

INTRODUCTION

Covington Box and Packaging of Waterloo, IN has a cardboard casket production process that currently is looking for areas of improvement. The team visited and observed the process of making a casket and talked with production workers to gather their input on suggested improvements. The current process consists of many tables with steps at each one. Below are challenges the team found:

- Gluing of casket ends
- Manual cleaning of hardware
- Non-ergonomic fixtures



Figure 1: Current Production Processes

CUSTOMER NEEDS/SPECS

The existing processes were analyzed, and an interview was completed with the sponsor to determine the customer needs and specifications.

Table 1: Needs and Specifications

Needs	Specifications
Process is Efficient	Production increase of 20%
Process is Safe	Table height is adjustable
Process is Reliable	Minimum 1000 cycles before preventative maintenance.
Product is Cost Effective	2 days or less to train workers and product is under budget.

DESIGN CONCEPTS

Many of the design concepts were created for ease of use and reliability. The team tested different folding methods of the cardboard sheet to mitigate the need for the vertically standing production step, shown within Figure 1. Other means of height adjustment like electric and pneumatic were considered. Tabletop materials like wood or plastic were also evaluated. The team utilized CAD to vision the concepts as seen below.

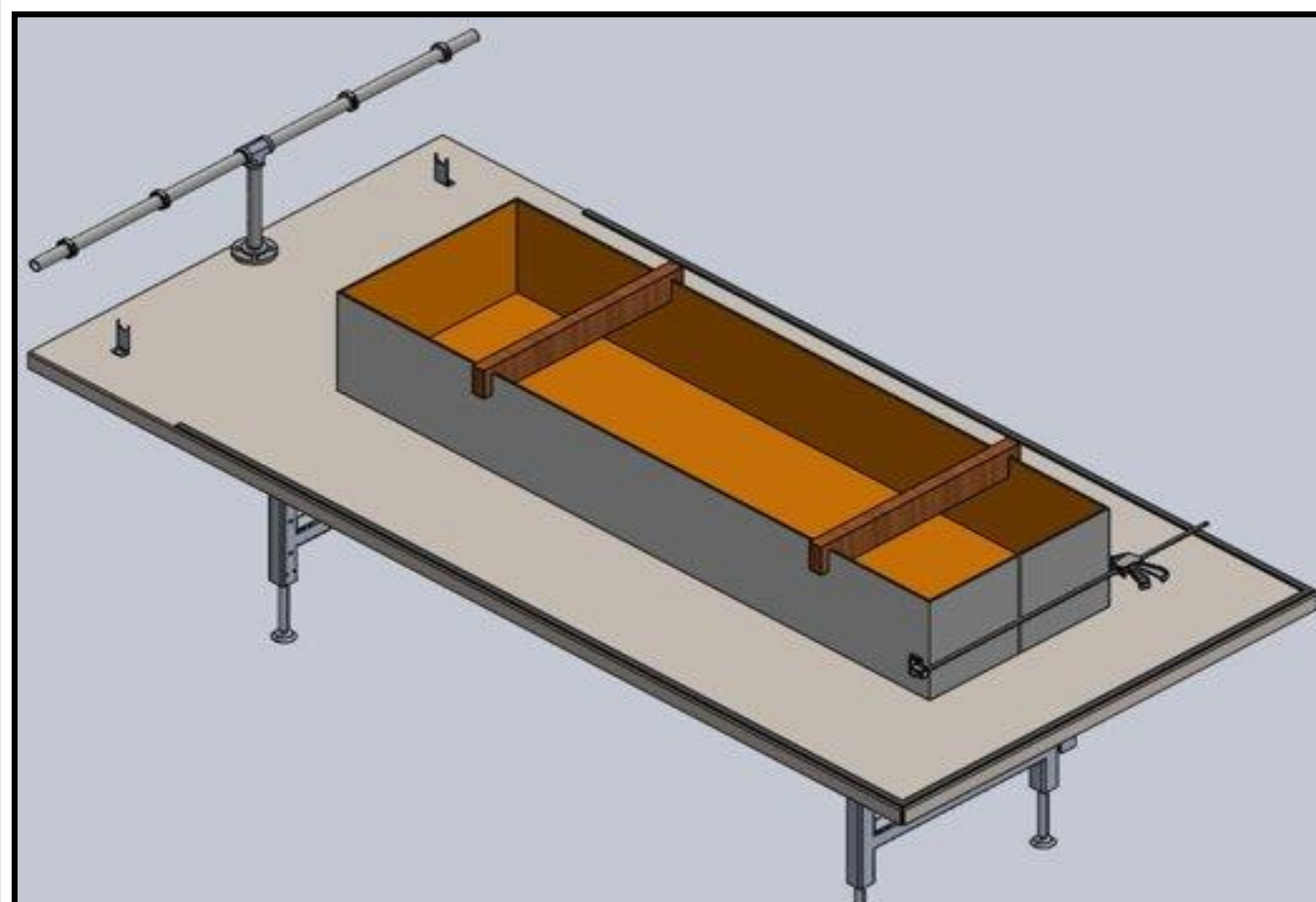


Figure 2: 3D Model of Table

TEST RESULTS

Testing was completed with SolidWorks FEA and physically at Covington Box & Packaging to ensure the product would work effectively. From the testing the following was found:

