Deliverable C

GNG1103 B00

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This deliverable's purpose encompasses three pivotal tasks—defining design criteria, conducting technical benchmarking, and establishing target specifications.

In response to the project's evolving needs, our team will identify functional and non-functional requirements, alongside constraints, creating a comprehensive set of design criteria. We will explore existing products and gather user feedback to perform technical benchmarking, ensuring our design aligns with industry standards and user expectations. To further clarify our goals, we will determine target specifications, specifying ideal or marginal values for various product attributes.

The impact of our recent client meeting will be reflected upon, reassessing the importance of criteria and making necessary updates to align with the project's shifting dynamics. The outcome of this deliverable will be a well-defined set of design criteria, ensuring our solution effectively addresses the identified needs and objectives of the client.

Table 1: Design criteria based on Interpreted needs

#	Interpreted need	Design Criteria
1	The jig allows marking of hinge holes and back set	Marking guide
2	The jig signals user when to stop drilling	Signalling system
3	Screw and hinge type specifications are preset and swappable	Swappable Presets
4	The jig remains perpendicular to the floor	Support system Levelling system
5	The jig can be easily held/supported	Handle Support system Weight (lb)
6	The system is careful when attaching to the frame of the door	Padded attachment system
7	The jig acts as a drill guide	Drill bit guide
8	The jig is efficient	Accuracy (in) Speed (min)
9	The system decreases human error	Accuracy (in) Precision
10	The jig is reliable	Easy Maintenance Material Accuracy (in)
11	The jig is durable	Material
12	The jig fits within the current manufacturing environment	Size (in^3) Dust and Damage Resistant
13	The jig is appropriately priced	Cost ($)
14	The jig stays in place or stands on its own	Strong support system
15	The jig is easy to use	Practical
16	The jig is compact	Size (in^3)

17	It is adjustable for tapping	Tapping and Greasing Guide

Design criteria have been ordered considering the basic required functionality of the jig, as per the client's request, at the top, more important constraints in the middle, and other considerations that were briefly mentioned by the client at the end.

Table 2: Technical Benchmarking

	Kregg Concealed Hinge Jig[1]	**Lee Valley Carrey Template[2]**	**Levoite Precision 35mm Hinge Boring Jig[3]**
Jig allows hole marking	Yes	No	Yes
Jig signals when to stop drilling	Yes	No	Yes
Jig is compact and easily held	Yes	No	Yes
Jig is reliable	Yes	Yes	Yes
Jig is durable	Glass filled nylon	Aluminum + Glass filled polycarbonate	Aluminum Alloy
Jig is appropriately priced	$36.00	$97.50	$218.65
Jig is easy to use	Small, compact, straightforward	Large, fits directly in pre-bored holes	Small, compact, adjustable
Jig stays in place while drilling (support system)	Jig fits inside pre-bored hole and has drill bit guide	Jig fits inside pre-bored hole, no drill bit guide	Clamps on to drilling surface and has drill bit guide + stop collar
Jig weight	2.65 lbs	1.7 lbs	1.3 lbs
Hinge offset compatibility	3mm, 4mm, 5mm, 6mm.	None	3mm, 4mm, 5mm, 6mm.

Certain aspects of design criteria from client needs are not included in the technical benchmarking. Details regarding levelling and padded attachment systems were unavailable. Accuracy, maintenance, and practicality are difficult to quantify and are better evaluated through situation-specific performance testing.

Table 3: Benchmarking and Criteria Specifications

Criteria	**Weight**	**Kregg Concealed Hinge Jig**	**Lee Valley Carrey Template**	**Precision 35mm Hinge Boring Jig**
Jig allows hole marking	4	3	1	3
Jig signals when to stop drilling	5	3	1	3
Jig is compact and easily held	5	3	1	3
Jig is reliable	5	3	3	3
Jig is durable	4	2	1	3
Jig is appropriately priced	3	3	2	3
Jig is easy to use	5	2	1	3
Jig stays in place while drilling (support system)	5	2	1	3

Jig weight	3	3	3	3
Hinge offset compatibility	5	3	1	3
Total		**113**	**63**	**132**

