IPRO 341
New Product Evaluation and Improvement

Sponsored by:

Versatility Tool Works & Manufacturing

Sponsor

- Who is VTW?
  - Located in Alsip, IL
  - Est. 1972
  - Manufacturer of Sheet Metal Products
- Project History (Spring 2009)

Project Objectives

- Structural analysis of new cabinet to determine longevity
- Design a next generation tool cabinet

Team Organization

Faculty Advisors
William Maurer
Sheldon Mostovoy

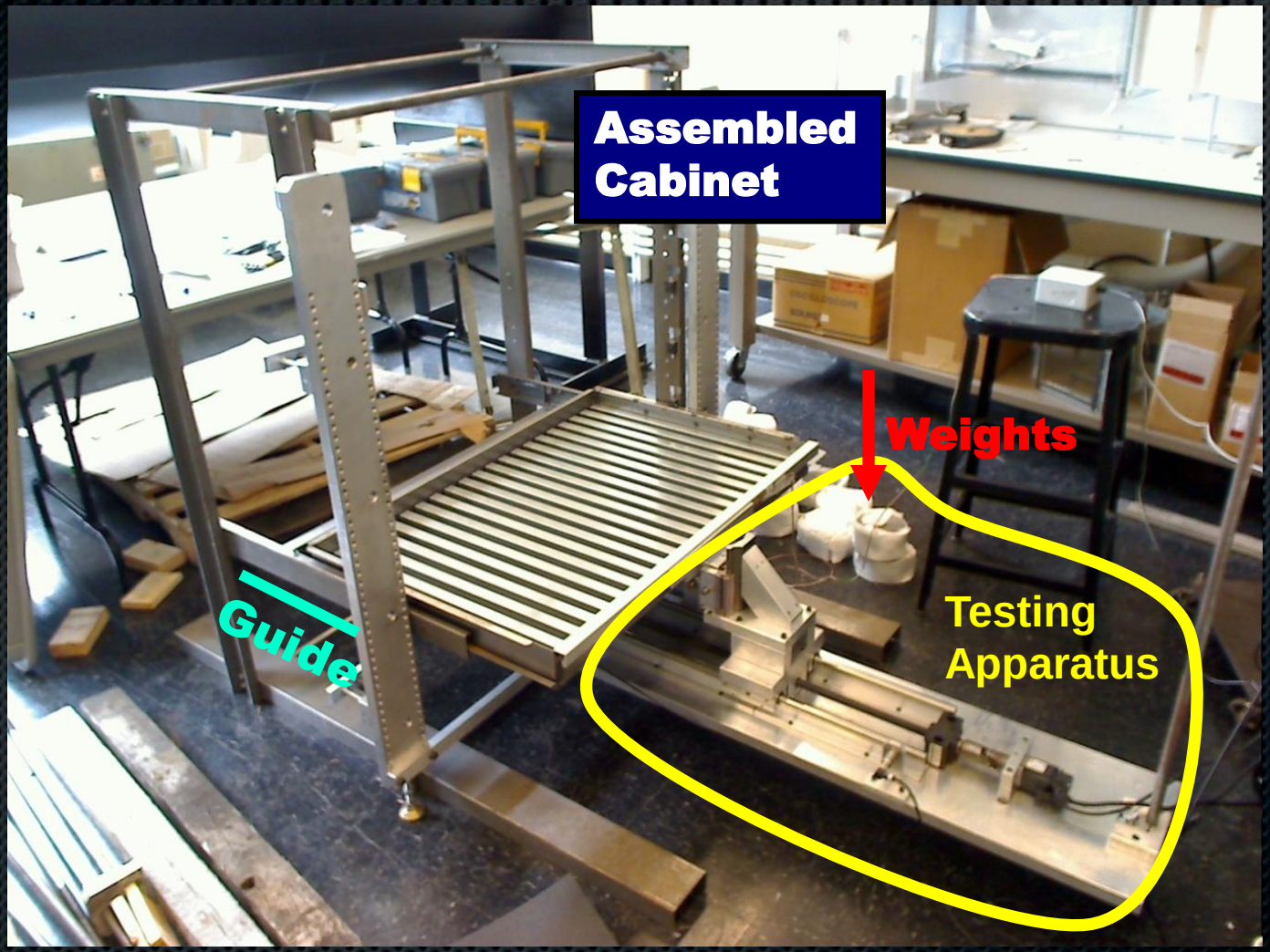
Testing Team
Marin Assaliyski
Vitali Basiourski
Luke Grabowski
Jose Guerrero
Natacha Tchobanova

