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A Guide for Potato Farmers

Based on the National Robotarium Horizon Scanning Report

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Contents

Contents 1

Executive Summary 2

The National Robotarium 4

1. Introduction 5

   1.1. Considerations Before You Invest 5

2. Current Challenges 13

   2.1. What the Current Approach Relies On 13

   2.2. Why the Status Quo Is Under Pressure 14

   2.3. What This Means for Technology Assessment 14

3. What to Consider When Exploring New Technologies 15

   3.1. Technology Trends 15

   3.2. Product Profiles 19

   3.3. Solution Comparisons 25

   3.4. Summary 30

4. The Market Landscape 31

   4.1. Market Overview 31

   4.2. Market Structure & Trends 38

5. Appendices 44

   5.1. Appendix A – Company Directory 44

   5.2. Appendix B – Bibliography 47

   5.3. Appendix C – Glossary 48

Executive Summary

This horizon scanning study provides a structured, evidence-based assessment of potato grading systems available across the UK and wider European markets, with a focus on their suitability for UK farmers.

The work examines the operational challenges faced by growers and packers in potato grading, including throughput requirements, labour constraints, quality consistency, and compliance with market standards. It maps the current landscape of grading technologies, ranging from conventional mechanical sorters to advanced optical and AI-enabled systems. It identifies key commercial suppliers and emerging innovations across the UK and Europe.

The analysis draws on desk-based research, technology benchmarking, and expert input from the National Robotarium robotics and autonomous systems engineering and research team to evaluate system capabilities, maturity, and adoption potential within UK farming contexts.

Key findings and market insights are summarised below, with detailed supporting evidence provided in the sections that follow.

Industry Context & Pressures

- UK potato planted area declined ~20% from 144,000 ha (2019) to 115,000 ha (2023), while production value nearly doubled to £1.5 billion by 2024, producers must compete on quality, not volume.
- Post-Brexit labour shortages have reduced access to seasonal grading staff; some farms have already cut planted area in response.
- Retailer and export specifications have tightened significantly – grading decisions are now expected to be recorded, traceable, and auditable.
- Scotland's SPCS recorded 10,393 ha of classified seed potato area in 2024 (+6.3% year-on-year), making precision grading a formal compliance requirement for Scottish producers.
- Inaccurate grading – over-rejecting good product or passing defective tubers carries a measurably higher financial cost per tonne than historically, given lower volumes in the market.

Technology Landscape

- The most significant shift over the past decade has been from mechanical to optical and AI-assisted grading driven by labour shortages, improving imaging capability, and rising quality standards.
- 24 manufacturers identified across the UK and Europe. Netherlands (33%) and UK (17%) lead. Optical sizing/sorting and static grading systems are the largest technology categories.
- System scale drives power and space needs: retrofit optical modules (~1-5 kW, 1-3 m) through to fully integrated AI sorting lines (20-60+ kW, 15-40 m linear layout).
- Modern AI systems allow configurable defect thresholds per buyer (e.g. adjustable scab % tolerance), enabling one machine to serve multiple supply chains simultaneously.
- Connectivity and data capture are identified as a Must-Have by farmers: grade records, throughput stats, and quality outcomes are required for SPCS compliance, retailer audits, and farm management yet only partially confirmed across all reviewed suppliers.

Four Profiled Solutions – Key Findings

- All four suppliers (Tong Engineering, Haith Group, Flikweert Vision, Wevano/U-Vision) meet core Must-Have requirements: size sorting, defect detection, and gentle non-damaging handling.
- Dirty potato handling is the critical differentiator for Scottish conditions. Wevano's U-Vision is explicitly designed for unwashed potatoes; Flikweert uses an upstream Divider unit; Tong and Haith offer mechanical pre-treatment but optical accuracy under heavy soil loads needs farm-level verification.
- Flikweert Vision is the only AI-enabled system in the shortlist with a confirmed Scottish installation – Wellhill Farm, Moray (2025) reporting a significant increase in pre-sorting capacity and reduced labour.
- Wevano, represented in Scotland by Agropack Solutions (Lossiemouth), offers the closest geographic coverage to the Moray and Aberdeenshire seed-growing regions.

- No supplier publicly states verified accuracy figures – a significant gap. Suppliers should be asked to provide accuracy data before any procurement decision.
- Pricing was not publicly available from any supplier; direct quotations should be obtained before procurement.

Actions Required Before Procurement

- Request verified grading accuracy data (%) from each supplier, in conditions comparable to Scottish seed potato production.
- Confirm data export, logging, and farm management integration – scope and format from all suppliers.
- Confirm tuber counting availability and method.
- Obtain indicative capital costs and available finance or leasing options from all shortlisted suppliers.
- Verify retrofit compatibility with existing mechanical grading lines (particularly relevant for Flikweert Vision).
- Explore public funding routes: Innovate UK, Scottish Enterprise, HIE, and South of Scotland Enterprise all offer relevant support.

The National Robotarium

The National Robotarium is the UK's leading Centre for robotics and artificial intelligence at Heriot-Watt University's Edinburgh campus.

