

Hermle North America Clock Design

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Abstract—Hermle has been a world leader in clockmaking for over 100 years, offering world-class craftsmanship with modern precision manufacturing. As the company has expanded to North America, there is an opportunity to engage a younger demographic while maintaining the brand’s emphasis on quality and functionality. This project serves to support Hermle’s market expansion by developing a contemporary grandfather clock design that balances aesthetic appeal with manufacturability. The focus of this work is the design and development of a complete computer-aided design (CAD) model for a new grandfather clock, accompanied by a marketing strategy to set the product within a targeted consumer market. The method for this project centered on using artificial intelligence tools during the concept generation phase to visualize design ideas. Following concept selection, detailed design decisions were made regarding dimensions, materials, color schemes, and internal clock mechanisms. These considerations helped create the comprehensive AutoCAD model intended for production. In addition, market research and demographic analysis were conducted to guide branding, pricing, and promotional strategies for the proposed product. The results include a finalized CAD model prepared for manufacturing and the fabrication of a prototype. Validation of the design is expected through prototype assessment and feedback from Hermle. Marketing analysis results indicate alignment between the proposed design and the targeted demographic. While the results of sellability and market performance will be forthcoming, the project demonstrates the feasibility of delivering a modern, manufacturable clock design that aligns with Hermle’s standards of precision, quality, and craftsmanship.

Keywords—clock design, systems engineering, market analysis, Hermle North America

I. INTRODUCTION

Grandfather clocks have been a staple of timekeeping since the late 1600s [1], following the development of pendulum-regulated clocks and their incorporation into tall wooden cases. While there is no official census of how many grandfather clocks exist worldwide, the number is likely in the millions, reflecting over three and a half centuries of production [2]. Today, that market includes a handful of established manufacturers, including Howard Miller, Hermle, Ridgeway, Bulova, and Kieninger. These companies have long shaped consumer expectations around design, quality, and craftsmanship in the grandfather clock industry.

A significant shift is underway in this market. Howard Miller, a nearly century-old American manufacturer, announced it will cease operations on March 31st, 2026, citing manufacturing challenges and trade tariffs, among other factors.

This closure creates a meaningful opportunity for remaining competitors to absorb Howard Miller’s former customer base and expand their market share. Among those positioned to benefit, Hermle, a German manufacturer with over 100 years of clockmaking experience and an established presence in the North American market, stands as the most established competitor.

This project was undertaken in partnership with Hermle to capitalize on this market transition by developing a new grandfather clock design aimed at a contemporary consumer demographic. However, creating a design that appeals to modern buyers can be challenging as the clock must balance updated aesthetics with Hermle’s standards of precision and manufacturing, all while remaining competitively priced. New clock designs are periodically introduced to reflect the aesthetics and lifestyle trends of their era, attracting both new buyers and existing ones. By analyzing current market trends, including preferences for multifunctionality, modern interior aesthetics, and generational buying behaviors, a design concept was developed to meet the needs of today’s market. In parallel, a marketing strategy was generated to define the product’s positioning, pricing, and promotional approach.

II. METHODS

Our methodology followed the structured engineering design process: Problem identification, concept generation, detailed design, testing and refinement, and product delivery. Our process integrated design generation, computer-aided design (CAD), and market analysis to develop a modern grandfather clock that would be manufacturable by Hermle and align with their target market objectives.

The process began with defining the problem and identifying the requirements based on the needs of the client. Key requirements included compatibility with already existing Hermle clock movements, manufacturability within their current production process, and a modern aesthetic that maintains Hermle’s quality and craftsmanship. The concept generation was conducted by brainstorming and rough sketching designs, and then utilizing artificial intelligence tool, ChatGPT [3], to allow our sketched designs to be viewed in a life-like environment. This allowed different design variations to be shown, including variations in style, materials, and finishes. The concepts were evaluated by the client to determine which design met all of the requirements.

