USDA Pecan Postharvest – Cracking

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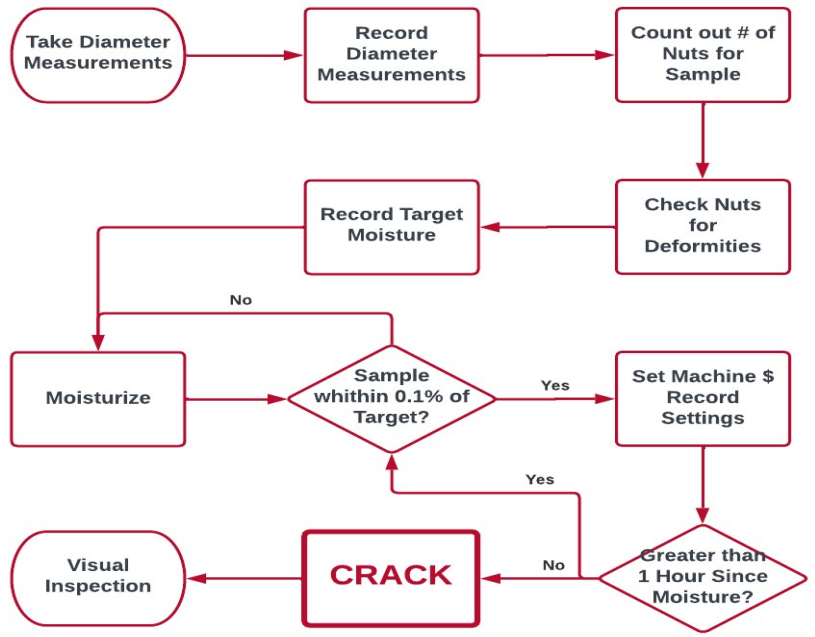
Motivation

- Limited Optimization: Current high-throughput pecan cracking technologies lack sufficient optimization, leading to increased costs and reduced product quality.
- Insufficient Research: Limited research exists on the impact of cracking methods on half yield, which is crucial for improving processing methods and minimizing waste.
- Lack of System Feedback: The absence of feedback mechanisms in pecan cracking processes hinders continuous improvement and adaptability.

Experimental Process



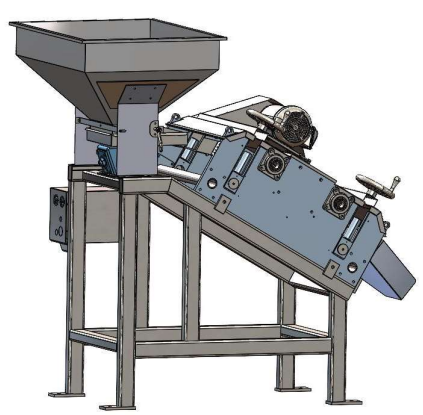
Meyer DOE

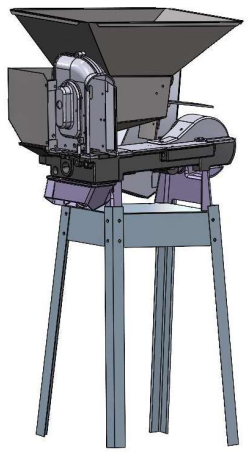
Research Objective (RO)	Independent Variable
RO 1	Displacement Screw Setting
	Preload Spring Stiffness
RO 2	Motor Speed
RO 3	Impactor Profile

JC DOE

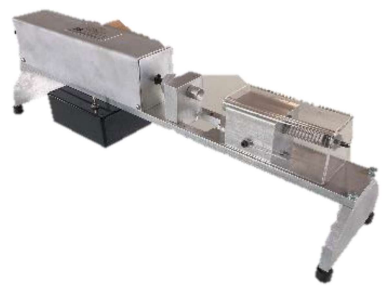
Research Objective (RO)	Independent Variable
RO 1	Contacting Plate Frequency
	Throughput
RO 2	Impactor Plate Relative Position
RO 3	Impactor Plate Insert Geometry

Equipment – High Throughput





Equipment – Low Throughput



Future Directions

- Intelligent Process Control: Use sensors and AI for real-time monitoring and machine adjustments.
- Enhanced Connectivity & Maintenance: Employ IoT and analytics to optimize communication, minimize downtime, and maximize equipment lifespan.

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