



SHAPING THE FUTURE OF OUR INDUSTRY

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INNOVATION
IS THE
FOUNDATION
OF SUCCESS.





THE INTRODUCTION OF AI INTO PECAN SHELLING

In the early days of the pecan industry, pecans had to be sorted by hand. This process was not only inefficient, costly, and labor intensive, but was unable to meet consumers' quality demands.

In the early 1940's, Buhler Sortex adapted their low-capacity sorter to sort pecans. While this was a slight improvement to hand sorting, hand sorting was still needed to meet consumers' quality expectations. There were several improvements made to this antiquated sorting model over the years, but there were no major improvements made to electronic sorters until Satake released the ScanMaster II in 2001.

The ScanMaster II drastically reduced the amount of hand sorting that was required, but it still did not eliminate the need for hand sorting. The ScanMaster II also required a lot of manual adjustment and calibration.



THE INTRODUCTION OF AI INTO PECAN SHELLING

It wasn't until 2021, that Artificial Intelligence was introduced into electronic sorting equipment. AI enabled sorters to become more efficient through "learning." By utilizing data collected over time, AI in sorters actually improve efficiency and quality the more you run them.

Like with any AI model, algorithms and some guidance from the operators is needed, but they require significantly less human interaction and manual calibration than previous sorting technology.

The introduction of AI into electronic sorting has eliminated the need for hand sorting and reduced our payroll expense by more than 30% .



WHERE DO WE GO FROM HERE?

ENHANCEMENTS THROUGH AI **AND PLC INTEGRATION**

OPERATIONAL EFFICIENCY & LABOR OPTIMIZATION

A. Automated System

- Integrating sensors and relays with a centralized PLC (Programmable Logic Controller) minimizes manual intervention and human error. This enables continuous plant operation with a smaller, more specialized labor force.

B. Smart Flow & Throughput Regulation

- Sensors feed real-time data back to the PLC, which automatically scales Variable Frequency Drives (VFDs) on conveyor lines.
- This regulation maintains a balanced, consistent product flow through the plant, reducing manual line adjustments and bottle necks.

ENHANCEMENTS THROUGH AI **AND PLC INTEGRATION**

IMPROVING QUALITY AND MINIMIZING PRODUCT LOSS AND DEGRADATION

A. Moisture Management: In-Shell Conditioning Optimization

- Achieving the perfect soak on inshell ensures a pliable kernel during cracking, preventing the kernel from shattering into lower-value pieces.
- Continuous moisture analysis ensures in-shell pecans reach the precise saturation required for inshell conditioning.

B. Moisture Management: Drying Precision

- Dynamic moisture detection sensors continuously track internal nut moisture, allowing the system to automatically adjust drying parameters.
- Optimizing moisture content eliminates the risk of mold growth, rancidity, and moisture-related shelf-life issues.
- In-process moisture sensors regulate drying times. Preventing over-drying eliminates kernel brittleness, significantly reducing product breakage during the final packaging stages.

ENHANCEMENTS THROUGH AI AND PLC INTEGRATION

IMPROVING QUALITY AND MINIMIZING PRODUCT LOSS AND DEGRADATION

C. Precision Sorting

- **INSHELL** - Applying AI-driven sorting to in-shell pecans at the intake stage drastically cuts down on the volume of foreign material entering the primary production facility.
- **KERNELS** - Modern color sorters utilize AI to continuously analyze, memorize, and adapt to variations shell and foreign material, increasing removal accuracy over time. AI sorters ensure kernels aren't ejected and shells aren't accepted with

DATA COLLECTION AND FOOD SAFETY

Food safety and quality go hand in hand in pecan processing both depend on protecting consumers and delivering a consistent, high-quality product. The most common challenge is shell fragments in pecan pieces, making effective shell removal a critical step in the process. This slide focuses on the float system: how water separation removes shell and protects both safety and quality.

Pecan pieces move through the float water system, where water helps to separate shell from pecans: where shells sink and pecan pieces float to the top. Introducing water also creates conditions for microbial growth, including yeast, mold, coliforms, and E. coli.

OUR CONTROL-

We use Pera Acetic Acid, an EPA-regulated sanitizer specifically approved for use on pecans. The product is mixed with water to achieve 85 ppm of peroxyacetic acid and sprayed directly onto shelled pecan pieces as they move through the line. This targeted spray application reduces microbial load right at the surface, adding a critical layer of protection before the pecans continue to drying and packaging. It's a simple, efficient step that fits seamlessly into our existing process flow. This concentration is verified by quality control technician every hour during production. And our historic lab results for pieces will be good source for validate effectiveness of this PAA since we have very fewer deviations

WHY PAA OVER CHLORINE

PER-OX EXTREME (PAA)

- ✓ EPA-regulated and approved for use on raw commodities, including pecans and Effective across a broad pH range
- ✓ Leaves no measurable byproducts behind
- ✓ Breaks down clean -oxygen, water, acetic acid with no residue
- ✓ Adds no extra rinse step saves lot of time in production and No chemical contamination safe and effective

CHLORINE

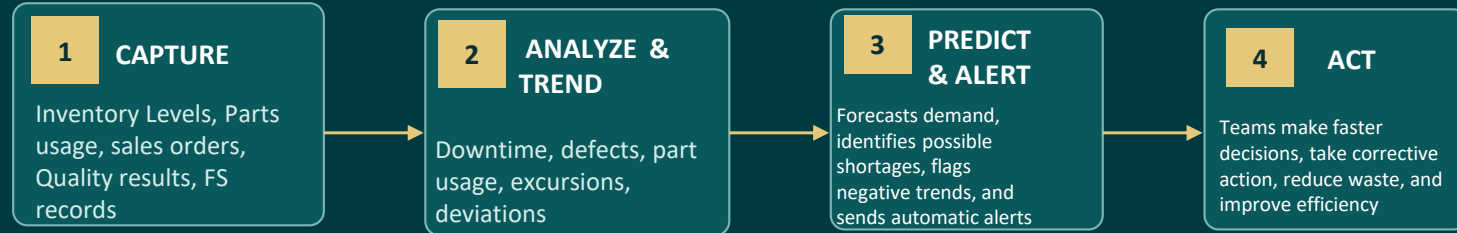
- ✗ Effective, but requires careful pH control to stay active PH>7.5 has less effeminacy and needs additional control steps and Complexity to the process
- ✗ Can form chlorinated byproducts, like trihalomethanes and chlorates
- ✗ Typically needs an added rinse step before drying

