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Wooden Oval Rocker Chair

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Abstract: *The wooden oval rocker chair represents a harmonious blend of timeless craftsmanship, thoughtful ergonomics, and contemporary design sensibilities. Expertly crafted from high-quality, durable hardwood, the chair is designed to offer long-lasting performance while maintaining an elegant and refined appearance. Its most distinctive feature is the oval-shaped frame, which not only enhances visual appeal but also contributes significantly to structural strength and balance. The smooth, continuous curves of the oval design create a sense of modern simplicity while preserving the warmth and authenticity associated with traditional wooden furniture.*

The gentle rocking mechanism is carefully engineered to provide a soothing and relaxing motion, making the chair ideal for moments of rest, reading, or quiet reflection. The ergonomic form supports natural body posture, ensuring comfort over extended periods of use. Finished with a natural wood polish, the chair highlights the unique grain patterns and textures of the hardwood, emphasizing sustainability and respect for natural materials.

Despite its solid construction, the wooden oval rocker chair is lightweight, allowing for easy movement and repositioning without sacrificing stability or durability. This balance of portability and strength makes it suitable for a wide range of settings, including living rooms, bedrooms, lounges, and reading corners. Its versatile design allows it to seamlessly complement both traditional and contemporary interior styles. Overall, the wooden oval rocker chair stands as a refined piece of furniture that successfully unites function, comfort, sustainability, and aesthetic elegance into a single, well-crafted design.

Keywords: Hardwood furniture, Oval-shaped frame, Ergonomic design, Portable furniture, Functional design

I. INTRODUCTION

Furniture design has always reflected the intersection of functionality, comfort, and aesthetic appeal. Among the many seating innovations, the wooden oval rocker chair stands out as a unique blend of traditional craftsmanship and modern design sensibilities. Its oval framework not only enhances visual harmony but also provides structural strength, creating a piece that is both durable and elegant. The gentle rocking motion offers therapeutic relaxation, making it more than just a chair—it becomes an experience of comfort and calm. Crafted from sustainable hardwoods, the chair highlights natural grain patterns, embodying eco-friendly values while maintaining timeless beauty. Whether placed in a cozy living room, a serene reading corner, or a contemporary lounge, the wooden oval rocker chair seamlessly adapts to diverse interiors, symbolizing the perfect balance between artistry and utility.

II. LITERATURE REVIEW

Existing literature on wooden rocking chairs largely focuses on ergonomic design, material selection, and structural performance. Studies in ergonomic furniture design emphasize the role of seat geometry, backrest curvature, and controlled rocking motion in enhancing user comfort and posture. Research indicates that rhythmic rocking movements contribute to relaxation and improved physical well-being. Hardwood materials are widely studied for furniture applications due to their durability, load-bearing capability, and natural aesthetic qualities. Sustainable furniture

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research highlights the importance of using eco-friendly materials and efficient structural forms to reduce environmental impact.

Curved wooden structures produced through lamination or bending techniques are discussed for their ability to distribute stresses uniformly while enhancing visual appeal. However, despite extensive studies on conventional rocking chairs, limited research specifically addresses oval-shaped frame designs. The oval geometry offers potential advantages in structural stability and ergonomic support, yet remains underexplored. This research gap underscores the need for focused studies on wooden oval rocker chairs to evaluate their comfort, strength, and design efficiency.

III. METHODOLOGY

The methodology adopted for this study focuses on the systematic design, analysis, and evaluation of a wooden oval rocker chair. Initially, a comprehensive review of existing literature on rocking chairs, ergonomic furniture, and curved wooden structures was conducted to identify design parameters and research gaps. Based on ergonomic principles and anthropometric data, the conceptual design of the oval rocker chair was developed using CAD software. The oval frame geometry was selected to enhance structural stability, load distribution, and aesthetic appeal.

