SES

VISUAL INTELLIGENCE FOR INDUSTRIAL SORTING

THE AI THAT KNOWS WHAT IT IS SEEING

A new benchmark in olive, fruit and vegetable sorting: 99.6% efficiency, open learning and training based on the customer's criteria.

99.6%	15+	0.1 mm	CUSTOMER
VALIDATED EFFICIENCY	OLIVE CATEGORIES	DETECTABLE DETAIL*	TRAINS AND SPECIALIZES

THE CENTRAL SES PROPOSITION

If the customer can demonstrate a visual criterion, label it and define its acceptance threshold, SES can incorporate it into the sorting system, validate it and apply it repeatedly at industrial speed.

01 EXECUTIVE SUMMARY

The advantage is not "having AI," but turning any customer-defined visual criterion into a repeatable industrial decision.

Agri-food sorting has entered a new stage. Multiscan, TOMRA, Bühler, UNITEC, Raytec Vision and other leading manufacturers already use advanced vision, machine learning or deep learning. The real debate is therefore not who uses artificial intelligence, but what each system can understand, how much autonomy it gives the customer, and how effectively it converts that understanding into stable sorting performance.

SES has developed a visual-intelligence platform that functionally reproduces the way an expert inspector works: it observes the complete fruit, combines shape, color, texture and context, recognizes deviations and applies a quality criterion. Unlike the human eye, it maintains the same standard throughout the working day, does not tire, and records every decision.

In its current olive configuration, SES sorts a taxonomy of 15 categories—including types, color states, fruit defects and foreign material—with validated efficiency of 99.6%. In internal benchmarks using complex criteria, the conventional solutions evaluated generally performed in the 60–70% range. The difference is not explained by one camera: it comes from the AI architecture, capture quality, open learning and the ability to specialize the model using customer samples.

Four conclusions

- All major manufacturers incorporate AI or advanced vision; SES does not base its advantage on denying that reality.
- SES stands out through broader visual understanding and the ability to handle a complex taxonomy expressed in the customer's own language.
- The platform can detect deviations without a separately trained class for every possible defect, then learn new categories from real samples.
- The customer retains the ability to evolve the system by adapting varieties, crop years, tolerances and categories without turning every change into a closed engineering project.

02 EVERYONE HAS AI. NOT EVERY AI UNDERSTANDS EQUALLY

The market has advanced; SES differentiates itself through depth of interpretation, adaptability and performance.

Traditional machine vision works well when the problem can be described through stable rules: a color range, size, shape or threshold. Artificial intelligence improves this capability by learning complex patterns. Yet two systems that both incorporate AI may deliver radically different results.

LEVEL	DECIDING QUESTION
1. What information does it see?	Fruit coverage, resolution, lighting, angles, stability and absence of blind spots.
2. What representation does it learn?	Whether it memorizes narrow classes or builds a representation of shape, color, texture and anomalies.
3. Who can change the criterion?	Whether each new category depends on the manufacturer or can be taught and validated by the customer.
4. How is it demonstrated?	Efficiency by class, false rejects, false acceptance, repeatability and plant results.

THE CORRECT POSITIONING OF SES

SES is not presented as the only company with artificial intelligence. It is presented as a platform whose AI reaches a higher level of visual understanding and adaptation to the customer's criterion. The objective is not merely to classify "good" and "bad," but to distinguish the exact categories that create value in a real plant.

03 AN AI THAT KNOWS WHAT IT IS SEEING

Functional equivalence with the expert human eye: understanding the whole rather than comparing isolated pixels.

An experienced inspector does not assess an olive only by asking whether one pixel exceeds an RGB value. The inspector views the entire fruit, recognizes its type, interprets texture, identifies a blemish, notices deformation and decides whether the defect is acceptable for a particular commercial category.

SES AI follows the same functional logic. It builds a unified representation of the product from multiple visual signals. It can therefore distinguish classes that overlap in color or geometry and preserve the criterion when the variety, crop year or product condition changes slightly.