The selected design was developed into a detailed CAD 2D model using AutoCAD [4]. This phase involved defining

dimensions that are crucial to having a proportional clock, integrating the internal clock mechanisms, and ensuring the model has tolerances that are manufacturable. Alongside the design process, market research and demographic analysis were conducted. This included evaluating consumer preferences and competitors to ensure alignment with the younger demographic. Finally, a scaled-down prototype was developed using an alternative material to evaluate the design's proportions, form, and overall visual presence. This prototype is intended for geometric and aesthetic validation rather than full material and structural testing.

III. MATERIALS

The types of wood available are predetermined by Hermle North America, as the standard for tolerance and resonance is well studied and has not changed drastically since the company began production. The type of wood available for use is determined by characteristics of the wood's structure, including the Macroscopic scale, Microscopic scale, and Sub-Microscopic scale [5]. Utilizing in-house materials reduces lead time and ensures that the final design aligns with the company's supply chain and quality standards. Additionally, material performance can be critical to both aesthetic and mechanical aspects of clock design.

The machinability of wood depends heavily on density, grain orientation, and moisture content. Selecting the right materials will improve precision and reduce production waste. Additionally, wood extraction treatments and structural composition influence vibrational properties, which suggests that acoustic behavior can be altered through careful material selection. Studies describe the importance of material selection aligned with Hermle's machining capabilities and acoustic goals. In researching why these woods are best suited for manufacturing and resonance, it was found that Hardwoods, like maple, oak, and hickory, are generally stronger than softwoods. As seen in Fig. 1, they have a higher density, compressive strength, more uniform grain structures, and thicker Sub-Microscopic cell walls due to their fiber and vessel composition for growth. Compared with hardwoods, softwoods rely on tracheid for growth, making them less structurally sound and more susceptible to warping or denting. Visible longitudinal vessels in hardwood are larger in earlywood than latewood, opposite of earlywood and latewood tracheid in pine softwood [6].

Additionally, Hermle uses different woods for aesthetic purposes. Aside from color variation that is present in woods such as cherry and birch, there is also variation in the visible grain. One of these variations is a design key in Hermle's product line- wavy grain. In wavy grain, the cells undulate in short, even waves. This sometimes produces a curly figure. Additionally, there are straight grains, where the longitudinal cells grow fairly straight and parallel to the axis of the trunk. Irregular grains are caused by the cells undulating around knots or in no discernible pattern, and interlocked grain, the cells spiral around the trunk, reversing direction every few growth rings. As seen in Fig. 2, this produces a ribbon figure.

During the decision-making process, the group had to consider the importance of these material impacts and relayed the findings to Hermle for their final decision on the material.

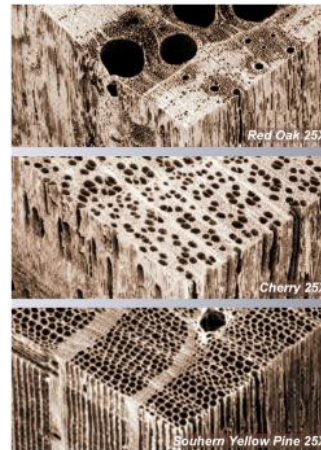


Fig. 1. Example wood grain microstructures



Fig. 2. Wood grain types

Furthermore, the group decided the product was better suited for a colorful paint to appeal to the desired clientele, which Hermle agreed with.

IV. CRITERIA AND CONSTRAINTS

The design of the grandfather clock was guided by a set of criteria and constraints outlined by Hermle and the project team to ensure alignment with client expectations and manufacturing feasibility. The primary design criteria centered on creating a piece of furniture that appealed to younger demographics, including new buyers or former Howard Miller customers, while maintaining Hermle's established craftsmanship. The design incorporates modern aspects alongside traditional ones to preserve the recognizable form of the grandfather clock. Functional criteria included compatibility with both quartz and mechanical clock movements, as well as the integration of a drawer to enhance utility. Additional criteria emphasized manufacturing within Hermle's existing production process to ensure scalability for mass production.

