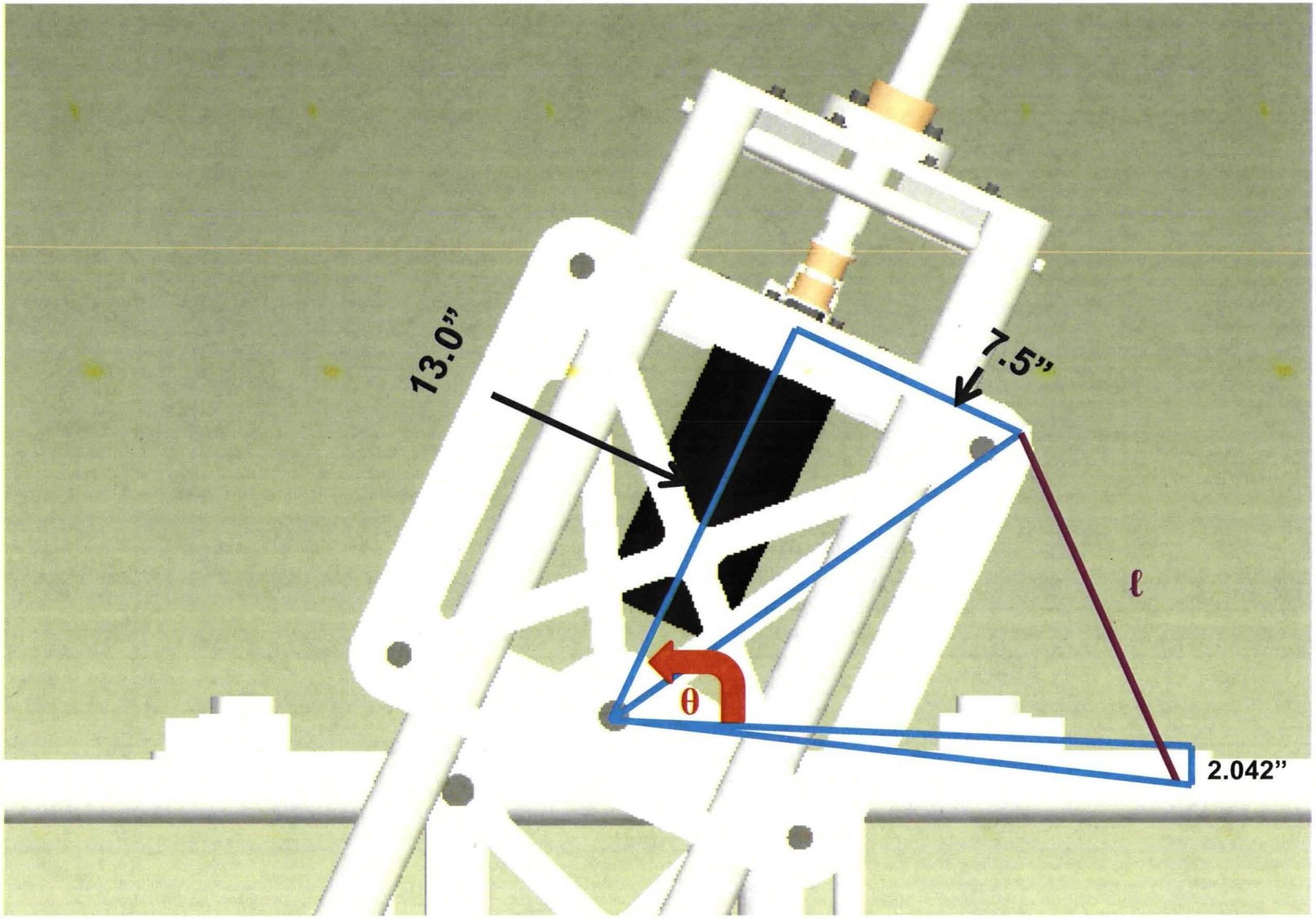

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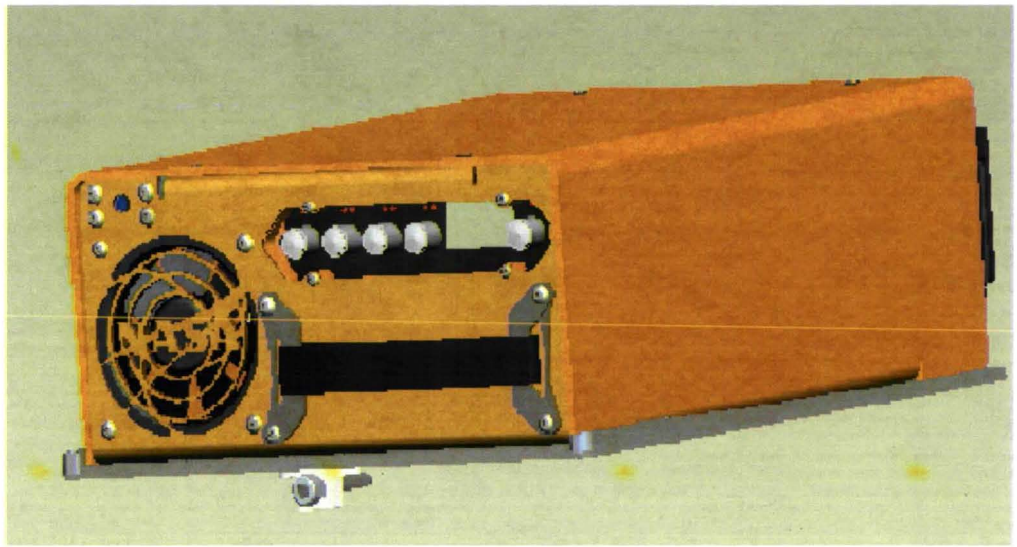
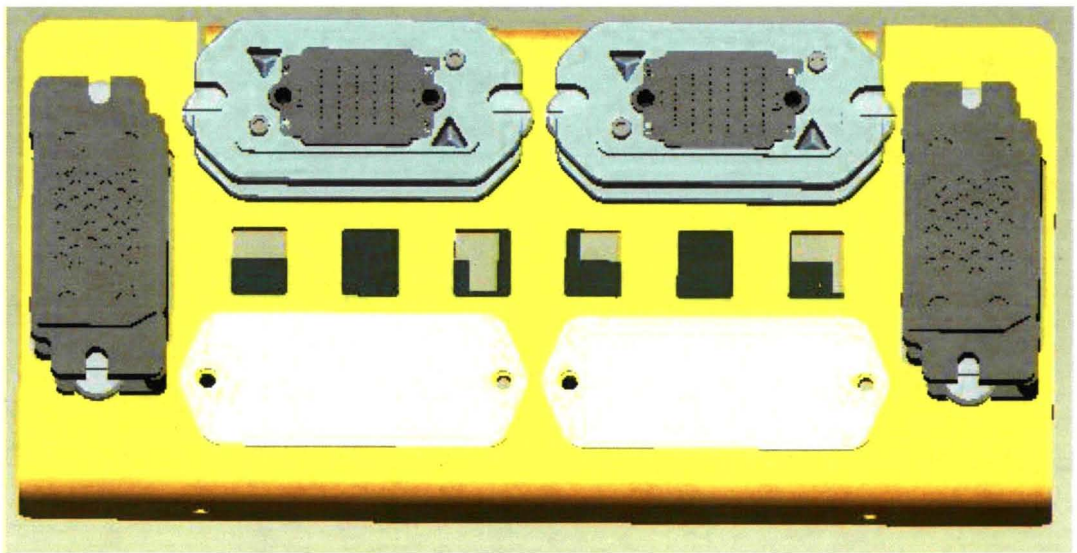
LRU Box

Top Right: LRU Box

Bottom Left: LRU Connector Plate

