

What AI Changes in Optical Sorting in 2026

A practical buyer's guide for almond, macadamia, seed, coffee and recycling processors

Optical sorting is changing — but not in the way most suppliers will tell you. The machine categories are roughly the same. The sensor types are familiar. What is different is what the software can now do with that sensor data, how defect recognition has evolved, and how that changes the commercial case for processors evaluating new equipment.

This guide cuts through the AI marketing to give you a practical framework for evaluating optical sorters for almonds, macadamias, seeds, coffee and recycling applications.

The buying question has changed

The old question was simple: 'Can the machine see the defect?'

That is no longer enough. The better questions are:

- Can it distinguish the defect from natural product variation?
- Can it protect good product from being rejected?
- Can it maintain performance when product changes between seasons or suppliers?
- Can operators manage recipes without creating instability?
- Can the supplier prove performance on your actual product?

What AI actually changes — and what it does not

Modern AI-supported optical sorting delivers five practical improvements over conventional threshold sorting:

- Better recognition of subtle defects that cannot be described by a single colour or size rule
- Smarter use of multispectral, NIR, infrared and X-ray sensor data
- Faster recipe changeover when raw material changes
- Better protection of good product — reducing the false reject problem
- Improved monitoring of machine health and uptime

What AI does not change

AI does not remove the need for correct machine selection. It does not guarantee every defect can be detected. It does not replace product testing, sample validation or operator training. And it does not make a colour sorter the right solution for every sorting problem. The commercial value of AI comes only when it is matched with the right sensor, product presentation, recipe workflow and support model.

Not all AI claims are equal

'AI' now appears in almost every optical sorting brochure. In practice, it can mean very different things:

At the lighter end: software assistance, image enhancement, automatic parameter suggestions or recipe shortcuts layered on top of conventional colour and shape sorting.

At the advanced end: trained deep learning models that classify product and defect patterns from thousands of real examples — essential where defects are subtle, variable or visually similar to good product.

When a supplier claims AI capability, ask:

- Is it recognising product and defect patterns, or just applying automated thresholds?
- What sensor data does it use — RGB only, or multispectral, NIR, infrared or X-ray?
- How relevant is the model library to your commodity?
- Can it be adapted to your product after commissioning?
- Does it reduce false rejects, or simply increase overall rejection?
- What support is required to keep the recipe performing after handover?

Meyer's current platform range — including the KI, KM/KMS, Thinker M, XR and CG.A Series — references AI plus multispectral detection, UHD deep learning, preset AI model libraries and one-key adjustment after raw material changes. These capabilities are worth validating against your specific application, but they give you a more specific basis for evaluation than a generic 'AI sorter' claim.

Important note on machine selection

Final machine selection should always be confirmed against product samples, defect presentation and Meyer's current technical configuration. Capabilities vary by platform and model version. Allegiant will confirm the right pathway for your specific application before any commercial commitment.

Match the sensor to the defect

The most common buying mistake is evaluating sorters by brand or AI label before defining the defect. Different defects require different sensing pathways. The table below is the starting point for any machine selection conversation.

Defect type	Best sensing pathway	Belt / chute	X-ray	Example application
Visible colour / surface	RGB / multispectral	✓	—	Almonds, coffee, seed
Subtle surface / texture	UHD deep learning + AI	✓	—	Seed germination, mould
Same-colour contamination	Multispectral + AI	✓	—	Shell in kernel, plastic
Internal / density defect	X-ray (XR)	—	✓	Macadamias, nuts
Moisture / spectral defect	NIR / infrared	✓	Possible	Toxic grain, impurities
Foreign material (external)	Multispectral + AI	✓	—	Cobble, plastic, husk
Foreign material (internal)	X-ray (XR)	—	✓	Metal, glass, dense FM
Mixed / complex streams	AI + combined sensing	✓	Depends	Recycling, multi-variety

What this means by commodity

Almonds

Almond processors manage high product value alongside customer quality expectations that leave little tolerance for either defects in the accept stream or good kernel in the reject stream. The yield protection challenge is as important as the defect removal challenge.