Design Team
Ryan Attard
Lawrence Dorn
Vlad Rusz
Laurie Feldman
Priscilla Zellarchaffers

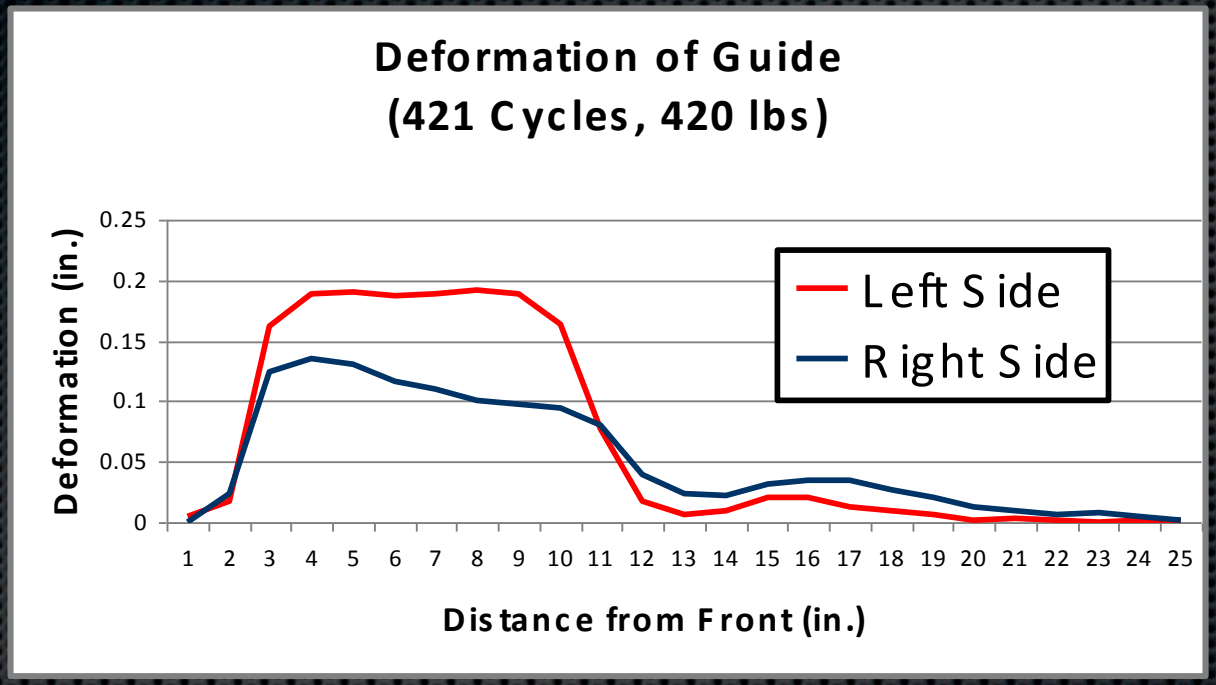
Testing Team Outline

- Ran simulation test, gathered data, and informed sponsor of results
- Analyzed parts used and recommended appropriate changes to current design
- Verified results using Finite Element Analysis (FEA)
- Continuously informed sponsor of progress