During the design process, constraints were imposed to align with Hermle's existing inventory and hardware. Key geometric constraints required the overall depth to be 12 inches for drawer functionality. Additionally, the vertical distance from the hand

shaft to the top of the drawer was limited to four specific values (29, 32, 35.5, or 43 inches), to allow space for a mechanical mechanism if desired. These constraints dictated the alignment of the clock proportions. Manufacturing constraints required all components to be compatible with the factory's CNC and laser engraving equipment. Finally, mechanical constraints ensured sufficient internal clearance for the pendulum and weight movement, ensuring the internal configuration could accommodate different movement types. These factors ensured the final design was not only aesthetically pleasing but also fully viable for production.

V. DESIGN METHODOLOGY

The design methodology for this project followed a structured concept development and selection process aimed at producing a grandfather clock that aligns with both Hermle's manufacturing capabilities and a modern consumer aesthetic. To begin, a mood board was created, including design and furniture ideas to pull inspiration from shown in Fig. 3. From personal preferences and a younger generational perspective, the mood board focused on a grand-millennial style [7]. This style contains colors like creams, grays, and blues while incorporating items like rattan and scallops. This provided a good mix of traditional and contemporary, incorporating a modern feel with the timeless piece of a grandfather clock. Once the mood board was established, four hand-sketched designs of grandfather clock concepts were drawn. One of these sketches can be seen in Fig. 4(a). These concepts were pulled from aspects of the mood board but also from a review of the best-selling clocks from both Hermle and Howard Miller.

The four concepts each included variations in cabinet structure, the inclusion of functional elements such as drawers, and aesthetic styles. Design 1 featured a rounded silhouette, a blue-gray color scheme, and a rattan base panel for the drawer, the most modern of the four, as shown in Fig. 4(b). Design 2 retained a more traditional top shape while introducing modern elements through a geometric panel at the base, choosing a white or navy color scheme. Design 3 took a different approach with a slimmer body, a light pink color, and open glass shelves instead of a drawer. Design 4 was the most traditional of all, featuring a classic silhouette with an arched top and a rattan-style base panel.



Fig. 4. Curated collection of visual images for mood board

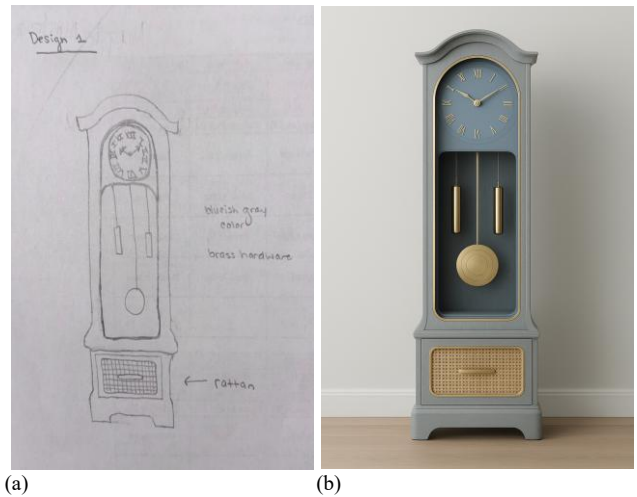


Fig. 3. Design 1. (a) Hand-sketched design uploaded to ChatGPT (b) Generated visualization from sketch

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Once the sketches were completed, ChatGPT [3] was utilized to generate high-fidelity visualizations of the concepts. This was a necessary step for the client, as Hermle required more polished visuals before committing to a design choice. Specifically, ChatGPT was used to efficiently produce images and visualizations, though this proved to be a repetitive process. In order to receive the ideal results, the sketches were uploaded alongside descriptions of the desired outcome, including color specifications, drawer placement, and geometrical features. If a generated image fell outside of the desired range, a new iteration was performed, describing the look in greater detail. As these visualizations reached the required level of detail, they were sent to Hermle for review. Ultimately, Hermle had the final say in which design concept was chosen, as they hold the financial investment required to bring it to production. Design 1 was selected based on its manufacturability, compatibility with their existing style, and the aesthetic appeal presented to younger buyers. This design was then carried forward into the detailed CAD development phase.