Table 4: Engineering Design Specifications Table

Design specifications	Relation(<,>,=)	Value	Units	Verification Methods
Functional				
Select materials that ensure the jig's longevity, aligning with the durability requirement	=	Yes	N/A	Performance testing
Quick set-up time and quick time for completion of the task	<	20	Time (mins)	Analysis, test
Provide swappable preset options for different screw and hinge types	=	Yes	N/A	Analysis, test
Ensure careful and padded attachment to the frame, so as to not damage wood veneer.	=	Yes	N/A	Analysis, test
Minimize human error by incorporating accuracy and precision mechanisms into the system.	<	1/32	in	Test
Support system offers independent stability that prevents movement during marking and drilling	=	Yes	N/A	Analysis, test
Integrate a levelling system that guarantees the jig maintains perpendicularity to the floor	=	Yes	N/A	Analysis, test
Guide for marking of holes and back-set	=	Yes	N/A	Analysis, test
Drilling Guide	=	Yes	N/A	Analysis, test
Implement a signaling system within the jig to indicate when to stop drilling	=	3/16	Depth (in)	Test
Constraints				
Cost	<	100	$USD	Estimate, final check
Weight of jig	<	5	(lb)	Analysis
Must integrate seamlessly into the current manufacturing process, considering size and support systems	=	Yes	N/A	Test
Practicality for laborer	=	Yes	N/A	Test
Operation Environment: dust	=	Yes	N/A	Test
Non-Functional Requirements				
easily transported throughout the shop, or can be kept on person	=	Yes	N/A	Test
Incorporate features for convenient handling and support, in line with the strong multi-use support system requirement.	=	Yes	N/A	Test
Reliability	=	Yes	N/A	Test

The client meeting significantly influenced the design criteria and specifications. It reinforced the importance of durability in our jig design, specifically in selecting materials for longevity. While the importance of quick set-up and task completion time remained significant, the client's feedback regarding time constraints underscored the need to set a specific benchmark of less than 20 minutes. This benchmark now serves as a clear performance expectation in our specifications, directly influenced by the client's insights. Additionally, the meeting highlighted the need for precision and accuracy. The client's concern about minimizing human error prompted us to establish a maximum tolerance level of less than 1/32 inch in our design criteria, ensuring precision mechanisms are integrated into the jig. Overall, the meeting's insights prompted updates to ensure the final product aligns with the client's expectations and needs.

Additionally, the user benchmarking made it apparent that there weren't many products available on the market that would be suitable for the client. However, further time to research and perform technical benchmarking has narrowed down some realistic specifications for the design criteria. For example, the cost of similar jigs varies from $ 30 to $ 200; therefore, the projected cost of $100 for the jig is reasonable. This price would be a good balance to develop a device that satisfies industrial standards and quality with affordability. Adding a third example also provides greater context and more data to analyze. Nonetheless, the specifications available for the current jigs are severely lacking. The expected set-up and completion time when using the products are not included, and neither is a metric measure of accuracy or precision for the jig. This is disappointing considering that, outside of basic required functionality, precision is an important aspect of the product.

The design team concludes that the client meeting has acted as a catalyst for refining our design criteria and specifications. Through reflective analysis, refined design criteria and specifications were put in place. Initial assumptions were not only validated, but also propelled the team toward a deeper understanding of which features to prioritize. This thorough recalibration of our design criteria and specifications positions the team well for the continued development and success of our project, ensuring alignment with the client's evolving needs.

References:

1-Kreg Concealed Hinge Jig, https://www.busybeetools.com/products/concealed-hinge-jig-kreg.html?gclid=Cj0KCQjwpompBhDZARIsAFD_Fp8C-wko3pMD6hOKrgItOtTSIgyf04rQM_ghW3XwfqxIcmHoYfvhe9YaAsB8EALw_wcB,

2-Lee Valley Original Carey Hinge Template https://www.leevalley.com/en-ca/shop/tools/power-tool-accessories/router-accessories/40219-the-original-carey-template-hinge-mortising-system?item=15J7501

3-Levoite 35mm Hinge Boring Jig https://levoite.com/collections/concealed-hinge-jig/products/precision-35mm-hinge-boring-jig-concealed-hinge-hole-drill-guide?gad=1&gclid=Cj0KCQjwpompBhDZARIsAFD_Fp8c51WaPPDJZByLO9x5zDVAeJ3AheByGGzaZlAM_CPrjiYuxNI3BcAaAjxfEALw_wcB