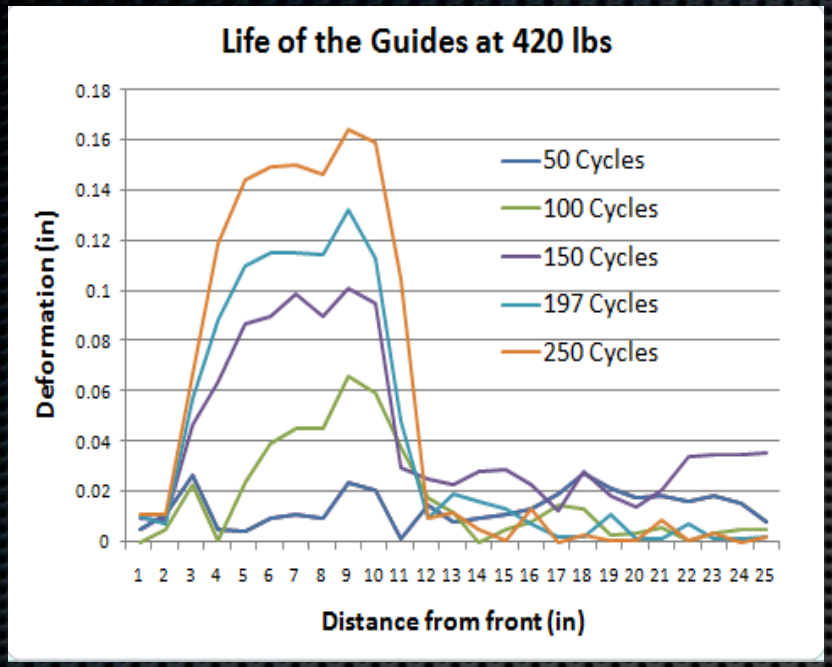
Set-up and Assembly

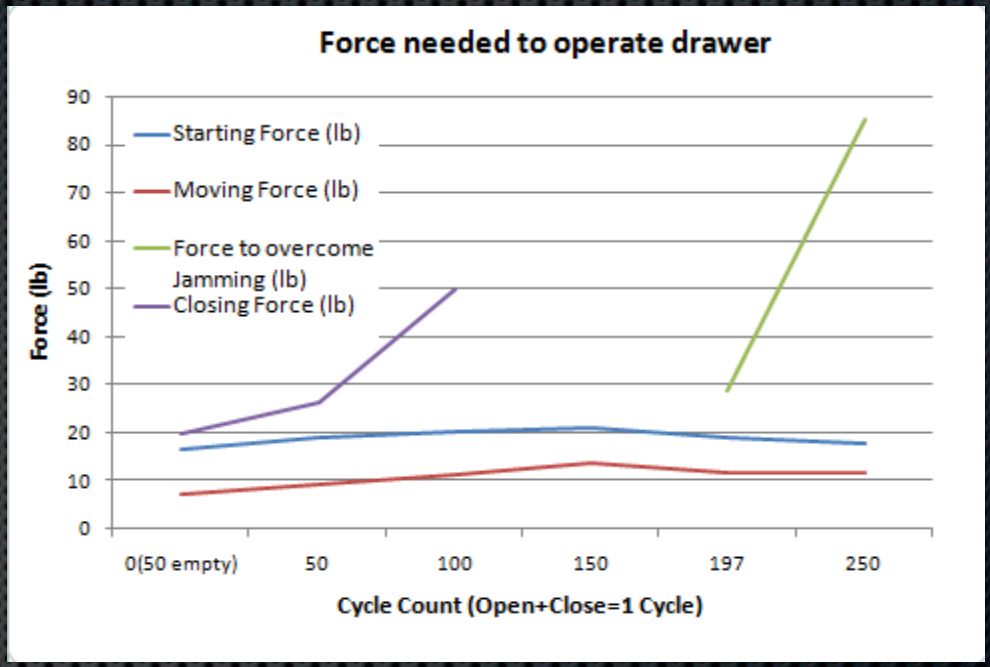


Failed After 421 Cycles



Data at 50 Cycle Intervals





- Perspective:
  - 50 cycles = 10 work days

- At 100 cycles closing force was maxed out 50+ lbs
- At 200 cycles the drawer required extra force to open all the way

