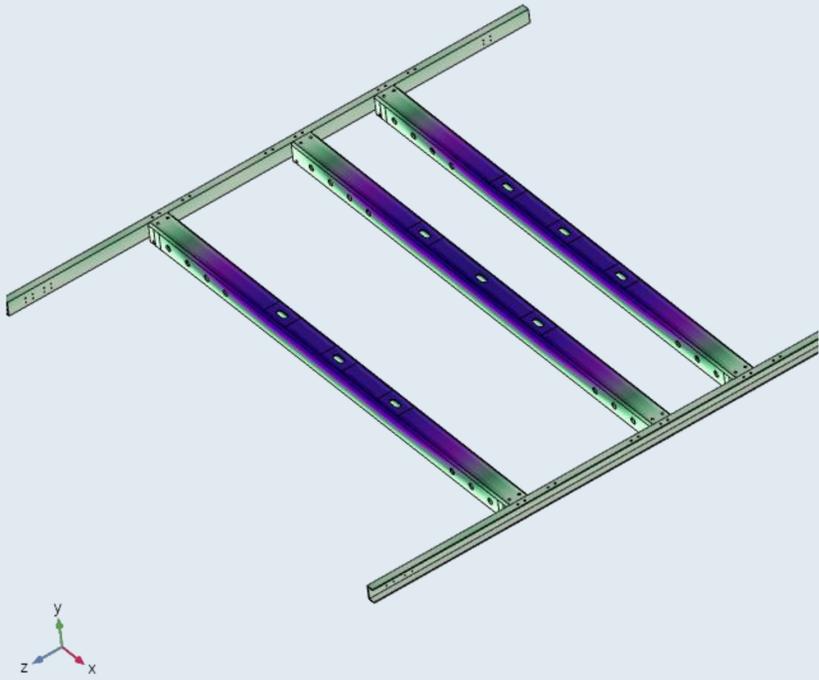


DESIGN AND ANALYSIS OF SUSTAINABLE PACKING CASE PALLET FOR MACHINE TOOL

To enhance the design process in terms of optimizing the cross section of the packing pallet by finding out the stress levels and displacement of the pallet

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Abstract

The manufacturing industry is shifting towards sustainable practices. One of the significant challenges in this pursuit is in logistics, where wood is traditionally the primary material for packing large machines. This project developed a rigid modular packing pallet to revolutionize the packing process, leveraging advanced simulation tools to optimize the design and identify weak points.

The proposed pallet is environmentally friendly and economically viable, aiming to be reused for at least ten cycles.

The successful implementation of this innovative packing case pallet has facilitated the successful delivery of machines across India without the need for traditional wooden packing, marking a significant step forward in the journey towards sustainable practices in the manufacturing industry.

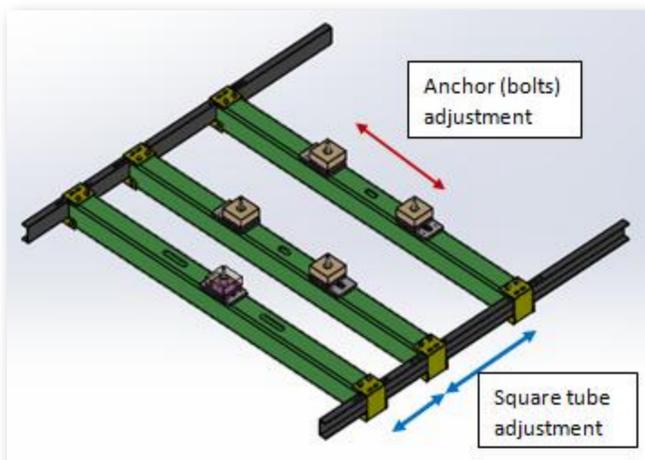


FIGURE 1. Pallet configuration mechanism

Methodology

Analyze existing wooden packing pallets to observe their behavior when a machine is grouted on them. Identify the key factors that contribute to pallet displacement.

Design a metal base pallet using square beams and C-channels to be highly rigid and easily configurable. Optimize the design to minimize pallet displacement under different loading conditions.

Test the metal base pallet with a variety of machines to ensure that it can efficiently accommodate different machines in a single design with similar floor plans, requiring minimal adjustments. Measure the pallet's displacement and other performance characteristics under different loading conditions.

Results

• Displacement in metal base pallet with 8mm thickness is less by 50% in comparison to Wooden pallet.

Conclusion

• Environmental benefits:

- Use of metal instead of wood eliminates the need for a larger workforce, higher costs, and non-reusable materials
- Pallet is designed to be reused for at least ten cycles throughout its lifespan

• Economic benefits:

- Cost savings of 75% by reusing the metal pallet instead of wooden packing for every 10 machines
- One pallet can accommodate a category of 3 to 4 machines

• Technical benefit:

- The metal pallet with 8mm thickness is more stiffer in comparison to metal pallets 6mm and 5mm thickness and wood material

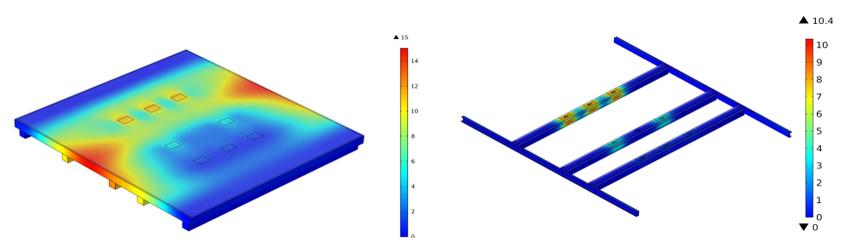


Figure 1: Displacement of Wooden pallet

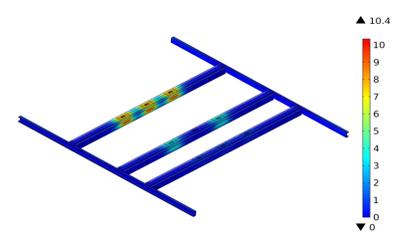


Figure 2: Displacement of Metal base pallet with (8mm)

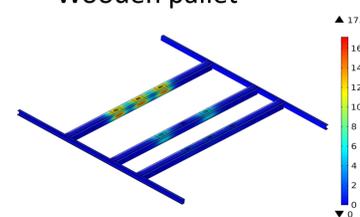


Figure 3: Displacement of Metal base pallet with (6mm)

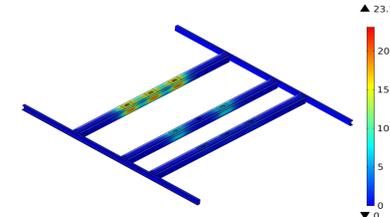


Figure 4: Displacement of Metal base pallet with (5mm)

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