VI. MARKET ANALYSIS

The grandfather clock market is currently made up primarily of older, traditional buyers who value long-term furniture pieces and legacy craftsmanship. However, shifts in consumer preferences show a growing demand for products that combine functionality with modern design. This creates an opportunity for Hermle to expand beyond its existing customer base.

With the recent closure of a major competitor, Howard-Miller, Hermle is in a strong position to capture additional market share. At the same time, there is a gap in the market for products that maintain traditional quality while appealing to younger, design-focused homeowners. Many existing clock designs lean heavily traditional, which limits their relevance in contemporary spaces. This creates an opportunity for Hermle to position its new design as a bridge between categories, offering the durability and reliability expected from traditional clocks while introducing updated aesthetics and functionality that align with modern interiors. By doing this, Hermle can retain its current audience while expanding into a new, underserved demographic.

VII. TECHNICAL IMPLEMENTATION

The technical implementation focused on translating the selected design concept into a CAD file suitable for manufacturing. Using AutoCAD allowed specific parts of the design to be drawn separately and created the necessary viewpoints. The modeling process followed a typical structured approach, beginning with the primary features of the clock, such as the base. These elements allowed the overall geometry and dimensional constraints to be aligned accordingly. Per the client, Hermle, two specific geometrical constraints concerning the technical specifications were provided: the depth of the clock required a 12-inch minimum to incorporate a drawer, and the vertical distance from the hand shaft to the top of the drawer needed to be either 29, 32, 35.5, or 43 inches. Due to the original vision of the design concept, the 43-inch value was selected as the clock was envisioned to be tall. After this, secondary components were designed, including internal supports and trim molding. In performing this modeling process, these components could be properly aligned and proportional to primary features for consistency across the drawing.

As mentioned above, particular consideration was given to the space between the hand shaft and the top of the drawer. This allows for the integration of various internal mechanisms. Hermle currently has options for quartz and mechanical movements. In the quartz mechanism, the pendulum and weights are designed for a visual effect, while the mechanical option utilizes functional weights that must be cranked. The selected 43-inch dimension supports both mechanisms, allowing Hermle to select either during final assembly. In addition to these tolerances, design dimensions were optimized for the machines utilized at Hermle North America’s facility. Once the CAD model was established, routine checks were conducted weekly to edit components and validate the fit. This ensured the design was both physically feasible and functionally sound prior to fabrication. The completed CAD model serves as the basis for prototype development and provides a comprehensive reference for any geometrical or tolerancing concerns.

VIII. RESULTS

The project results included the development of the final CAD drawing, prototype planning, and the development of necessary marketing tools in relation to the expansion of Hermle’s target market.

A. Technical Deliverables

The primary technical result was the completion and delivery of the detailed CAD model. As seen in Fig. 5, this model showcased the chosen grandfather clock style with views from the front, side, top, and bottom. The model includes all the structural components, including the base, cabinet, hood, drawer assembly, and internal supports. All components were dimensioned and assembled within AutoCAD to ensure proper fit, alignment, and proportionality. The validation of the design was conducted through iterative processes within the CAD environment. This ensured that all the parts of the grandfather clock fit well without any interference. In addition, the design also met all the client-specific constraints, including the fixed 12-inch depth and the selected 43-inch vertical spacing requirement. Furthermore, the geometry of the other components was developed to align with Hermle’s CNC machine and laser engraver. This ensures manufacturability will be possible within the existing facility. Additionally, it is planned to develop a full-scaled front facing prototype of the finalized CAD model in order to further test the physical as well as aesthetic design of the product. Through this prototype, the presentation of the product in a real-world setting will be able to be assessed. It will also be used to inform the public about specific design and refinement choices prior to production by Hermle. In addition to technical outcomes, a marketing deliverable was developed to support the introduction of the new product. This included setting a target audience, while also establishing strategies focused on social media engagement to increase visibility of the product. The design and marketing approach were developed in parallel to ensure alignment between the physical product and its intended audience. Overall, the results signify that the proposed design is both technically feasible and aligned with current market opportunities.