Strength and Stiffness of Materials

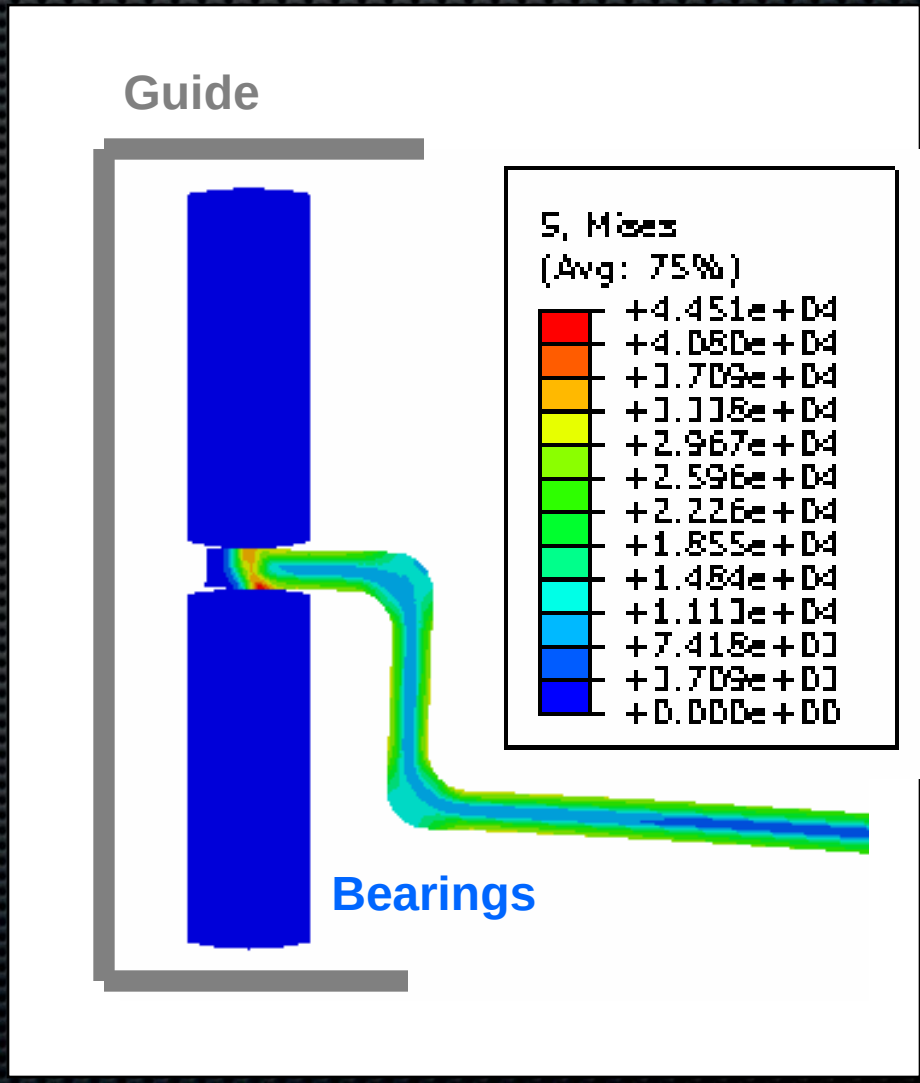
- Bearing: 350 KSI
- Guides: 54 KSI

(Diamond)

(Graphite)

Computer Model of Drawer:
Finite Element Analysis

- Using gathered data to create a computer model of the drawer
- Analyze weak points
- Determine possible improvements



Proposed Improvements

- Increasing the thickness of guides to increase stiffness
- Adding more bearings to distribute load
- Adding an angle bracket to the guides

