

Illinois Institute of Technology
Interprofessional Project
IPRO 341

Design and Global Market Analysis of a Tool Cabinet

Sponsored by: Versatility Tool Works

Spring 2010 Semester
Project Plan



I. Objective:

The objective of IPRO 341 is to assist Versatility Tool Works with the design, testing, and marketing of an industrial strength tool cabinet. Ideally, one or more of the drawers in the cabinet should be capable of holding 450 pounds of equipment, and have a lifespan of 20,000 cycles. (One (1) cycle is defined as one opening and closing of the drawer.) Extra features to include in the design of the cabinet will also be investigated to try to make the cabinet more marketable. However, it will be important to first determine what progress has been made thus far so that this semester's design improvements can be better demonstrated.

II. Ethics Statement:

Due to the sensitivity of this project with respect to intellectual property, all members of IPRO 341 were required to sign a non-disclosure agreement at the request of Versatility Tool Works.

III. Background:

IPRO 341 is sponsored by Versatility Tool Works, based out of Alsip, Illinois. Established in 1972 as a tool and die operation, Versatility Tool Works has since diversified their product line to include sheet metal fabrications, roll formed products, stamping tools, precision machined components, and most recently, custom made tool cabinets.

Previous teams of this project analyzed the tool cabinet and developed improvements to its performance. Shot peened slides and Accuride slides were incorporated, as well as testing materials that were harder. (The "hardness" of a material was determined with hardness testing.)

The team from this past semester made recommendations to continue the development of a tool tracking system, and a lighting design, as well as improving the crossbars in the drawer, replace the rubber blocks of the locking mechanism with roller bearings, and to include angle brackets in the design of the cabinet. Last semester's team showed a gain of nearly 3000 cycles of cabinet lifespan.

VTW has been pleased with the results of the previous three semesters of this IPRO, and is expecting that working with IIT students again will further improve the design of the tool cabinet.

IV. Team Roster and Structure:

Team Instructors:

- ❖ Prof. Sheldon Mostovoy, PhD
- ❖ Prof. William Maurer

Team Members:

- ❖ Eric Hamann, *Materials Science and Engineering, and Aerospace Engineering*
Strengths/Skills: *Microsoft Office and Matlab programs, knowledge of materials, design and testing procedures, experience using mechanical testing equipment.*
Expectations: *I expect to apply my skills and knowledge to a real-world problem, and gain experience interacting with industry and other majors.*
- ❖ Stephen (Steve) Falk, *Materials Science and Engineering*
Strengths/Skills: *Data analysis and technical writing.*
Expectations: *To make significant improvements to the current prototype based on data collection and team collaboration.*
- ❖ Taehoon Kim, *Mechanical Engineering*
Strengths/Skills: *Math, physics, computer language (Fortran, Matlab, C)*
Expectations: *With good members, professors and communications, we are going to get a good job.*
- ❖ Ian Wiese, *Mechanical and Materials Science Engineering*
Strengths/Skills: *Leadership, Desenrascanço (a Portuguese word used to express an ability to solve a problem without having the adequate tools or the knowledge to do so, by use of imaginative resources or by applying knowledge to new situations; a.k.a. to "MacGyver" something.)*
Expectations: *To go above and beyond the satisfaction of the Sponsor's expectations, and to subsequently win the best IPRO award.*
- ❖ Tom Kozmel, *Materials Science and Engineering*
Strengths/Skills: *Lab experience with materials (science and mechanical testing), Drafting/AutoCAD, basic design, MS Office, organizational skills.*
Expectations: *To work as a member of a team that will improve the lifespan of the tool cabinet to the fullest of our abilities, to learn, and gain valuable experience through a real world engineering scenario.*
- ❖ Alex Di Sciullo Jones, *Aerospace and Materials Science Engineering*
Strengths/Skills: *Experience with design, research, and materials testing, knowledge of material properties.*
Expectations: *I expect to use my experience with design and knowledge of materials to make a viable product. I also hope to increase my experience with working with a company and on a team.*