Officially opened in 2022, it brings together world-class research engineers, industry partners, and government stakeholders to develop and deploy robotics and AI solutions that address real-world challenges across a range of sectors, including healthcare, energy, and agri-food.

The National Robotarium is a Data-Driven Innovation hub, funded in partnership with The University of Edinburgh as part of the £1.5bn Edinburgh and South-East Scotland City Region Deal. The Deal is supported with £300m funding from the UK Government and £300m funding from the Scottish Government.

1. Introduction

This report outlines a comprehensive understanding of the potato grading technology market. The objective is not to prescribe a solution, but to build the evidence base that makes well-grounded future decisions possible, whether that involves procuring an off-the-shelf system, commissioning a bespoke development, forming a commercial partnership, or undertaking further feasibility work. Horizon scanning, in this context, refers to the systematic examination of the current state of a problem domain and the technologies, products, and actors operating within it. It is an inherently forward-looking exercise: while it captures what exists today, its value lies in helping stakeholders understand where the market is heading and where gaps, risks, or opportunities may emerge.

The analysis focussed specifically on potato grading solutions, ensuring all content remained relevant and actional for farmers. All analytical content is supported by primary desk research, supplemented by the National Robotarium's domain expertise. Sources are documented in Appendix B – Bibliography.

1.1. Considerations Before You Invest

Any grading system needs to work within the real conditions on farm, not ideal ones. These constraints will shape what technology is practical to adopt.

Key considerations include:

- Power supply
- Connectivity
- Seasonal operation
- Regulatory requirements
- Workforce
- Space limitations
- Functional needs

These factors should be considered early, as they influence system choice, performance, and overall fit. Figure 1 provides a simple overview of how these constraints interact within a typical grading setup