Original Guide

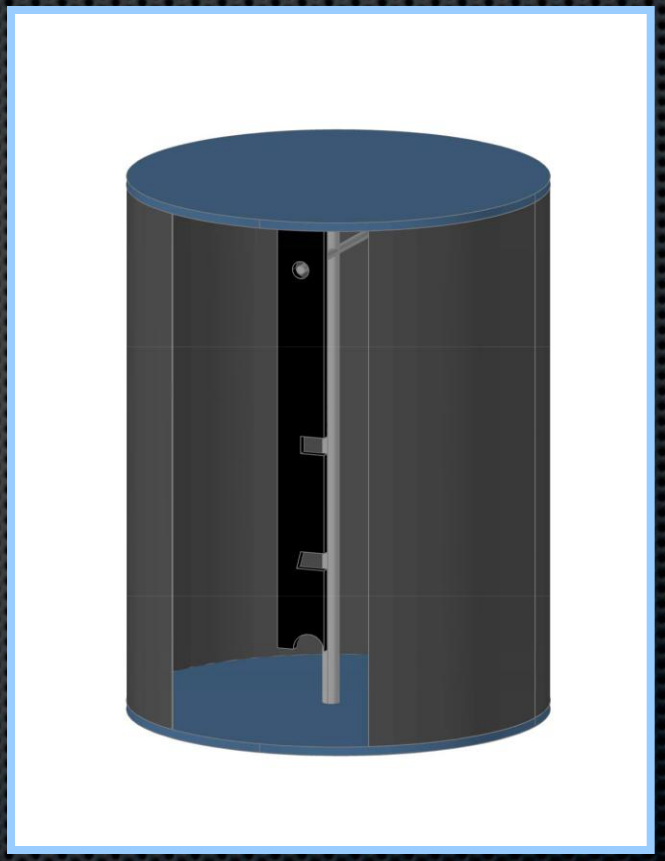
Modified guide

Design Team Outline

- Researched existing products and technologies in the market
- Analyzed research to developed new product ideas
- Sketched potential designs ideas
- Selected the most promising designs
- Further developed specific designs

Rotary Design

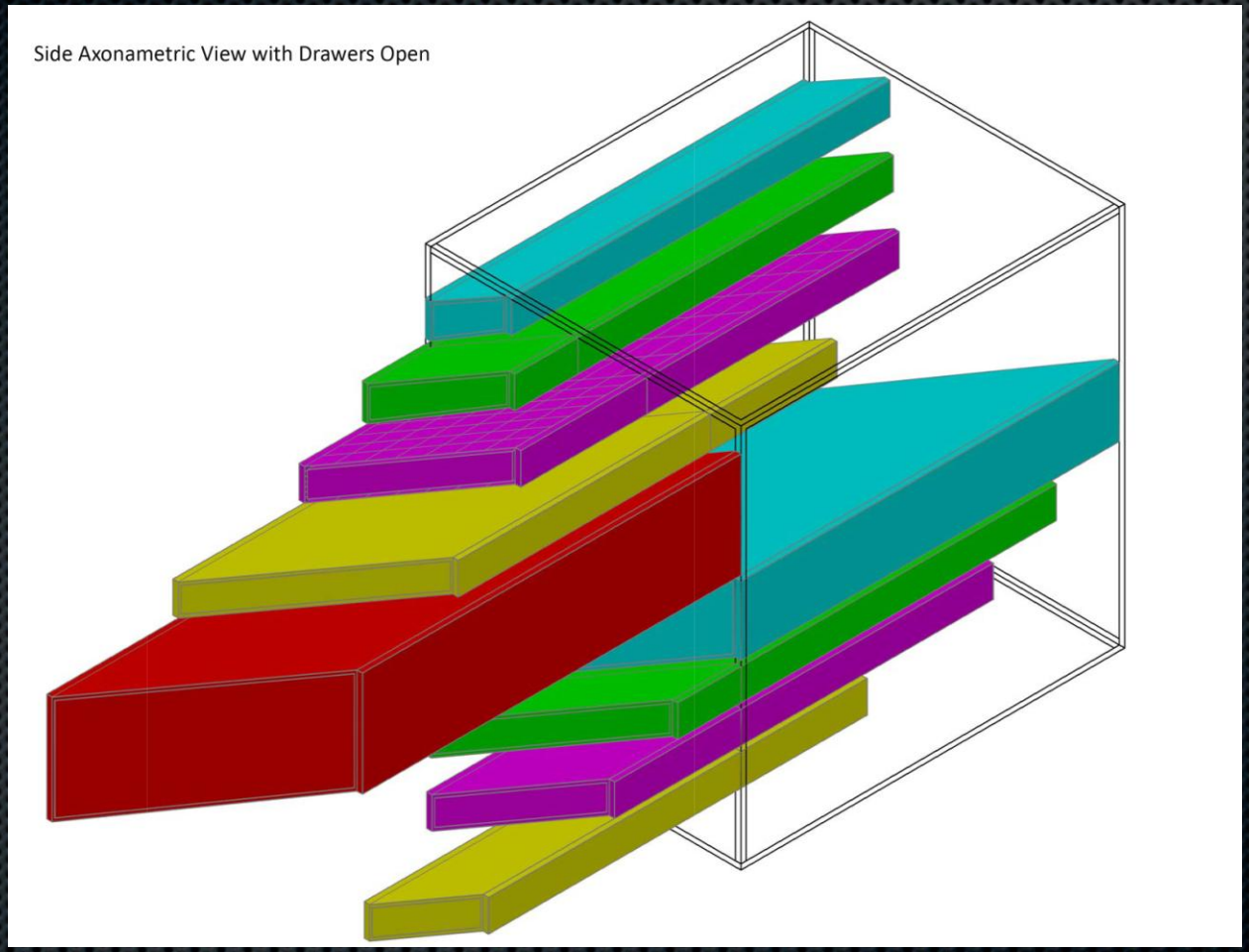
- Rotary Shelf Storage Systems use lazy-Susan design