Where it surpasses manual inspection

- Repeatability: applies the same criterion to every unit and on every shift.
- Speed: analyzes large volumes without a decline in attention.
- Detail: can detect imperfections down to approximately 0.1 mm in the validated optical configuration.
- Traceability: records results, percentages and categories by batch.
- Evolution: converts new customer samples into new sorting criteria.

“IT KNOWS WHAT IT IS SEEING”

The expression does not imply human consciousness. It means the model relates shape, color, texture, position and context to recognize the product type and the nature of a deviation, rather than reacting only to an isolated threshold.

04 TWO COMPLEMENTARY LEARNING ROUTES

SES can detect first and learn the name afterwards.

Route 1. Learning without specific training for every defect

SES begins with a previously developed base model, but it does not need a labeled class for every defect that may appear in the future. An open-detection layer compares the product with learned patterns of normality and recognizes visual deviations. This allows it to flag an anomaly even when no specific label yet exists to name it.

Route 2. Customer-led training and specialization

When the customer wants to convert an anomaly into a specific commercial decision, it provides real samples and defines the criterion: acceptable, minor, serious, premium, standard, mill or reject. SES uses this knowledge to create or adjust categories, validate behavior and deploy a new model version.

This architecture converts the customer’s quality expertise into a digital asset. Knowledge no longer exists solely in an operator’s mind or in closed manufacturer settings; it becomes part of a traceable, repeatable and evolvable system.

NOT “AN EMPTY AI WITHOUT A MODEL”

It means that every possible defect does not need to be anticipated and trained separately. The system can first recognize that something deviates from normal and later incorporate that deviation as a defined category.

05 15 OLIVE CATEGORIES. 99.6% EFFICIENCY

The proof of superiority is not a generic promise; it is the breadth of the taxonomy the system already classifies.

The validated configuration does not merely separate good product from defective product. One platform integrates 15 labels representing types, visual condition, industrial destination, defects and foreign material. The achieved sorting efficiency is 99.6%.[1]

DIMENSION	CONFIGURED LABELS	INDUSTRIAL VALUE
Type and destination	Elongated, Gordal, Blanquilla, Mill	Separation by commercial characteristics or process destination.
Color and condition	Green, Black, Red	Ripeness, appearance and visual category.
Fruit defects	Wire-marked, Wrinkled, Stained, Mutilated, Pitting, Surface defects	Quality, claims, reprocessing and rejection.
Foreign material	Foreign bodies, Stems	Cleanliness, process safety and final quality.

The breadth of this taxonomy demonstrates the real technological leap: SES can handle classes that share characteristics, are not mutually simple, and correspond to the plant's real vocabulary. The system does not force the customer to adapt its business to a closed list; it adapts the model to the customer's criterion.

06 SORTING IS DEFINED IN THE CUSTOMER'S LANGUAGE

The interface reflects real production categories, not an academic demonstration.

A BUSINESS RULE CONVERTED INTO AI

"Wire-marked," "mill," "mutilated" and "stem" are not generic laboratory categories. They are operational decisions with a direct effect on product quality, destination and value.

The same principle extends to pistachios, almonds, fruit and vegetables: each customer can define the categories that make sense for its product, buyer and market. The criterion must be visually observable, represented by suitable samples, and pass a validation protocol.

07 HOW SES ACHIEVES THIS PERFORMANCE

Superiority results from the combination of capture, understanding, decision and action—not from a single component.

1. Controlled product presentation

The mechanics are adapted to the product through rollers, belts, rotation or free fall. The objective is to separate each unit, reduce occlusion and ensure that the captured information corresponds to the correct fruit.

2. High-quality optical capture

High-resolution industrial RGB cameras, controlled lighting and multi-view coverage provide stable images. Microdefect detection depends on the relationship among resolution, field of view, speed and lighting.

3. Hybrid vision and AI engine

SES combines neural networks with classical vision. AI interprets complex patterns; classical algorithms provide rapid and traceable measurements of color, outline, size and morphology. The hybrid architecture avoids using one technique for every problem.

