

Deliverable C – Design Criteria

GNG 1103[B]

B04-18 “JJANGC”



Jake Brown 300112518

Nathan Malench 300353993

Andrick Grant 300396296

Greyson Lee 300364983

Connor Harrison 300346496

Jonathan Swyer 300311549

October 8th, 2023

Table of Contents

List of Tables and Figures.....	3
Problem Statement	4
Brief Summary.....	4
Functional Requirements and Constraints	4
Available Products on the Market.....	5
Technical Benchmarking	8
Target Specifications	8
Reflection.....	9
References.....	10

List of Tables and Figures

TABLE 1: DESIGN CRITERIA	4
FIGURE 1: ALWAYS SH DOWEL DRILLING JIG [1]	5
FIGURE 2: 3-IN-1 DOWELLING JIG [2]	6
FIGURE 3: KREG DOOR MOUNTING JIG [3]	7
FIGURE 4: MILESCRAFT DOWEL JIGKIT [4]	7
TABLE 2: BENCHMARKING CURRENTLY AVAILABLE PRODUCTS	8

Problem Statement

Ambico, a door manufacturing company needs a jig to aid in the drilling of holes/tapping of their doors. It is our task to create a reusable, reliable jig(s) that is easy to operate that will fit the dimensions of the door hinge and backset, with the proper arrangement of holes for drilling/tapping.

Brief Summary

Our team created a prioritized list of functional and non-functional design criteria including any relevant constraints and metrics based on the client's needs. Additionally, our team conducts technical benchmarking by researching existing products that meet some of the client's requirements. Also, we included a user benchmarking. Furthermore, our team determined target specifications with numerical value ranges representing our ideal product attributes. Finally, this technical document aims to create a clear set of design goals that will guide our final product's process, ensuring that our final product meets the client's needs and aligns with benchmarked industry standards.

Functional Requirements and Constraints

Table 1: Design Criteria

Jig Needs and Priorities	Grading scale (1-5, 5 being high priority)	Design Criteria
Reliability	5	Expected service life (years)
Ease of use	4	User-friendly
Durability	4	Maintenance (months)
Drilling/Taping support	4	Compatibility (with different tools)
Reproducibility and Precision	5	Accuracy (in)
Cost effective	2	Cost (\$)

Clear labeling of sizes	2	Display measurements (inch)
Size	2	Mass (LBS)
Must be able to notify the laborer when they are done drilling through the frame	3	Visual Cues

Available Products on the Market

The AlwaysH 41 PCS Dowel drilling Jig is a jig designed to help with the drilling of dowel holes. It is a small, portable plastic tool with multiple holes to guide different size drill bits. *Figure 1*, you can see the bushes where the drill is guided and how it may be used. What qualities this product possesses is a simple durable one piece construction and ease of use to the technician. Where the design fails to meet the client’s specifications is; the holes don’t match the holes of the hinges the client specified, it is not secured to the surface it’s drilling, it’s designed for dowels and doesn’t tell the technician when the hole is deep enough.

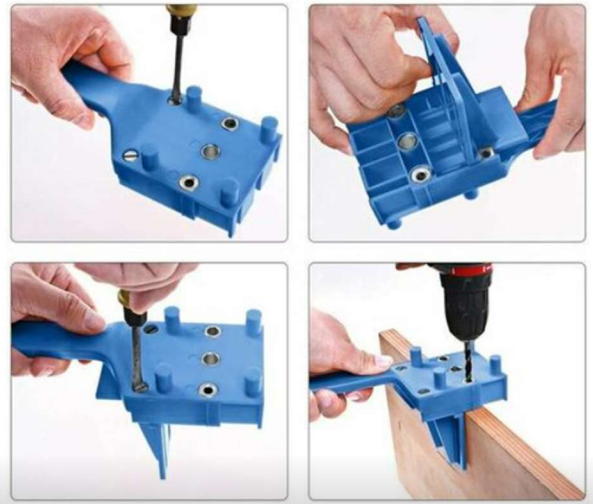


Figure 1: AlwaysH Dowel Drilling Jig [1]

The 3 in 1 Woodworking Hole Doweling jig is a robust design. It’s made of aluminum and steel giving it durability. It also has 3 bushes for boring holes into wood with great precision thanks to the clamps that secure it to the door. One major issue that design suffers from is an excessive number of

features that the client does not need, such as the guide rails to slide along the work surface and adjustable guides to angle the holes. The design is also too large and cumbersome to be set up rapidly. In *Figure 2*, you can see that it also suffers from the same flaw as the previous product of not having the same holes as the client's requirements.

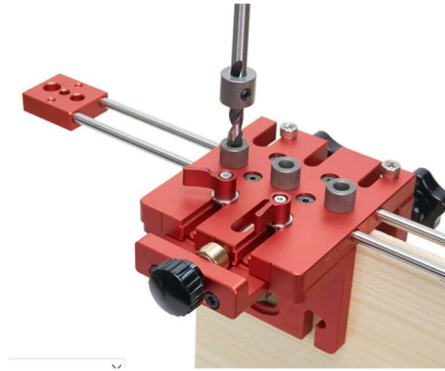


Figure 2: 3-in-1 Dowelling Jig [2]

Summary: The Kreg Door Mounting Jig is a plastic jig that allows you to easily clamp/attach the jig to the door thanks to the support arm that allows you to hold it with one hand as seen in *Figure 3*. The GripMaxx anti-slip adds grip and stability to make sure you don't lose your grip when drilling to allow accurate holes. The Kreg Door Mounting Jig is very versatile since it works with both left- and right-hand doors. It is very user friendly and not hard to use at all, just put it on the door and clamp it. It can adjust to 1/16" and 1/8" to offer more precision, as well as an adjustable inset 2" overlay in 1/4" increments. It is light weight weighing around 25lbs. For our jigs this one is missing the taping feature as well as not having the desired metrics for drilling to assist our client as well as, the need for a clamp on the side could interfere/get in the way of the clients as they drill.

