

HOW CAN CPG MANUFACTURING COMPANIES TAKE ADVANTAGE OF COMPUTER VISION FOR VISUAL INSPECTION?

PROBLEM

One of India's leading potato chip producers had been discarding up to 7% of its finished product due to defective quality issues. Attempts to detect inferior potato batches through a manual inspection method proved labor-intensive and inefficient.

SOLUTION

The company implemented a computer vision-enabled camera system running Avathon Industrial AI platform to uniformly and efficiently analyze samples of potato chips before accepting the delivery lot.

OUTCOME

Industrial AI platform caught 15% more defects than manual methods—while dramatically reducing the time and labor costs for visual inspection at each site.

Who doesn't love the simple pleasure of snacking on potato chips? Estimates put the global market value of packaged potato chips at more than \$31B and growing steadily.

The journey from a potato farm to a consumer's pantry includes numerous steps, each essential to creating the perfect chip. One of the most critical steps involves examining the potato chips for quality defects. Potatoes used for chip production can have multiple types of defects, including undesirable color (greening or browning), external discoloration (ED), or internal discoloration (ID).

If a batch of potatoes is inflicted with any of these defects yet still goes through the full production process, it can mean the difference between selling thousands of units of potato chips at a profit or discarding the entire run at a considerable loss.

FIGURE 1: Chip Quality Defects



REACHING THE LIMITS OF MANUAL INSPECTION METHODS

Avathon's customer ranks as one of India's leading private-sector companies, with revenue approaching \$10B in 2020. Their branded packaged foods business includes several varieties of potato chips exported worldwide. They observed that a significant portion—up to 7%—of their finished potato chips were unsellable due to defects from the raw potatoes themselves. Worse, they were being rejected too late in the process, at the packaging step—after the entire lot had gone through all the time and resource-intensive slicing, segregating, blanching, frying, etc.

In an effort to reduce wastage, managers implemented a manual scanning process. When a facility received a potato lot, they would segregate a small sample, create a batch of chips with it, and then manually observe and report the percentage of total potato defects (TPOD) found, rejecting the entire lot if excessive defects were present. The problem with this manual process? It was too dependent on the subjective and fluctuating observation skills of human scanning teams working in multiple shifts across multiple sites. Human individuals perceive subtle discoloration cues quite differently from one another. They might be tired or disengaged, affecting their work performance, or they could just randomly miss quality cues altogether. The results of their manual inspection process were highly varied, hard to trust, and did not generate the desired quality improvement outcome. Consider that at just one of the company's sites, they might receive deliveries from 10 trucks per day, with two lots per truck—making critical decisions on lot quality 20 times/day. Investing so much business value in an inefficient and unreliable manual process was difficult to justify.

LEVERAGING COMPUTER VISION TO DETECT POTATO CHIP DEFECTS MORE RELIABLY

The company wanted to create an automated solution that could remove the unpredictability of scanning results, save production and labor resources, and help them catch more defective potatoes before they made it to the production line. They implemented our advanced computer vision-enabled scanning solution, Avathon Industrial AI platform, to streamline their visual scanning process and reduce wastage in their potato chip manufacturing sites.

As before, sample chips were segregated before accepting a delivery lot, with roughly 300 chip samples reserved for quality control inspection. But after the representative samples were washed, sliced, fried, and dried, the sample chips were scanned through a conveyor machine integrated with CCTV cameras running Industrial AI platform. (See Figure 2)

As the potato chips passed through the camera scanner, Industrial AI platform accurately detected the overall TPOD percentage of the batch based upon specific parameters set by the customer:

- **Undesired color (browning):** Edge Touched/Untouched - 17.5MM and above
- **Internal discoloration:** Inside the periphery - 4.75MM to 17.5MM
- **External discoloration:** Touching the edge - 4.75 MM to 17.5 MM
- **Greening:** Any amount

Industrial AI platform’s dashboard provided an overview of correct chips percentage vs. TPOD per batch or lot. It allowed operators to drill down to evaluate specific chip defects or get the big picture with analytical tools tracking defect trends over a selected time range. Any discrepancies between what Industrial AI platform flags as inferior and what the human operators observed could be commented per image result inside the product’s dashboard—an easy and efficient way to log notes about each defect or false positive, track all historical data, and share evidence of issues with the potato vendors.

REALIZING SIGNIFICANT QUALITY CONTROL GAINS WITH AVATHON INDUSTRIAL AI PLATFORM

Based on the automated scanning results of batch sample runs through the Avathon Industrial AI platform system, our customer can now accurately and confidently assess the TPOD of a given lot before making the highly consequential decision of accepting or rejecting it. (See Figure 3)

Industrial AI platform proved better than 90% effective at identifying undesirable potatoes before they entered the customer’s potato chip processing line. They have experienced a 15% improvement in the number of defects caught by visual inspection, with consistent result sets that do not fluctuate based on the variability of testers and shifts.

Using Avathon Industrial AI platform for AI-powered visual inspection in manufacturing, one of India’s most popular potato chip brands has vastly improved quality control across their sites, achieving standardized and objective defect identification across dozens of processing lines with fewer workers per shift while building a valuable database of results to apply toward quality and profitability enhancements going forward.

ABOUT AVATHON

Avathon, a leader in Industrial AI, extends the life of critical infrastructure while advancing the journey toward full autonomy. Avathon’s Industrial AI platform empowers commercial and government customers with scalable, secure, and value-driven solutions that enhance efficiency and resilience across heavy industry.

To learn more about how Avathon’s AI solutions can unlock the power in your data, visit www.avathon.com.

FIGURE 2: Chip Scans on Industrial AI platform



FIGURE 3: Scan Results on Industrial AI platform