Bottom Right: Remodeled adapters





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And Now…The Fun Stuff

- Hovercraft Testing

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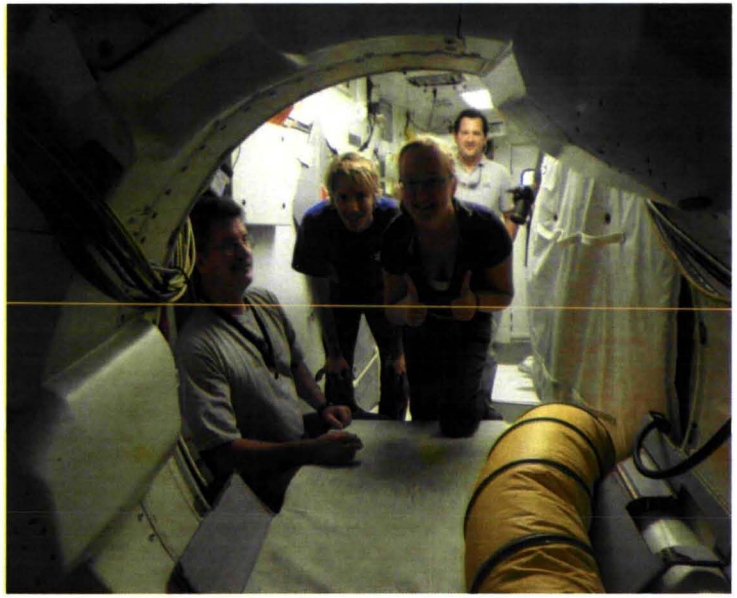
Climbing launch pad 39A