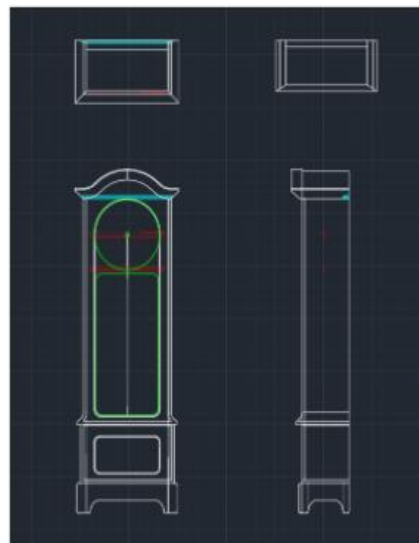


Fig. 5. Orthographic CAD views (top, bottom, front, and side) of the final design delivered to Hermle

B. Marketing Deliverables

As part of the Hermle Clock Design project, a marketing deliverable was developed to provide a practical and implementable social media strategy to support the launch of a new clock design. This strategy is intended to work alongside Hermle's existing social media efforts while introducing a new approach specifically designed to reach a younger demographic. Because this is a new product targeting a younger audience, it requires a distinct social media approach and platform strategy to effectively reach that group. Based on the market analysis, the opportunity is not to replace Hermle's traditional audience, but to expand beyond it by appealing to younger, design-focused homeowners who value both functionality and aesthetic. This requires a shift in how the new product is presented in the market rather than a complete change to the overall brand.

The proposed deliverable focuses on a structured social media strategy that Hermle can implement using its existing resources. Instead of creating entirely new marketing materials, this strategy provides a clearer framework for how content can be organized and communicated when promoting the new product. The approach emphasizes consistency, clarity, and alignment with the intended audience. Key elements include defining content pillars such as craftsmanship, functionality, and modern home integration, and using these pillars to guide posting decisions. The strategy also introduces a more intentional posting structure, where content highlights how the clock fits into real living spaces, functions as both a design piece and furniture, and reflects long-term value.

To effectively reach a younger audience, this strategy recommends expanding into platforms such as Instagram and Pinterest, which are widely used for visual discovery and home décor inspiration. Research on Gen Z consumer behavior shows that younger audiences rely heavily on visual platforms such as Instagram and Pinterest for product discovery and home design inspiration. Instagram allows Hermle to present the new product through curated imagery and short-form content, while Pinterest supports long-term discovery through search-based inspiration. Together, these platforms help connect the new product with a younger demographic in environments where they are already actively engaging with home design content. A consistent posting schedule of approximately 2 to 3 times per week is recommended to maintain visibility while keeping the strategy manageable.

This approach is designed to be realistic and adaptable, allowing Hermle to gradually implement the strategy while building on its existing marketing efforts. Rather than requiring a complete shift in direction, it provides a structured way to introduce a new product to a new audience through targeted messaging and platform selection. By aligning content with how younger consumers discover and engage with home décor products, Hermle can begin to evaluate how the new design resonates with this audience while continuing to reinforce its legacy positioning. Overall, this deliverable provides a clear and actionable marketing direction that aligns with both the product design and the identified market opportunity.

IX. CONCLUSION

This project developed a contemporary grandfather clock design, intended to support Hermle's expansion into a younger market as well as Howard Miller's former customer base. The final design incorporates modern aesthetics while maintaining the traditional qualities to align with Hermle's brand. Although additional validation will occur through the prototyping of both our own model and Hermle's manufactured prototype, the results suggest potential for success on the feasibility and marketing sides. Overall, this project highlights the importance of integrating engineering design principles with market insight to foster innovation.

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