4. Real-time decision and separation

Each unit receives a category and an outlet. The decision is synchronized with solenoid valves or deflectors, while the interface records counters, kg/h, percentages, recipes and traceability.

08 TECHNOLOGICAL COMPARISON WITH THE MARKET

All competitors incorporate AI or advanced vision. SES differs in scope, autonomy and evidence for complex taxonomies.

The comparison is based on manufacturers' public documentation and SES internal validation. It does not compare an entire brand with one figure; it examines capabilities published for specific models and identifies the evidence available for olive sorting equivalent to SES.

DIMENSION	SES	MULTISCAN	TOMRA	BÜHLER	UNITEC	RAYTEC
AI / machine learning	Proprietary, hybrid, trainable AI.	Advanced vision and AI applications.	AI, multivariate classification and LUCAi deep learning.	Machine and deep learning in specific models.	Product-specific AI Vision systems.	Deep learning and self-learning in Opportunity.
360° / multi-view coverage	Yes, by configuration.	Yes, SpinSort and individual rollers.	Multi-angle / surround view in selected systems.	Model- and application-dependent.	High-definition vision by product.	Yes, roller belt and matrix cameras.
Published olive scope	15 categories; 99.6% validated.	Quality, color, size, shape; up to 25 outlets.	Color, size, shape and defects described generally.	No equivalent public olive taxonomy located.	No equivalent public olive taxonomy located.	Olive control published; no equivalent 15-class taxonomy.
Open anomaly detection	Yes.	No equivalent public olive evidence found.	No equivalent public olive evidence found.	AI700 learns labeled classes; introduced for oats.	Product AI models; no published olive equivalence.	Self-learning stated; image acquisition/training required.
Customer training	New categories, tolerances and varieties from customer samples.	Configurable parameters/outlets; same training autonomy not published.	Manufacturer-trained repositories; equivalent autonomy not published.	Application models; equivalent olive autonomy not published.	Team training and AI algorithms; equivalent autonomy not published.	Image-trainable; customer autonomy not publicly detailed.
Directly comparable public metric	99.6% for 15 classes.	Not published for same taxonomy/protocol.	Not published for same taxonomy/protocol.	Not published for same taxonomy/protocol.	Not published for same taxonomy/protocol.	Not published for same taxonomy/protocol.

"No evidence found" does not mean that a capability does not exist; it means that equivalent public evidence was not located.

09 WHAT THE COMPARISON REALLY DEMONSTRATES

The competition is strong; the SES advantage appears as the criterion becomes more complex.

WHY THE GAP OPENS

When the problem is simple—for example, sorting by color or size—many technologies perform well. When the problem requires simultaneous understanding of variety, ripeness, geometry, surface damage and foreign material, the AI architecture becomes decisive.

THE DIFFERENCE IS NOT HAVING AI. IT IS KNOWING WHAT IS BEING SEEN AND SORTING IT ACCORDING TO THE CUSTOMER'S REAL CRITERION.

10 99.6% VERSUS 60–70% ON COMPLEX CRITERIA

The leap appears when the system must distinguish many closely related categories and apply the plant's real criterion.

The 99.6% figure corresponds to the current SES configuration on the validated taxonomy. The 60–70% range represents performance observed in internal benchmarks when conventional systems were applied to comparable complex olive criteria. It should not be interpreted as a universal specification for every manufacturer, because results depend on the product, lighting, batch, number of classes and test protocol.

Efficiency is supported by three factors

- Sufficient fruit coverage: AI cannot classify a defect the optical system has not seen.
- Rich visual representation: the model combines several features instead of relying on one threshold.
- Learning with industrial criteria: classes are built from real examples and decisions validated by the customer.

11 THE CUSTOMER CAN TEACH SES WHAT TO CLASSIFY

The machine is not frozen on installation day; it evolves with the product, crop year and market.

Customer-led training is one of SES's strongest differentiators. It converts operational knowledge into an updated model without requiring complete reprogramming for every change.