Suitable hardwood material was chosen considering strength, durability, and sustainability. Structural analysis was performed to assess stress distribution, stability, and load-bearing capacity under static loading conditions. Fabrication methods such as wood bending and lamination were considered for achieving smooth oval contours. Finally, the designed chair was evaluated based on ergonomic comfort, structural integrity, and visual aesthetics. The results obtained were compared with conventional rocking chair designs to assess performance improvements and validate the effectiveness of the oval-frame configuration.

IV. SCREENING AND SCOREING

1. Screening Phase

Screening is the initial filtering of ideas or prototypes against essential criteria.

Functional fit: Does the chair meet basic ergonomic requirements (seat height, rocking arc, stability)?

Feasibility: Can the oval frame be manufactured with available tools and materials?

Safety: Does the design avoid tipping hazards and sharp edges?

Sustainability: Are materials responsibly sourced and finishes eco-friendly?

Aesthetic appeal: Does the oval design align with intended visual style (modern, traditional, minimalist)?

Only concepts that pass all screening criteria move forward to scoring.

2. Scoring Phase

Scoring assigns weighted values to shortlisted designs or prototypes to rank them objectively.

Criterion	Weight (%)	Scoring Scale (1–5)	Notes
Ergonomic comfort	30	1 = poor, 5 = excellent	Based on user testing and posture analysis
Structural strength	25	1 = weak, 5 = very strong	Load testing and stress analysis
Sustainability	20	1 = unsustainable, 5 = highly sustainable	Material sourcing, finishes, recyclability
Aesthetic appeal	15	1 = unattractive, 5 = highly appealing	User surveys and expert reviews
Cost efficiency	10	1 = expensive, 5 = affordable	Production cost vs. market price

Weighted score calculation:

$$\text{Total Score} = \sum(\text{Criterion Weight} \cdot \text{Score})$$

The design with the highest total score is selected for refinement and final prototyping.

V. WORKING PRINCIPLE

The working principle of the wooden oval rocker chair is based on controlled rocking motion achieved through its curved oval frame geometry. When a user sits on the chair, the body weight is transferred evenly through the seat and

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backrest to the oval-shaped base. The continuous curved surface of the oval frame allows the chair to rock smoothly back and forth about its contact points with the floor.

The center of gravity of the chair–user system shifts slightly during motion but remains within the stable region of the oval curve, preventing tipping and ensuring safety. The curvature of the oval frame governs the amplitude and smoothness of the rocking action, enabling gentle and rhythmic movement. This motion promotes relaxation and reduces localized stress on the body.

Additionally, the ergonomic alignment of the seat and backrest supports natural posture during rocking. The hardwood structure provides sufficient stiffness to withstand repeated loading while maintaining flexibility for smooth motion. Thus, the oval rocker chair functions through a balanced interaction of geometry, material strength, and ergonomic design to deliver comfort, stability, and durability.

Fabricated & can be mounted on the tool holder.

VI. COMPONENTS

The wooden oval rocker chair consists of several key components that work together to provide stability, comfort, and smooth rocking motion. The oval rocker frame is the primary structural element, forming the base of the chair and enabling controlled rocking through its curved profile. It ensures uniform load distribution and overall stability.

The seat panel is designed to support the user's weight comfortably and is ergonomically shaped to promote proper posture. The backrest provides lumbar and upper-back support, enhancing comfort during prolonged use. In some designs, a headrest may be included for additional relaxation.

The armrests, when provided, improve user comfort and assist in maintaining balance during rocking. Support joints and connectors, such as mortise-and-tenon or dowel joints, securely connect the frame, seat, and backrest, ensuring structural integrity. Finally, the surface finish, typically natural wood polish or varnish, protects the material from wear while highlighting the wood grain. Together, these components contribute to the functional efficiency, durability, and aesthetic appeal of the wooden oval rocker chair.