- ❖ Calin Gavris, *Computer Science*
Strengths/Skills: *Experience from a previous IPRO, good communication skills. Programming: C, C++, Java, Scala, SQL.*
Expectations: *Work in a team where everybody gets involved; meet the challenges of a real life project.*
- ❖ Hon-Kyu Chong (Charles), *Computer Engineering*
Strengths/Skills: *Computer programming, Public relation, Customer service*
Expectations: *Getting to know everyone's strengths and using them in every way possible for this project.*
- ❖ Johnathan Eckhardt, *Business (Finance)*
Strengths/Skills: *Marketing, finance, business strategies*
Expectations: *Give VTW a worth-while experience with the team.*
- ❖ Abdul Aleem Syed, *MITO (Master in Industrial Technology and Operations)*
Strengths/Skills: *Good Technical knowledge and Understanding.*
Expectations: *Achieve goals while working as a Team.*
- ❖ Robert VanKley, *Mechanical Engineering*
Strengths/Skills: *Good problem solving and organization skills. Experience in working as part of a team and in leadership roles.*
Expectations: *I expect to learn how a real company operates and about the process of designing and testing a product*
- ❖ Tristan Esparza, *Materials Science and Engineering*
Strengths/Skills: *Hands on fabrication and mechanical experience, familiarity with industrial work (worked at several shops), competent in managerial positions (production and shipping supervisor). Welding, machining, industrial management.*
Expectations: *Expecting to bring practical knowledge of fabrication to the project, as well as implementation of design features to the cabinet, such as the possibility of a scale system involving strain gauges.*
- ❖ Kaisar Syzdykov, *Industrial Technologies and Management*
Strengths/Skills: *Communication Skills*
Expectations: *To gain experience from collaborative team work!*
- ❖ Alvin Turner, *Industrial Technologies and Management*
Strengths/Skills: *Practical applications and all hands-on. Electrician*
Expectations: *Results!*

Team Structure:

Coordinator/Leader: Tom Kozmel
Design Team Leader: Ian Wiese
Testing Team Leader: Robert VanKley
Ambassador to VTW: Alex Jones

Design Team: Ian Wiese
Calin Gavris
Alex Jones
Hon-kyu Chong (Charles)
Tristan Esparza
Johnathan Eckhardt
Abdul Aleem Syed

Testing Team: Robert VanKley
Tom Kozmel
Eric Hamann
Stephen (Steve) Falk
Taehoon Kim
Kaisar Syzdykov

V. The Path to Success:

Design Team:

Design Structures:

- ✓ Explore material choice
- ✓ Drawer setup and construction
- ✓ Explore stiffening options
- ✓ Analyze drawer mounting points
- ✓ Experiment with slide mechanisms

Features – RFID Considerations:

- ✓ Investigate industry standards
- ✓ Consider size and material of tools
- ✓ Consider cost of RFID tags and readers
- ✓ Integration of a computer system
- ✓ Standard features bundle vs. upgradable system

Features – Lighting and Charging:

- ✓ Requested by the client
- ✓ Minimal space solutions
- ✓ Energy sources and consumption
- ✓ Cost

Economics:

- ✓ Product innovation
- ✓ Move into retail market
- ✓ SWOT analysis of Versatility Tool Works
- ✓ Customer profile
- ✓ Market assessment (current and prospective)
- ✓ Competitive advantages and disadvantages
- ✓ Customer feedback (end-user for cabinets)

Testing Team:

Objectives:

- ✓ Find benchmark data
- ✓ Improve durability and longevity of drawer system
- ✓ Investigate low cost alternatives

Methods:

- ✓ Set up testing apparatus
- ✓ Develop standard testing procedure
- ✓ Test new slides and drawer setups
- ✓ Evaluate preliminary results
- ✓ Develop and test alternatives

VI. Budget and Schedule:

Budget:

During the course of this semester, expenses may be incurred as a result of:

- Transportation to and from Versatility Tool Works in Alsip, Illinois
- Food for some team meetings and meetings with Versatility Tool Works
- The need to manufacture and/or acquire parts, testing equipment, testing pieces/prototypes, etc. for the sake of making progress with the IPRO.

Exact figures cannot be determined at this time, but will be reported to the IPRO office promptly as needed.

Schedule:

Throughout the semester, the design and testing teams will develop new ideas and conduct testing on design prototypes. Implementations of designs will be an ongoing process. Testing of the drawers and mechanical aspects of the tool cabinet will take place throughout the entire semester. Although no set schedule for actual IPRO content can be currently provided, a Gantt chart showing the progression of the IPRO will be updated as the semester progresses. The interactive Gantt chart can be found online here:

www.tomsplanner.com/shared/ipro341

IPRO teams are also required to submit documentation throughout the semester to the IPRO office in order to demonstrate progress. A listing of the required items (called “Deliverables”) and their due dates is shown below:

Task/Deliverable	Due/Event Date
Project Plan	February 5 th , 2010 by midnight
Midterm Review	Monday, February 22 nd , 2010, 6:15-6:30pm, MTCC Auditorium
Ethics Reflective Report	March 26 th , 2010 by midnight
Final Project Report (first draft)	April 9 th , 2010 by midnight
Abstract/Brochure	April 19 th , 2010 by 10:00am
Poster	April 19 th , 2010 by 10:00am
Final Presentation	April 22 nd , 2010 by 10:00am
Final Project Report	April 30 th , 2010 by midnight