Cell Phone Cubby Cabinet

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INTRODUCTION

Koester Metals, located in Freemont, IN and founded in 1975, is a top of the line competitor when it comes to the manufacturing of precision sheet metal fabrications and enclosures of the highest qualities. Koester Metals wants to provide employers with a smart and secure way to prevent employee phones from being on the work floor. Along with several benefits such as increased workplace safety and attendance this solution will also allow for employees to increase productivity and efficiency, as well as support the growth of interpersonal attributes within the workplace, leading to long term profit growth.

PROBLEM STATEMENT

Koester Metals would like the Trine University Design Engineering Technology Senior Design Class to design and produce a cell phone locker system for employees of facilities where cell phones are not acceptable on the work floor. This would allow for secure individual storage during work hours and quick access to an employee's cell phone during scheduled breaks. Each cubby hole would require a lockout system and have power access for charging during storage. Koester Metals would like to offer employers with a way to keep employee phones off the work floor and keep productivity and efficiency at a maximum.

CUSTOMER NEEDS / SPECS

The group met with the sponsor and developed a list of needs and specs based off interviews as follows:

- **Ability to charge phones -** USB port and charging cord provided
- **Sensors -** Weight sensor to determine if device is in cubby
- **Modularity -** Main unit can control up to 40 different cubbies
- **Mass Producible -** All sheet metal pieces that can be lasered and welded
- **App -** Electronics chosen can work with an App
- **Security -** Electronic Locking Mechanism

A few of the specs are listed as followed:

- # of modulus: 8 – 10 modules
- Overall Weight: < 50 lbs.
- Individual Cubby Size: 6 x 6 x 10 inches
- Overall Modular Size: 24 x 24 x 10 inches
- Time to Unlock Individual Cubby: < 10 Seconds

CONCEPT IDEAS

After meeting with the sponsor and determining the customer needs the group developed a list of possible solutions to meet the needs. The group then created a variety of different models to present to the sponsor. Figures 1 and 2 show the models that were presented to the sponsor.

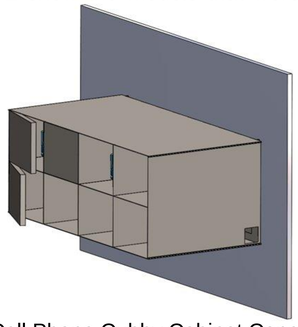

Figure 1: Cell Phone Cubby Cabinet Concept Idea #1

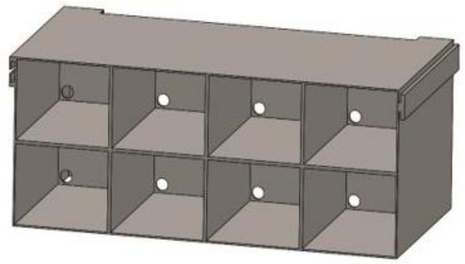

Figure 2: Cell Phone Cubby Cabinet Concept Idea #2

INITIAL DESIGN

During the concept review meeting, the sponsor provided feedback to the group and requested that the model be made using the sheet metal feature on SolidWorks. The group spent time learning this feature and developed an initial model as seen in Figure 3 to meet the customers feedback.

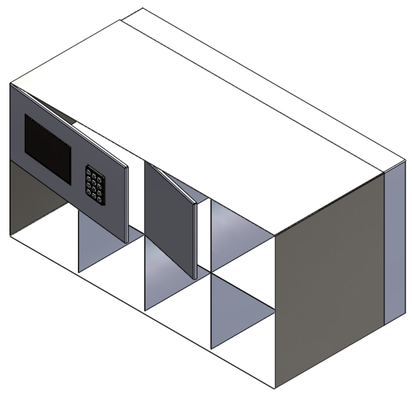

Figure 3: Cell Phone Cubby Cabinet Initial Design

HARDWARE SOLUTIONS

Figures 4 - 6 are potential solutions from research for the key electrical components that would be used for the Cabinet.

Figure 4: Potential Keypad

Figure 5: Potential Display

Figure 6: Possible USB Port

FINAL DESIGN

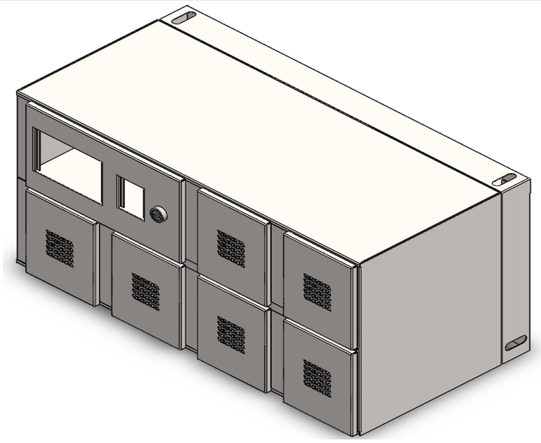

Figure 7: Cell Phone Cubby Cabinet Final Design

After the initial design, the sponsor continued to provide feedback to the group. The group added flange supports around the door to structure the cabinet. The doors will be attached to the cabinet utilizing a hidden piano hinge. The cabinet will be mounted to the wall utilizing a French cleat. A display and keypad will be used to gain access for each employees assigned cubby. Within each cubby will be a USB port along with a charging cord. The vents on the front of the individual cubby doors can be used to ensure that employees are placing a cell phone inside cubby. A cam lock will be used to gain entrance to the display and keypad door incase the electronics lose power or fail at any given time. Additional modules can be added and will be like the model in Figure 7 but there will be four cubby spaces available on both the top and the bottom.

FUTURE WORK

Below is a list of things that still need to be done before the Cell Phone Cubby Cabinet is complete.

- Determine All Necessary Electrical Components (power supply, wiring, etc.)
- Program Electronic Components
- Test Door Hinge
- Test French Cleat

CONCLUSION

The team has been able to work closely with Koester Metals and Dr. Timothy Jenkins to design a Cell Phone Cubby cabinet that meets the needs of the problem defined by Koester Metals. After brainstorming both individually, and as a team, the group developed a myriad of potential solutions. The group compiled this list and used a design decision matrix to determine which solutions best met all the target specifications. Once the list was filtered down to the best solutions, the team was able to take key defining concepts of each and combine into elements that can be found on the final design.

LESSONS LEARNED

Throughout the duration of the project the group has been able to take away the following:

- Creating a schedule and sticking to it
- Communication between multiple parties (group members, professor, and sponsor)
- Sheet Metal Feature in SolidWorks
- Sheet metal manufacturing
- Overcoming obstacles

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