Far left: Myself with the external tank.

Top Right: A picture taken from inside the orbiter.

Bottom Right: In the whiteroom.

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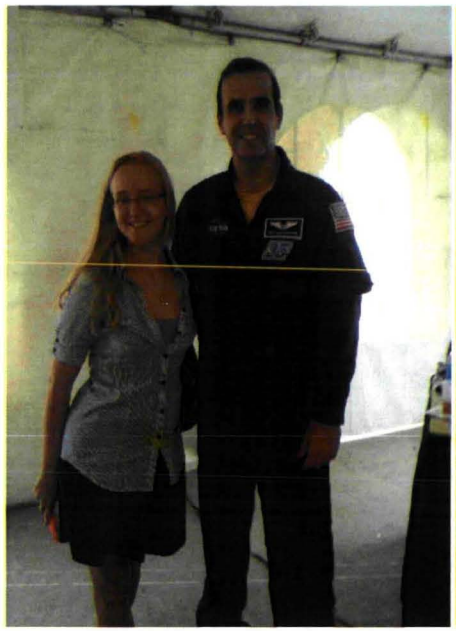
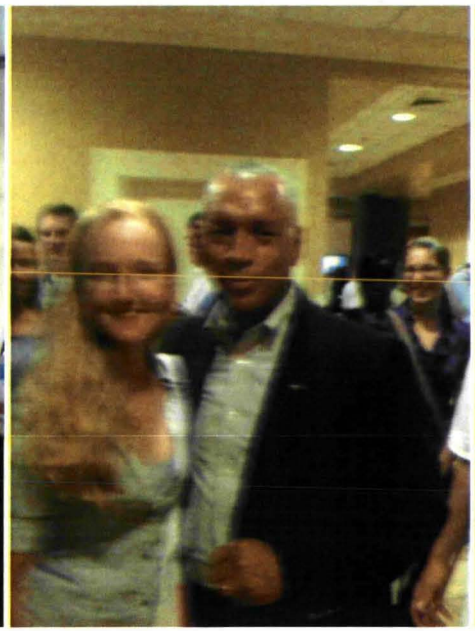
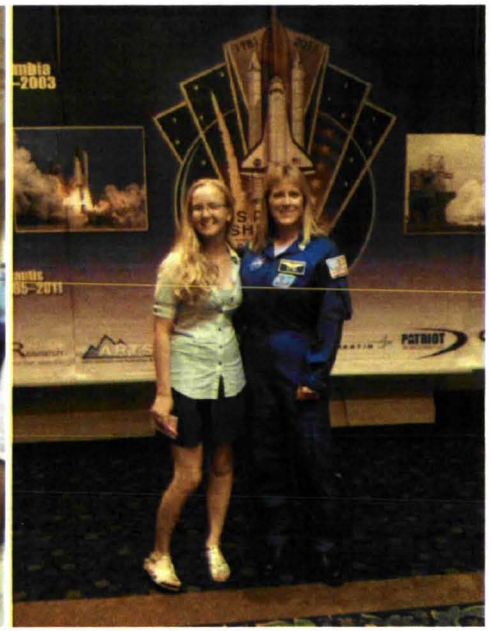
Socializing with Astronauts



