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COMPACT AUTOMATED HAMMERING MACHINE FOR REPETITIVE WORKSHOP OPERATIONS

Sudhir Tiwari[1]*, Sumeet Nishad[2], Surendar Kumbhaj[3], Tushar Kumbhaj[4]

[1234]*Department of Civil Engineering, Chhattisgarh Engineering Collage, Durg (CG)*

Abstract

In today's manufacturing world, automation is a game-changer—it cuts down on the need for manual labor while helping boost productivity and efficiency.This study focuses on designing and building an automated hammering machine that does the job faster and more accurately than people can with their hands—cutting out guesswork and boosting productivity along the way.The system basically comes together with a DC motor, pulley, shaft, crank, and hammer—all working together to turn spinning motion into steady, rhythmic hammering. It's designed to deliver that consistent pounding you'd expect from a good old-fashionedThis machine is designed to cut down on operator fatigue, keep things safer, and make sure the hammering force stays steady every time it's used.Testing the prototype shows that the automated hammering system works reliably, delivers more consistent force, and cuts down on the time needed to complete tasks.This design is simple, cost-effective, and perfect for small workshops or industrial spaces where you need to do repetitive hammering tasks.The study highlights how automation can really ramp up productivity and streamline mechanical tasks—making them faster, cleaner, and more efficient.

Keywords: *Automated Hammering Machine, Mechanical Automation, Reciprocating*

* *Corresponding author*

1. Introduction

This project is all about building a simple rotor test rig—basically a setup to simulate and study different types of rotor problems and see how they affect the machine's overall performance.The test rig is designed to give you a real-world setup where you can intentionally create and observe common mechanical issues—like imbalance, misalignment, or looseness—to really understand how they affect performance.The system is equipped with vibration sensors that keep a close eye on the movements of its spinning components—helping catch any irregularities before they become bigThese vibration signals are collected and studied to keep an eye on how the machine is holding up—and whether it's staying in good health.

The rotor test rig is super important—it helps engineers understand how rotating machines act when things go wrong.Engineers can spot problems early by watching how things vibrate and noticing warning signs—this lets them jump in with fixes before anything really breaks or gets worse.This means businesses can cut down on

repair costs, dodge unexpected breakdowns, and keep their machines running more reliably.Plus, the project helps keep workers safer by making sure rotary machines run properly and cuts down on unexpected breakdowns..

2. Methodology

This study takes a hands-on approach, focusing on designing, building, and testing an automated hammering machine — one that can handle repetitive hammering tasks with precision and speed.The study uses a hands-on, design-driven approach to build a prototype and test how well it actually performs in real-world conditions.

Initially, we took a close look at how the hammering machine actually works—examining how the hammer moves, how much force it applies, and how stable it stays during use.To meet those needs, we went with a mechanical system that turns spinning motion into straight-line movement.A crank-and-slider setup was chosen because it's simple, reliable, and delivers evenly spaced hammer strikes—no fancy tech needed, just solid mechanical engineering.

By applying basic mechanical design rules, we figured out the key specs—like hammer weight, crank size, motor speed, and frame strength—to make sure the machine performs reliably and consistently.We went with a DC motor to drive the mechanism, paired with a belt and pulley setup—it's reliable and gives us the right amount of control.The mechanical parts were carefully arranged to create a steady, controlled hammering motion—without compromising the overall structure's strength or stability.

To make sure the design worked, we built a prototype of the automated hammering machine.We ran some experiments to see how well the system handled the hammering motion, how consistent each stroke was, and how stable it performed overall.We took a closer look at key metrics—like how often the hammer strikes and how efficiently

We took a close look at what the experiments showed to compare how the automated hammering system stacks up against the old manual method — focusing on things like how much more productive it is, how consistent its results are, and how much less it depends on human workers.

3. Result and Discussions

Once built, the automated hammering machine went through successful tests to make sure it was working well and running efficiently.During testing, the machine kept delivering smooth, evenly spaced hammer strikes — no skips, no jerks, just steady rhythm.The crank and slider setup cleverly turns the motor's spinning motion into the hammer's steady push-and-pull action—smooth, reliable, and super efficient.The system kept a consistent, steady rhythm and mostly handled things on its own—no need to jump in and manually adjust during operation.

The tests showed that the automated hammering machine does the same repetitive tasks way more efficiently than doing them by hand.The machine ran smoothly throughout the whole operation—almost no shaking—and applied force evenly across the workpiece, making for a clean, consistent result.The test results reveal that

the system helps workers get more done, cuts down on tiredness, and keeps tasks more consistent—making the whole process smoother and more

Overall, the prototype worked well—and it proves that automated hammering systems can be a practical and effective solution for small-scale factories and workshops..

4. Conclusion

We've successfully built and tested the automated hammering machine — and it's a game-changer. It takes spinning motion and turns it into smooth, back-and-forth hammering, cutting down on the need for human labor and making every hit more consistent and reliable.The experiments showed that the machine gives steady, reliable hammering—boosting productivity and delivering consistent, trustworthy performance every time.So, this system works great for small businesses and workshops that do repetitive hammering jobs — it's built with those kinds of tasks in mind.

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