- Circular Cabinet: Long narrow tools hung upright

Diagonal Drawers

drawers angled for easy access



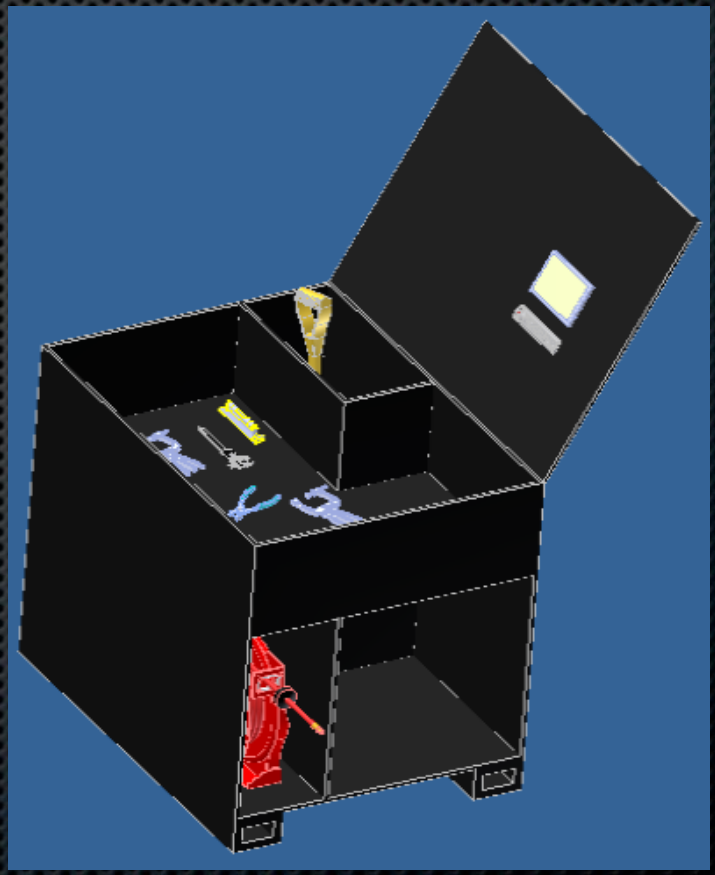
Back View

RFID
passive inventory management

- Benefits:
  - Inventory Tracking
  - Versatile tag location
  - Tool location
- Drawbacks:
  - Cost effectiveness
    - Scanning Range
  - Effectiveness of technology around metal

Job Site Center
everything in one place

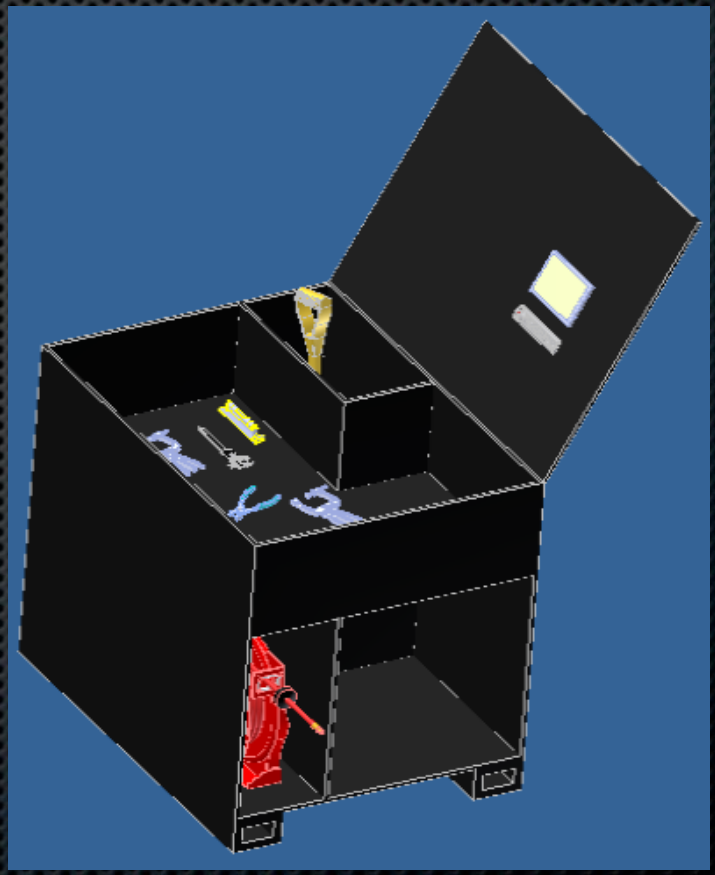
- Benefits:
  - Built in air compressor and generator
  - Locking common tools
  - New tool storage capability
  - No drawers
- Drawbacks:
  - Unwanted vibrations
  - Novelty of product