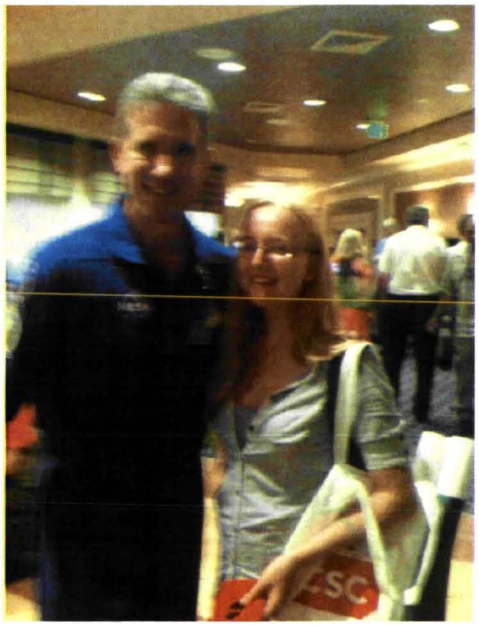
Rick Mastracchio



Charlie Bolden



Kay Hire



Michael Good

Going Inside of Space Shuttle Endeavour

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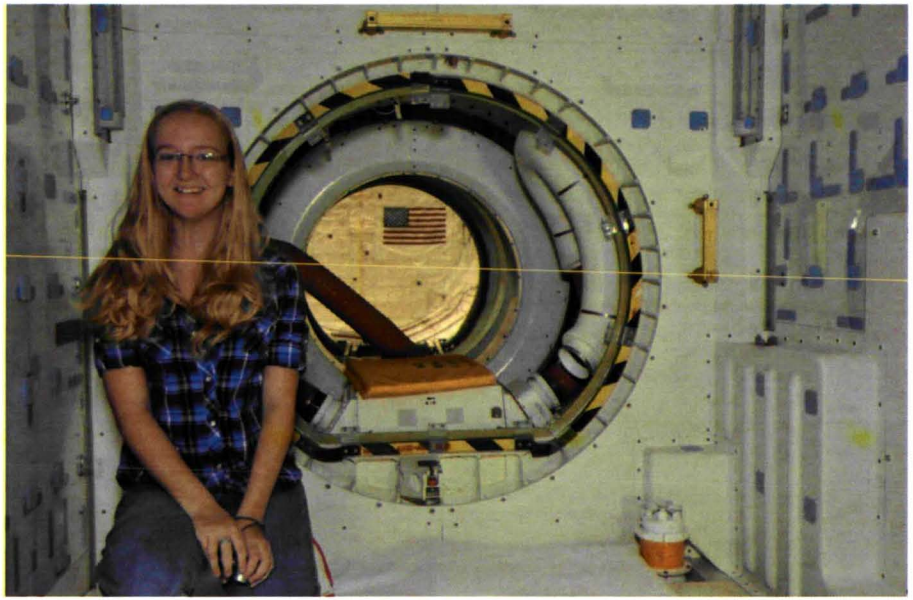
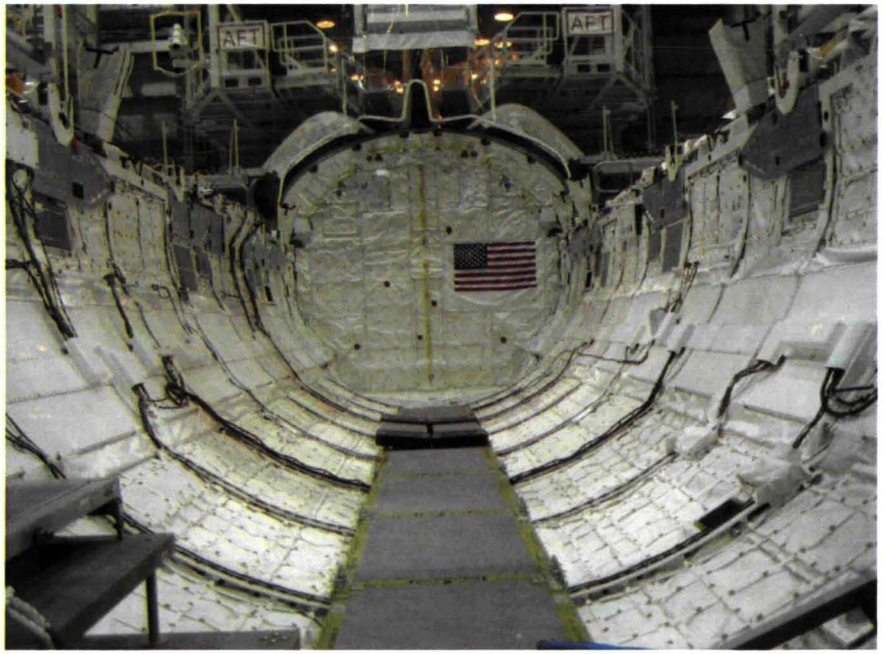


