PROJECT ABSTRACT

Motorized Sand Sieve Shaker for Aggregate Gradation Analysis

A motorized sieve shaker with a standard sieve nest, timer-controlled runs and a gradation workbook for sand and aggregate analysis. Delivered built-to-order with the machine, sieves, report, PPT and viva Q&A.;

01. Title

Motorized Sand Sieve Shaker for Aggregate Gradation Analysis

02. Introduction / Background

Concrete strength and road-base performance depend on the particle-size distribution of the sand and aggregate used — measured by the sieve analysis taught in every construction-materials lab, usually by hand-shaking sieves for ten tiring, inconsistent minutes. A motorized sieve shaker standardizes the test: it clamps the sieve nest and shakes it with a repeatable motion for a timed run, so results depend on the sample rather than the operator. This project fabricates such a machine — motor with eccentric drive, spring-suspended platform, standard sieve nest and run timer — so the student performs the full analysis from their own machine's output.

03. Problem Statement

Hand-shaken sieve analyses vary between operators and exhaust the student, undermining the repeatability the standard test demands. The project addresses this with a motorized shaker that delivers identical shaking to every run, letting the student focus on correct sampling, weighing and the gradation analysis itself.

04. Objectives

- Shake a standard sieve nest with a repeatable motorized eccentric motion.
- Support 4.75 mm, 2.36 mm, 1.18 mm, 600 µm and 300 µm sieves plus pan.
- Isolate vibration on a spring-suspended platform.
- Time each run with an adjustable timer for identical test duration.
- Guide weighing, percentage calculations, gradation plotting and fineness modulus.
- Cover sample washing, drying and quartering in the procedure manual.
- Deliver the machine, sieves, workbook, report, PPT and viva Q&A.;

05. Proposed Methodology

The machine is fabricated as an MS base cabinet with a spring-suspended sieve platform driven by a single-phase motor through an eccentric and link. The student prepares the sample (wash, dry, quarter, weigh), stacks the nest, clamps it, sets the timer and runs the shaker. Each sieve's retained fraction is weighed; percentage retained, cumulative

passing and the semi-log gradation curve follow in the workbook, with the fineness modulus computed and the sample classified. A second sample gives the comparative study.

06. System Architecture / Working

The motor's eccentric converts rotation into the platform's shaking motion; the coil springs let the platform move freely while isolating the base. Particles smaller than each mesh pass down through the nest during the timed run, so each sieve retains exactly its size fraction. Weighing the fractions closes the mass balance and yields the gradation data the workbook turns into curves and the fineness modulus.

07. Hardware / Software Requirements

- Fabricated MS base cabinet and sieve platform
- Single-phase motor with eccentric drive and link
- Coil spring suspension set
- Brass test sieves 4.75 mm–300 µm + pan and lid
- Adjustable run timer
- Clamp plate with wing-nut fasteners
- Digital weighing balance 0–5 kg
- Gradation workbook and fabrication drawings

08. Expected Outcomes

- Complete sieve analyses with mass-balanced weighings from student runs.
- Plotted gradation curves and computed fineness moduli for two samples.
- A comparative discussion of the two sand sources.
- A complete report, PPT and viva Q&A; on gradation theory and the standard test.

09. Applications

- Construction-materials and concrete teaching laboratories.
- Aggregate quality comparison for student projects.
- Demonstrating standardization and repeatability in materials testing.

10. Future Scope

- Coarse-aggregate sieve set as an add-on.
- Wet-sieving attachment for fines below 75 µm.
- Automated fraction weighing with a logged balance.
- Flakiness/elongation gauge set for shape analysis.