Key sorting challenges include shell and kernel separation, same-colour contamination, heterochromia, foreign material and subtle surface defects. Where the primary risk is same-colour plastic or homochromatic foreign material, AI-supported multispectral detection becomes important because RGB colour sorting alone cannot reliably distinguish material that appears similar in colour.

Starting question for almonds

Is the main challenge visible colour, subtle surface defect, shell/kernel separation or same-colour foreign material? The answer determines whether a standard belt sorter, a multispectral AI platform, or X-ray inspection is the right pathway.

Macadamias

Macadamia processing is commercially sensitive because the value of good kernel is high. Excessive rejection quietly destroys margin — a yield problem that may not be visible until it is compared against actual throughput records.

External visible defects such as discolouration and foreign material are addressable by belt or chute optical sorting. Internal issues — empty kernels, wormhole damage, rot and mould — are not reliably detected by optical means alone and require X-ray inspection. Any macadamia operation with internal quality risk should evaluate X-ray capability before making a final machine selection.

Starting question for macadamias

Is the defect visible externally, or internal and density-related? This single answer determines whether optical or X-ray inspection is required — or whether a combined approach is needed.

Seeds

Seed processors often face a sorting challenge that conventional colour sorting handles poorly: defective and acceptable seed that look very similar. Early germination is a practical example — affected seed may still appear close in colour to acceptable seed, making simple threshold approaches unreliable.

This is where AI-supported recognition can add genuine value when validated against real product samples. Rather than applying fixed colour rules, a trained model can classify subtle surface cues, sprouting indicators and shape variation while allowing recoverable good seed to remain in the product stream. Performance depends on the specific seed type, defect presentation, lighting configuration and recipe validation — and should always be confirmed on your actual product before purchase.

Starting question for seeds

Are you removing a visible colour defect, a subtle surface defect, a germination cue, an internal defect or a foreign material risk? Each requires a different sensing and model approach.

Coffee

Coffee sorting spans multiple processing stages and quality objectives. Depending on the application, the goal may be premium grade improvement, defect removal, foreign material reduction or consistency across variable incoming product — and each objective affects the machine selection and commercial case differently.

RGB colour sorting addresses visible defects such as discoloured, broken or damaged beans. NIR configuration adds the ability to detect defects that are not reliably distinguished by visible colour alone. For operations where premium grade consistency is the commercial driver, the ability to sort accurately across variable incoming product is as important as peak detection performance.

Starting question for coffee

Is the goal premium grade improvement, defect removal, foreign material reduction or consistency across variable incoming product? The answer determines whether RGB sorting, NIR capability or a more advanced platform is commercially justified.

Also applicable to complex material streams

The same sorting principles apply to recycling and other mixed-material processing applications. Where streams are variable, contaminated or visually similar, AI-supported recognition can outperform simple threshold sorting — particularly for separating materials that share colour or texture characteristics.

Machine selection for recycling should be validated against recycling-specific equipment configurations and application data. Meyer's food and agricultural platform range provides the technology foundation, but application suitability for specific recycling streams should be confirmed directly with Allegiant before any machine selection is made.

Two operational factors buyers underestimate

Recipe management and product changeover

The ability to sort well on day one is only part of the picture. Processors dealing with different varieties, suppliers, harvest conditions and seasonal defect pressure need a system that can be adjusted when raw material changes — without requiring a specialist to rebuild recipes from scratch.

The direction across modern platforms is toward one-key adjustment after raw material changes, structured recipe libraries and automatic parameter matching. This does not remove the need for validation, but it significantly reduces the operator skill required to maintain consistent performance across a variable season.

Ask your supplier: How are recipes created? How are they changed between products? What happens if incoming product quality shifts mid-season? Can the system be managed by a standard operator, or does it require specialist involvement?