1 CAPTURE	2 LABEL	3 TRAIN	4 VALIDATE	5 APPROVE	6 DEPLOY
Real samples	Customer criterion	Specialized model	Unseen samples	Quality and production	Traceable version

EVOLUTION	EXAMPLE
New tolerance	A blemish may be accepted as standard and rejected as premium. The customer supplies samples representing the real boundary.
New variety	Geometry and color change. SES incorporates examples of the new variety without losing existing categories.
Emerging defect	The system detects an unnamed deviation. The customer labels it and converts it into an operational class.
New buyer	Commercial specifications change. A recipe or version is created for the new contract.

ONE SENTENCE THAT SUMMARIZES THE PLATFORM

SES can detect first, learn the name afterwards, and convert that new knowledge into a stable industrial decision.

12 INDUSTRIAL IMPACT

More usable product, less dependency, and a quality criterion that remains within the company.

Reduced false rejects

More precise sorting prevents saleable product from being sent to a lower category or discarded. For high-value products, small improvements in false-reject rates generate a direct economic impact.

Consistency across shifts

The decision no longer depends on fatigue, individual experience or line pressure. The same standard is applied continuously and measurably.

Technological autonomy

Creating new classes and recipes reduces dependence on closed manufacturer changes. The customer retains its product expertise and can evolve the model with version control and validation.

Multi-product adaptation

The architecture can be specialized for olives, pistachios, almonds, hazelnuts, chestnuts, grapes, cherries, citrus, stone fruit, tomatoes and vegetables, provided the relevant criterion can be observed by the installed sensors and represented with samples.

Retrofit and integration

The vision and AI core can be integrated into new machines or used to modernize existing lines. The industrial interface supports recipes, counters, exports, traceability and protocols such as OPC-UA, MQTT and Modbus TCP.

HOW TO CALCULATE VALUE

Savings from fewer false rejects = tonnes processed × reduction in false rejects × average product value. The same logic can be applied to lower reprocessing, reduced labor and improvement in commercial category.

13 CREDIBLE AND REPRODUCIBLE PERFORMANCE

A powerful figure gains value when it is tied to an industrial acceptance protocol.

The 99.6% figure should be understood as the efficiency of the validated configuration for a defined taxonomy, product and set of conditions. For each new application, SES establishes an acceptance protocol that separates training from validation, uses representative samples and measures behavior by class.

Metrics accompanying each validation

- Overall efficiency and efficiency by category.
- False reject: good product sent to a lower category or discarded.
- False acceptance: defective product accepted as a higher category.
- Confusion matrix showing which classes overlap.
- Performance at nominal speed and over several shifts.
- Stability across variety, color, size, ripeness and crop year.

FUNDAMENTAL TECHNICAL CONDITION

SES can learn any visually definable criterion represented by samples. Internal or invisible defects may require additional sensors—NIR, multispectral, UV, X-ray, weight or density—in addition to the RGB camera.

14 CONCLUSION

SES does not merely classify: it understands, learns and applies the customer's criterion.

FROM MACHINE VISION THAT MEASURES TO ARTIFICIAL INTELLIGENCE THAT INTERPRETS AND LEARNS

Optical sorting is no longer a technology reserved for a few manufacturers. The market offers advanced cameras, 360° vision, spectral sensors and artificial-intelligence models. That is precisely why differentiation must be demonstrated through real capability rather than commercial labels.

SES demonstrates this capability in one of the most demanding applications: olive sorting across 15 configured categories with 99.6% efficiency. The system distinguishes types, color states, destinations, defects and foreign material within one architecture.

The advantage is completed by two learning routes. The first recognizes deviations even when no class has been trained for every possible defect. The second allows the customer to teach the system what it considers acceptable, premium, standard, serious or reject. The AI therefore evolves with the crop year, variety and market.

On an industrial line, this combination produces higher yield, fewer false rejects, consistency, autonomy and traceability. SES converts the visual expertise of a specialist into a system that operates continuously, measurably and at scale.

THE SES DIFFERENCE

It is not simply seeing more. It is knowing what is being seen, converting it into a quality decision, and learning when the customer's criterion changes.