- 👍 Ultra-Sonic Cleaner – cleaned greasy bolts well.
- 👎 Pneumatic Glue Gun – Glue dispersed slow and unevenly.
- 👍 Material Roller – Was able to hold more than the weight of a full material roll.
- 👍 Bar Clamps – Held the ends of the casket tight for gluing.

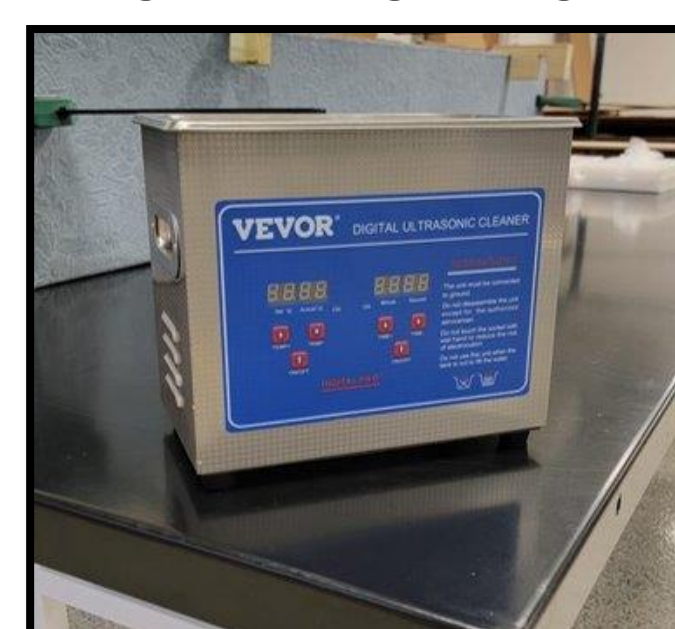


Figure 3: Ultra Sonic Cleaner

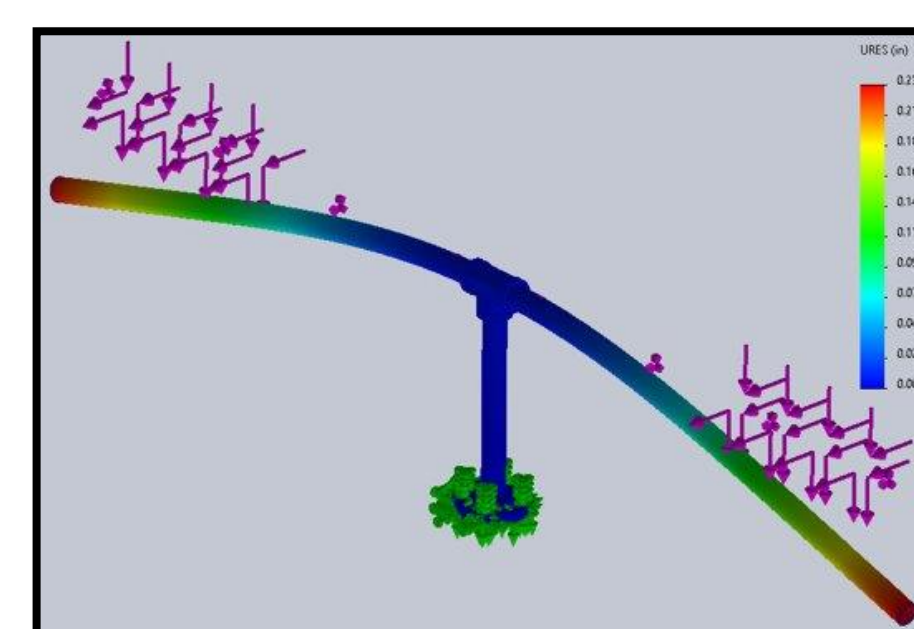


Figure 4: Material Roller FEA

FINAL DESIGN

The completed cardboard casket production table, seen within Figure 5, is more durable and feature rich than the current production table located at Covington Box and Packaging. Features include:

- Height Adjustability
- Steel Construction
- Mobile
- Quick Material Swap
- Mobile Storage Cart
- Easily Cleaned

The project also includes products that will aid in a more efficient production process. An ultrasonic cleaner will be used for cleaning the oils off bolts, as well as a fold-up drill fixture for locating holes that are drilled into the side of the casket to install the handles. Lastly, supplies to glue the ends of the cardboard casket horizontally were purchased, seen within Figure 7.