PROCESS CONTROL & BENFITS

The float system improves quality by separating shell fragments from pecan pieces. But introducing water also raises microbial risk which is exactly why we apply PAA before drying. The result: a safer, cleaner, more consistent finished product, every time..

UTILIZING AI IN DATABASES

AI is changing how food manufacturers manage and use information. AI can enhance databases used for inventory, parts, sales, quality control, and food safety. Instead of only storing records, AI can organize information, identify patterns, create trends, and generate alerts. This reduces manual analysis and helps teams make faster, better-informed decisions.



WHERE AI CREATES VALUE

Inventory & Parts

Tracks stock levels and usage, predicts shortages, and supports timely reordering.

Sales & Demand

Analyzes customer orders, seasonal patterns, and available inventory to improve forecasting.

Quality & Food Safety

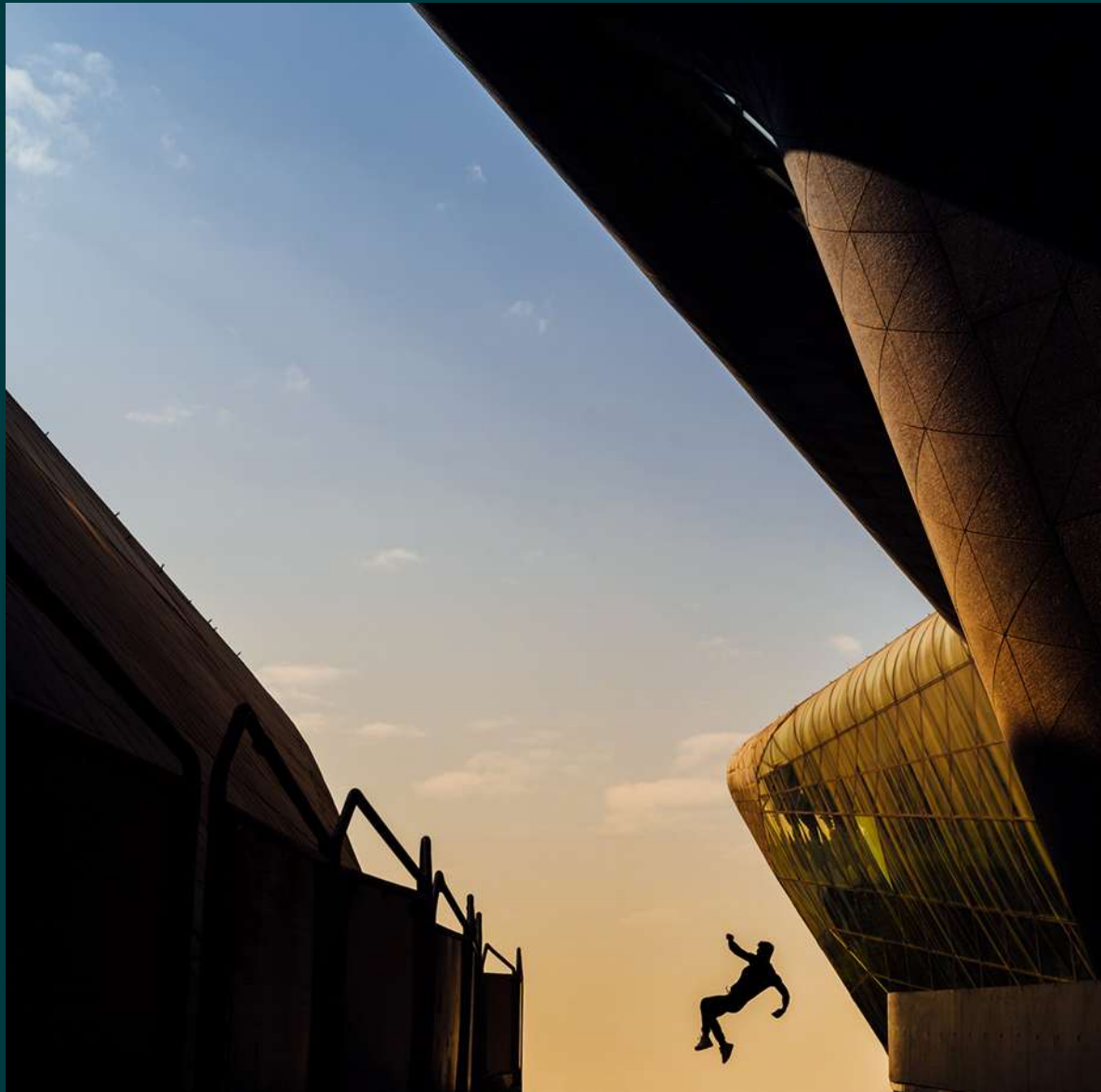
Trends test results, defects, deviations, sanitation records, and corrective actions to identify developing risks.

Operations

Reviews production, yield, downtime, and performance data to identify losses and improvement opportunities.

IN SHORT

AI transforms databases from passive record-storage systems into active tools that identify trends, predict needs, and support faster decisions.



Q&A

Panel discussion session