Left: Sitting by entryway to hatch, airlock, and cargo bay

Right: Looking into the cargo bay



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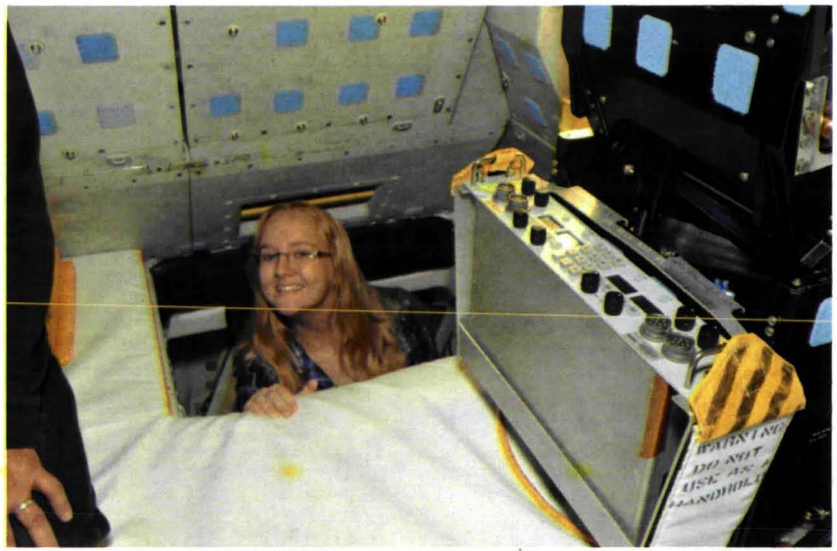
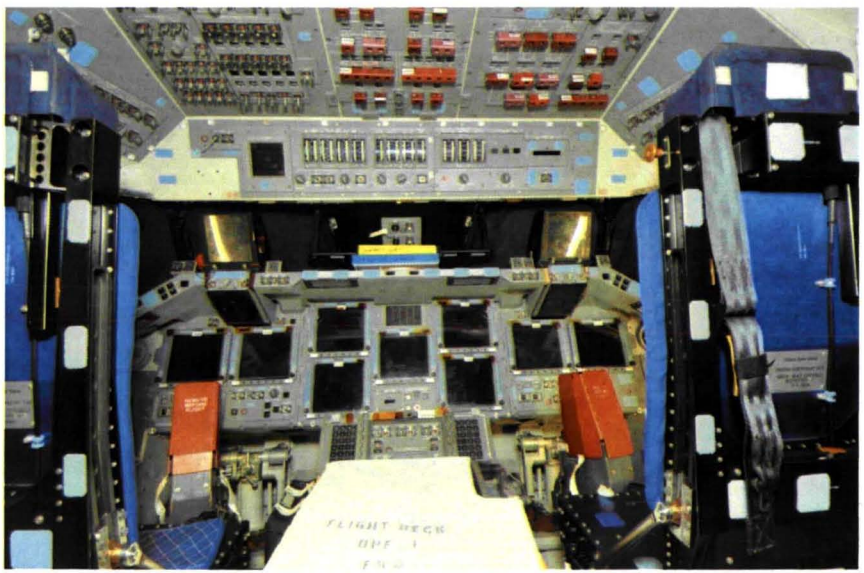


Top: Climbing into the flight deck
Bottom Left: Commander and pilot seats
Bottom Right: Sitting in the pilot seat



My Experience as an Intern

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- My overall experience was truly incredible. I was able to work as an engineer with some of the coolest people I've ever met. I was able to work with engineering software, make my own designs, and work with many people throughout KSC.

Future Plans in STEM and NASA

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- I will start at the University of North Florida as a junior in the fall, and will major in either Mechanical Engineering or Physics with Mechanical Engineering.

UNF
UNIVERSITY of NORTH FLORIDA.

- I hope to be able to intern or co-op with NASA throughout the rest of my college career, and upon graduation, work in the space industry.

NASA

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Thank you!

- I want to give a big thanks to:
  - Steve Chance
  - Priscilla Moore
  - Jim Gerard
  - Adam Cofield, John Trautwein, Adam Dokos, and all of the wonderful people I've worked with at the PDL.
  - All of the awesome interns I've met and worked with.