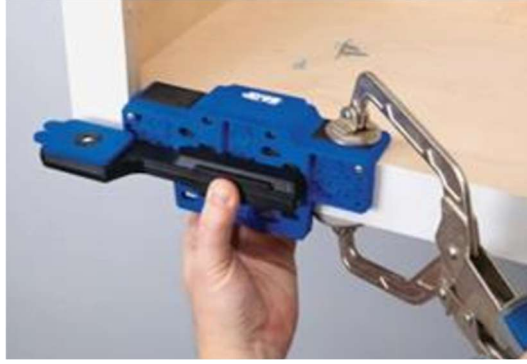


Figure 3: Kreg Door Mounting Jig [3]

Summary: The Milescraft Dowel Jig Kit, is a jig that is made up of plastic and metal/steel as seen in *Figure 4*. This jig has a Self-centering guidepost which allows for accurate alignment and joint strength. It also has molded hardened steel bushings to ensure accurate alignment when drilling to ensure maximum precision and longer doweling life. The Jig is compatible with ½" to 1-½" thick wood. Some of its flaws is that it doesn't have a clamping system to keep the system in place and secured. As well as the metrics and drill hole sizing doesn't match with the desired measurements. It also is used more for vertical drilling, which is not what we need, we need to be able to drill horizontally to endure perfect straight on drilling.

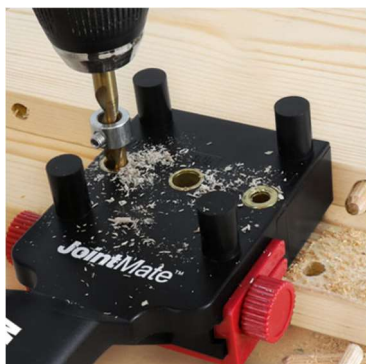


Figure 4: MILESCRAFT DOWEL JIGKIT [4]

Technical Benchmarking

The benchmarking uses a scale of 1-5, with 5 being the best and 1 being the worst.

Table 2: Benchmarking Currently Available Products

Needs	Rating	Always H 41 PCS Dowel drilling Jig	3-in-1 Dowelling Jig	Kreg Door Mounting Jig	MILESCRAFT DOWEL JIGKIT
Reliability (years)	5	4	5	4	4
Ease of Use	4	2	4	4	3
Durability (months)	4	3	3	3	3
Drilling/Tapping Support	4	4	5	2	3
Reproducibility and Precision (in)	5	2	5	4	4
Labeling of Sizes	2	2	3	5	3
Cost-Effective	2	5	1	3	3
Size (LBS)	2	3	4	4	3
Visual Clues of completion of drilling/tapping	3	4	4	4	4
Total		97	105	112	110

Target Specifications

After benchmarking with our design criteria, the results of the four jig products were very close. However, it must be noted that each of the four jigs are designed for different applications than what our product will be designed for. For our concepts, we should take aspects of each of the different jigs to design the best possible product for our client. Our concepts should resemble the Kreg Door Mounting, with the accuracy and support of the 3-in-1 Jig, and the cost of the AlwaysH jig.

Reflection

The size variations between hinge #1(4 ½" by 4 ½") and hinge #2(4 ½" by 5"), while slight, demonstrate the importance of selecting the right size jig for the intended application. The backset measurements, particularly #1(¼") which is used of both hinge sizes, #2(9/16") which is used for 4 ½" by 5" hinge, and #3(11/16") which is used for 4 ½" by 4 ½" hinge, provide essential information for proper installation, ensuring that the jig will align correctly with the door and the routed intent. The screws are 12-24 thread and a depth of ¾". This highlights the importance of developing the right-sized holes so that the screws can fit in the jig. While, keeping in mind the importance of durability and long-term use.

References

- [1] [Online]. Available: <https://www.manomano.co.uk/p/41-pcs-dowel-drilling-jigs-dowel-drilling-jig-kit-straight-hole-woodworking-dowel-jig-with-6810mm-dowel-centerer-for-hand-wood-dowel-blue-71846599>.
- [2] [Online]. Available: https://www.cartoolshop.com/products/3-in-1-woodworking-hole-drill-doweling-jig-positioner-guide-locator?variant=41608003190951¤cy=USD&utm_medium=product_sync&utm_source=google&utm_content=sag_organic&utm_campaign=sag_organic&srsltid=AfmBOoqzxULiigP.
- [3] [Online]. Available: <https://www.busybeetools.com/products/kreg-cabinet-door-mounting-jig.html>.
- [4] [Online]. Available: <https://www.busybeetools.com/products/milescraft-dowel-jigkit.html>.