General Job Site Toolboxes

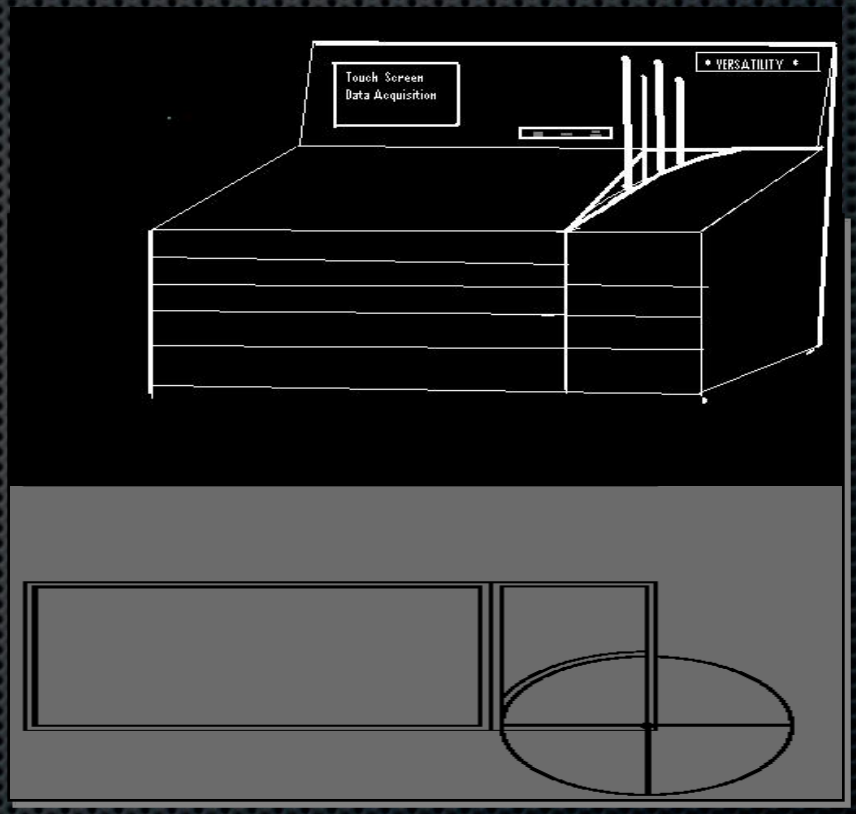
Job Site Center
everything in one place

- Benefits:
  - Built in air compressor and generator
  - Locking common tools
  - New tool storage capability
  - No drawers
- Drawbacks:
  - Size



Combo Cabinet
modular design for easy access

- Benefits:
  - Easy access
  - Multiple configurations and add-on design
  - Different storage capabilities
  - Add-on sale
- Drawbacks:
  - Cost effectiveness



Next Steps

- 3-D Finite Element Analysis
- Implement test recommendations
- Further design development

Ethical Issues

- Non-Disclosure Agreement
  - Accidental release of information
- VTW reputation

Acknowledgements

- Versatility Tool Works
  - Norman
- MMAE Department
  - Dr. Hu
  - Dr. Mostovoy
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- Architecture Department
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- RFID Providers
  - Texas Instruments
  - Alien Technologies

Questions?

Summer is Over