Machine monitoring and uptime

Uptime is not only about build quality. Modern connected sorting platforms provide monitoring of critical component parameters, maintenance alerts, abnormality warnings, operational load tracking and fault diagnosis. Remote support capability can reduce the response time when something goes wrong.

For high-value commodity processing, an unplanned sorter outage is a production and quality risk. The monitoring and support model behind the machine matters as much as the machine itself.

Pre-purchase evaluation checklist

Use this checklist before comparing machine prices. It takes 15 minutes and will prevent the most common optical sorting buying mistakes.

	Question	Why it matters
Define the defect		
1	Is the defect visible externally or internal?	Drives belt/chute vs X-ray selection
2	Is it colour, shape, texture or density?	Determines sensor pathway
3	Does it look similar to good product?	If yes, AI deep learning is likely essential
4	Is it seasonal or supplier-dependent?	Affects recipe management requirements
Challenge the AI claim		
5	Is it deep learning or automated thresholds?	Ask the supplier to be specific
6	What sensor data does it use?	RGB only vs multispectral / NIR / X-ray
7	Can the supplier show results on your product?	No sample test = no proof
8	Does it reduce false rejects or increase overall rejection?	Yield protection matters as much as defect removal
Validate sensing pathway		
9	Has the supplier matched sensor to defect type?	See sensing matrix on previous page
10	Can they test real product samples pre-purchase?	Non-negotiable for high-value commodities
Validate operating workflow		
11	How are recipes created, saved and changed?	One-key adjustment vs manual re-tuning
12	What operator skill level is required?	Assess dependency on expert staff
13	What happens when incoming product quality changes?	Seasonal variation is the real stress test
Validate service and support		
14	Who commissions, trains and supports post-install?	Local support matters more than machine brand
15	Are spare parts available in Australia?	Downtime risk assessment
16	What monitoring and fault alerts are available?	Proactive vs reactive maintenance

The Allegiant process

Allegiant supports Australian processors through an application-first evaluation process. We do not start by recommending a machine. We start by understanding the product, the defect challenge and the wider process.

In some cases, the best solution may be an optical sorter. In others, the issue may be better addressed upstream through product preparation, handling, cleaning, sizing, moisture control or process flow improvements. Our role is to help identify the right solution, not simply add equipment.

1. Application review

We define the commodity, defect challenge, throughput requirement, current process and commercial objective. This includes understanding where the issue is occurring and whether it is best solved at the sorting stage or earlier in the process.

2. Process assessment

Before recommending equipment, we consider the full production flow. This may include infeed quality, product presentation, cleaning, aspiration, sizing, moisture, contamination sources, reject handling and downstream requirements.

3. Machine pathway selection

Where optical sorting is the right fit, we select the most suitable Meyer platform for the application. This may include belt, chute, NIR, X-ray or compact AI platforms, depending on the product and defect profile.

Meyer platforms include KI Series, KM/KMS Series, Thinker M, XR Series and CG.A Series across relevant applications such as nuts, seeds, coffee, grains and other food processing streams.

4. Product testing and validation

Where required, product samples or on-site trials are used to validate defect detection, reject quality, false reject behaviour, product recovery and operator workflow before commercial commitment.

5. Commercial proposal

We provide a proposal based on the selected solution, expected application fit, support requirements, commissioning approach and commercial case. This includes consideration of yield, quality, labour, downtime and process reliability.

6. Commissioning and operator training

We support recipe setup, operator handover, cleaning routines, daily checks, reject stream review and escalation processes to ensure the system is correctly embedded into the operation.

7. Ongoing optimisation

Sorting performance is an operating discipline, not a one-time setup. As product conditions change across the season, recipes, process settings and operator routines may need review. Allegiant stays involved to support long-term performance.

Ready to understand where the real opportunity sits in your process?

Request an application review from Allegiant.

We will review your product, defect challenge and sensing pathway — and tell you honestly which machine approach makes commercial sense for your operation.

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