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

Assembled Cabinet

Weights

Testing Apparatus

Guide
Failed After 421 Cycles

Deformation of Guide
(421 Cycles, 420 lbs)

Distance from Front (in.)

Deformation (in.)

Left Side
Right Side
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
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
• 3-D Finite Element Analysis

• Implement test recommendations

• Further design development
Ethical Issues

• Non-Disclosure Agreement
  – Accidental release of information

• VTW reputation
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Questions?

Summer is Over