

PROJECT ABSTRACT

Sugarcane Juice Extractor Machine

A motorised three-roller sugarcane juice extractor with a worm gearbox drive, stainless juice tray and bagasse chute, designed for hygienic small-vendor and farm-level juice extraction with a measurable extraction yield.

01. Introduction / Background

Sugarcane juice is a popular fresh beverage across India, and small vendors and farms need a hygienic, motorised alternative to hand-cranked crushers. A three-roller mill — two crushing rollers and a top roller in triangular arrangement — is the standard small-scale extraction geometry: cane passes through the roller nips twice, improving juice recovery over single-pass designs. Designing and building such a machine is a classic mechanical fabrication project.

02. Problem Statement

Manual cane crushers are slow, tiring and unhygienic, while industrial mills are far too large for a vendor or farm. A compact motorised extractor with food-contact stainless surfaces, guarded drives and a measurable juice yield would fill the gap — and give students a complete machine-design project covering rollers, gearing, frames and hygiene.

03. Objectives

- Build a three-roller sugarcane juice extractor driven by a 1.5 HP motor through a worm gearbox.
- Achieve a design extraction yield of 60–70% by weight of cane.
- Provide a stainless steel juice tray with strainer mesh and a bagasse outlet chute.
- Enclose all drives with sheet-metal safety guards and provide roller-gap adjustment.

04. Proposed Methodology

The rollers are sized and grooved for the design throughput, and the gearbox ratio is selected to give a roller speed of 10–15 rpm for good extraction. Cane is fed through the roller nips, juice drains to the stainless tray and strained, and bagasse exits through the chute. Extraction yield is measured by weighing the cane fed and the juice collected over timed trials, recorded on the yield test sheet. Roller-gap adjustment screws let students study the effect of nip setting on yield.

05. System Architecture / Working

The 1.5 HP single-phase motor drives the worm gearbox, which turns the three grooved steel rollers at low speed and high torque. Cane stalks fed into the top nip are crushed between the top and front rollers, then pass between the top and rear rollers for a second squeeze. Juice flows down into the stainless tray with its strainer mesh, while crushed bagasse is pushed out through the rear chute. Guards enclose the gearbox, belts and roller ends.

06. Hardware / Software Requirements

- MS frame, three grooved steel rollers with bearing blocks and gap-adjusting screws.
- 1.5 HP single-phase motor, worm gearbox, stainless juice tray with strainer mesh and bagasse chute.
- Sheet-metal safety guards, weighing scale for yield trials.
- No software is required; yield test sheets record the measurements.

07. Expected Outcomes

The extractor is expected to crush cane continuously at the design throughput with a measured extraction yield in the target range, recorded across roller-gap settings. Students get a working food-processing machine plus quantitative yield data for their project report.

08. Applications

- Small juice vendors, farms and canteens needing a hygienic motorised extractor.
- Mechanical fabrication and machine-design projects in engineering colleges.
- Demonstration of roller-mill crushing and extraction-yield measurement.

09. Future Scope

The machine can be extended with a cane-feed conveyor, a juice chilling attachment, a larger four-roller configuration for higher yield, or a solar-assisted drive for off-grid farm use.