Figure 5: Production Table With Cart



Figure 6: Crank Extension

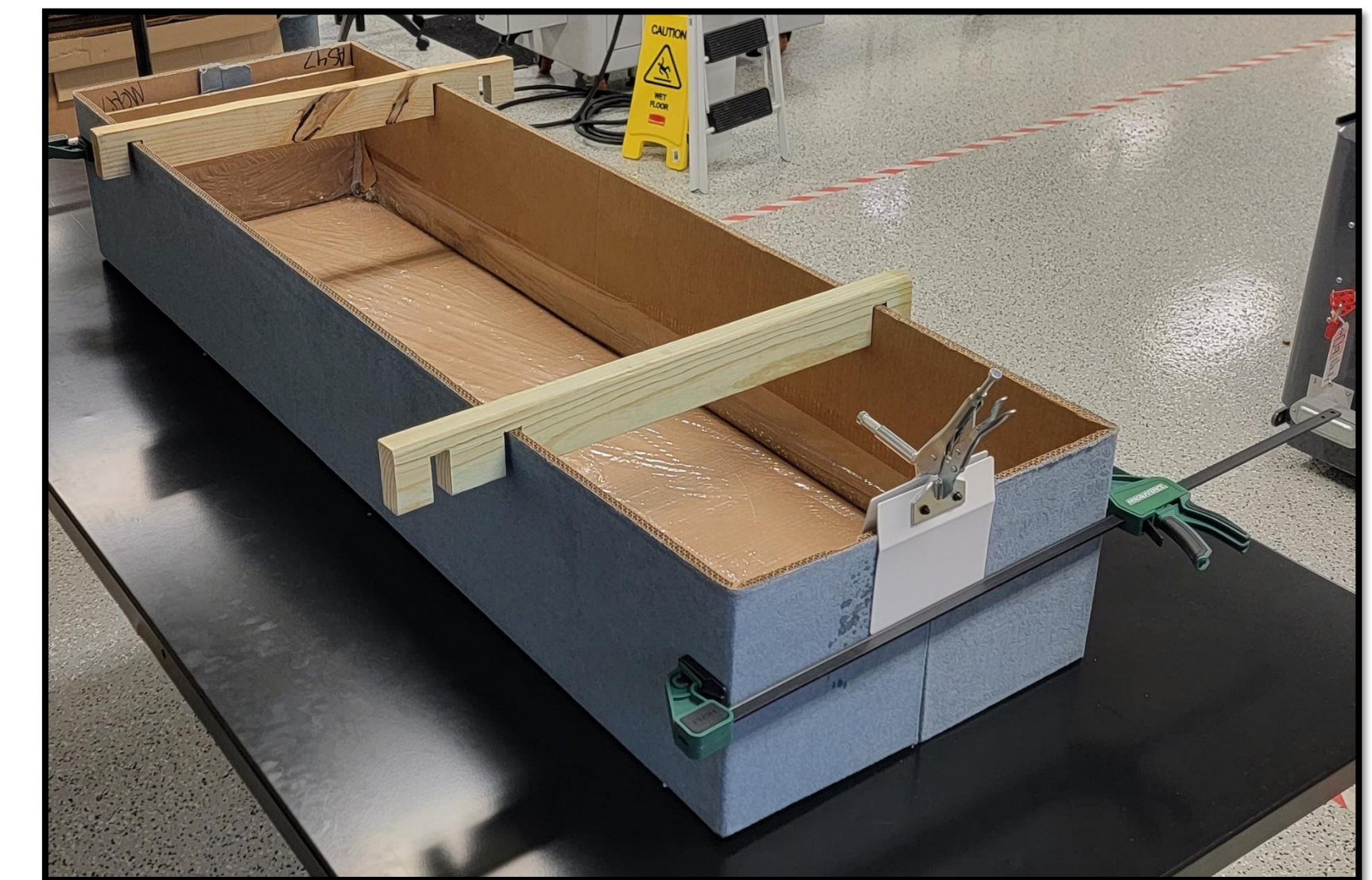


Figure 7: Glue Process Tooling

CONCLUSION

The final solution includes an adjustable height production table with improved fixturing to allow completion of multiple processes and eliminate unnecessary material handling. Design phases were used effectively to produce a product to solve the problem at hand. This allowed the team to meet the customer specification of height adjustability.

LESSONS LEARNED

The team learned a lot of different lessons throughout the creation of the cardboard casket production table project:

- Recording all information from beginning to end of the project is extremely valuable
- Product development is very time intensive and almost always goes through several iterations.
- Understanding the customers' needs is one of the most important aspects to have a successful project.

ACKNOWLEDGEMENTS

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