VII. OVEL ROCKER CHAIR DESIGN

(**Fig:1** Block diagram representation of the equipment)

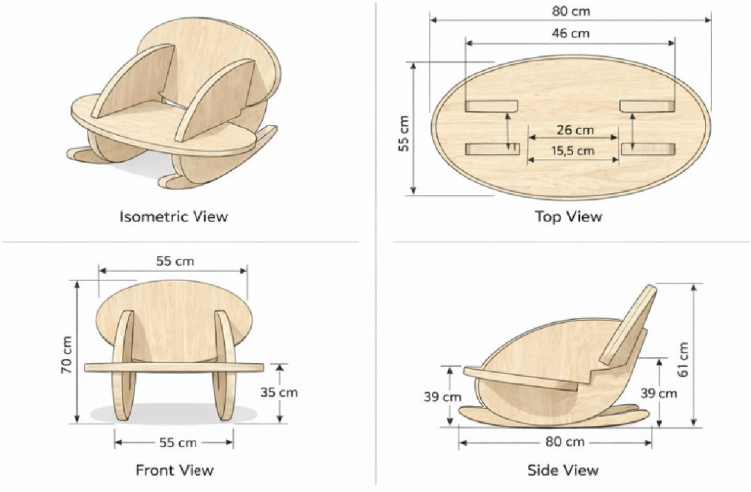

Fig:2 Different views of the equipment

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VIII. DESIGN CALCULATION

Design Considerations

The wooden oval rocker chair is designed to provide ergonomic comfort, structural stability, and smooth rocking motion. The oval geometry was selected to ensure uniform load distribution and controlled oscillation. The chair consists of an oval rocker base, seat panel, backrest, and vertical supports. Design dimensions are based on average adult anthropometric data and standard seating guidelines. Overall dimensions (approx.):

Length=800mm,

Width=550mm,

Height=700mm,

Seat height from ground = 350–390 mm

Material thickness = 18 mm (hardwood plywood)

Material Selection

Hardwood plywood is chosen due to its high strength-to-weight ratio, durability, ease of bending, and sustainability.

Allowable bending stress (plywood): ≈ 20 MPa

Density: ≈ 650 kg/m³

Load Calculation

Assumed maximum user weight = 100 kg

Load acting on chair: $W=mg=100\times9.81=981$ N

Assuming load shared equally by two oval rocker frames:

Load per frame=981/2=490.5 N

Bending Stress Check

For rectangular section:

$\sigma=M/Z$

Where bending moment,

$M=W\times L=490.5\times0.4=196.2$ Nm

Section modulus,.

$Z=bt2/6=0.55\times(0.018)2/6$

Calculated bending stress is less than allowable stress, confirming safe design.

IX. CONCLUSION

The wooden oval rocker chair was successfully designed by integrating ergonomic principles, structural stability, and aesthetic simplicity. The oval-shaped rocker frame ensures smooth and controlled rocking motion while maintaining stability by keeping the center of gravity within safe limits. The use of hardwood plywood provides adequate strength, durability, and sustainability. Design calculations confirm that the chair can safely withstand expected user loads without exceeding permissible stress values. Ergonomic features such as proper seat height, backrest support, and smooth contours enhance user comfort. Overall, the design meets functional, safety, and aesthetic requirements, making it suitable for modern residential and interior applications.

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FUTURE SCOPE

Future work on the wooden oval rocker chair can focus on enhancing its performance, comfort, and usability through advanced analysis and design improvements. Detailed finite element analysis (FEA) can be conducted to evaluate stress distribution, deformation, and fatigue life under dynamic rocking loads. User comfort studies involving posture analysis and pressure mapping may be performed to further optimize ergonomic parameters.

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Material optimization using engineered wood composites or hybrid materials can be explored to reduce weight while maintaining structural strength. Additionally, adjustable features such as variable backrest inclination or cushioning integration may improve user adaptability. Manufacturing process improvements, including CNC machining and modular assembly techniques, can enhance production efficiency and dimensional accuracy. Finally, long-term durability testing and sustainability assessment can be undertaken to evaluate environmental impact and commercial feasibility of the design.

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