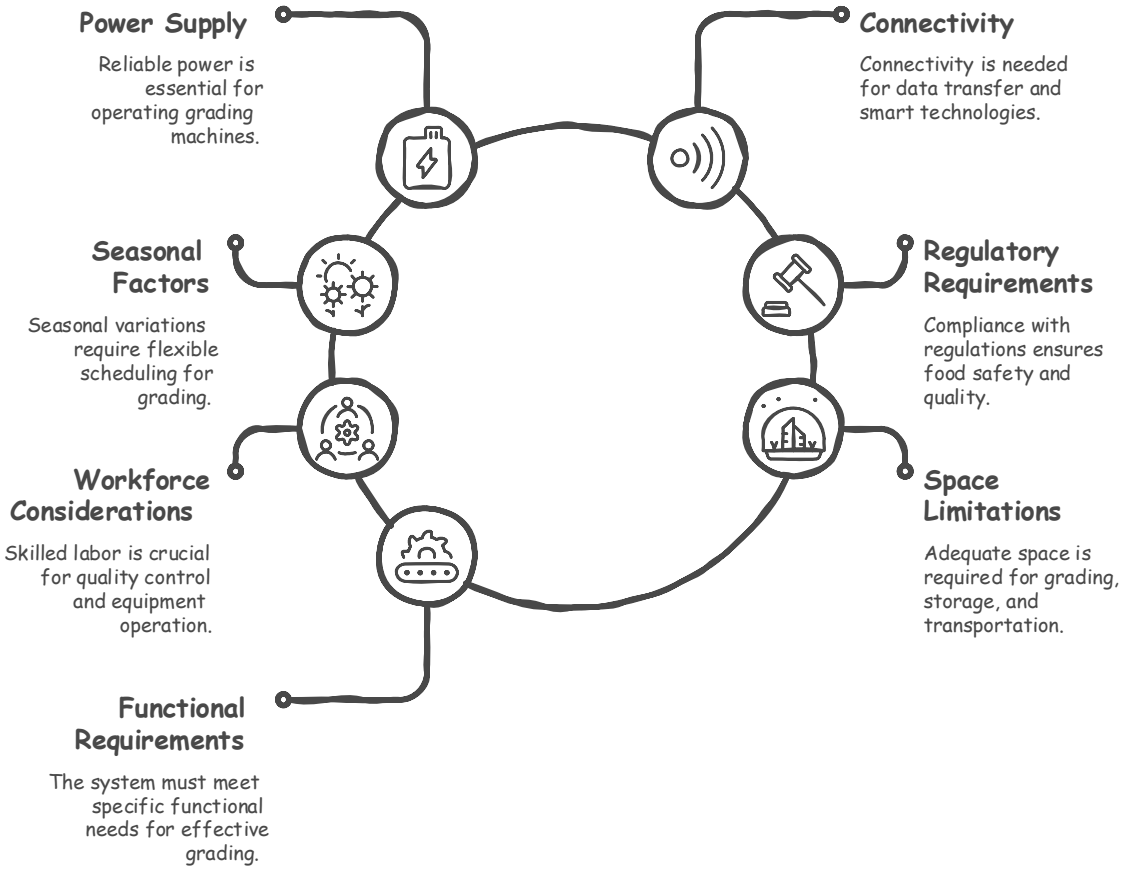


Figure 1: Potato grading Challenges

Power Supply

Across the potato grading systems identified which are listed in Appendix A – Company Directory, the power demand varies significantly depending on the level of automation and system integration. Entry-level or retrofit optical units, such as those offered by *Flikweert Vision*, typically add only a modest load of approximately 1-5 kW to existing lines. Standalone grading machines that combine mechanical sizing with optical sorting generally operate within a 5-15 kW range. In contrast, fully integrated grading, sorting, and packing lines from providers such as *Tong Engineering* and *Newtec* require substantially higher power, often between 20-60 kW or more depending on throughput. Advanced AI-based optical systems from *TOMRA Food* and *Ellips* further increase

demand due to high-performance imaging, processing hardware, and pneumatic rejection systems. As a result, most commercial-scale installations require a standard industrial 3-phase 400V AC at 50 Hz power supply.

Table 1 provides a summary of the power supply requirements based on observed system categories.

System Category	Example Providers	Typical Power Requirement	Key Drivers of Power Consumption
Retrofit Optical Units	Flikweert Vision	~1–5 kW	Additional cameras, lighting, minimal processing hardware
Standalone Graders (Mechanical + Optical)	Tong Engineering	~5–15 kW	Mechanical grading components, conveyors, basic optical modules
Full Integrated Grading + Packing Lines	Newtec	~20–60+ kW	Multiple processing stages, conveyors, packing systems, automation controls
High-Throughput AI Optical Sorters	TOMRA Food, Ellips	Typically, highest within system range	High-resolution cameras, GPU-based processing, compressed air ejection systems

Table 1: Power demand increases with system scale and automation level.

Minimum Connectivity Requirements

Connectivity requirements are primarily driven by the adoption of optical and AI-based grading technologies. Traditional mechanical grading systems operate with minimal connectivity, relying on standalone control systems. However, modern solutions such as those from Schouten Sorting, inSystem, and Insort GmbH require robust internal communication networks to link cameras, processing units, and control interfaces. At a minimum, a stable wired industrial Ethernet or PLC-based local network is necessary to ensure reliable real-time data transfer and machine control. While internet connectivity is not essential for operation, it is increasingly used for remote diagnostics, performance monitoring, and software updates, particularly in integrated systems supplied by companies such as Haith Group and Newtec.

Table 2 provides a summary of connectivity requirements based on identified technologies available in the market.

Connectivity Category	Example Providers	Minimum Requirement	Key Characteristics / Notes
Baseline Control Network	Schouten Sorting	PLC-based control system	Core machine control, sequencing, and automation logic
Internal Machine Communication	inSystem, Insort GmbH	Wired Industrial Ethernet (LAN)	Connects cameras, processing units, and HMI for real-time operation
AI / Hyperspectral Systems	inSystem	High internal data bandwidth	Handles large image datasets; relies on edge computing (on-machine processing), not cloud-dependent
Optional Remote Connectivity	Haith Group, Newtec	Internet (optional)	Enables remote diagnostics, maintenance support, and performance monitoring
Emerging Digital Features	Newtec	Cloud connectivity (optional)	Early-stage adoption for analytics and system optimisation

Table 2: Connectivity requirements based on identified technologies available in the market

Seasonal Factors Influencing Production Rate

During peak harvest periods, there is a strong emphasis on throughput, with systems such as mobile graders (e.g., Smart Grader (Gejo)) and high-capacity field sorters like the ones from TOMRA Food enabling rapid processing of large volumes, often exceeding 100 tonnes per hour. In contrast, during storage and off-season periods, the focus shifts toward quality assessment and defect detection, leveraging optical and AI-based solutions such as those from Flikweert Vision and Karevo. Additionally, seasonal variability in crop conditions such as soil contamination, moisture content, and size distribution directly impacts grading efficiency and system configuration. Technologies like the U-Vision grader from Wevano are specifically designed to handle dirty or unwashed potatoes, highlighting the need for adaptable systems.

Seasonal Phase / Factor	Example Providers	System Type Used	Operational Focus	Key Characteristics / Notes
Harvest Season (Peak Throughput)	Smart Grader (Gejo), Tong Engineering	Mobile graders, field-deployable systems	Speed > precision	High-volume processing, rapid deployment, supports on-farm grading
High-Throughput Processing	TOMRA Food	Field sorters / large packhouse systems	Maximum throughput	Capable of very high capacities (e.g. ~100 t/hr), continuous operation
Storage / Off-Season Processing	Flikweert Vision, Karevo	Optical and AI-based grading systems	Defect detection, grading accuracy	Lower throughput, higher emphasis on quality control and rejection accuracy
Crop Variability – Dirty Produce	Wevano	Optical grading for unwashed crops	Robustness to field conditions	Designed to handle soil contamination and variable crop conditions
Crop Variability – Grading Complexity	Newtec	Advanced optical grading systems	Multi-grade classification	Supports high granularity sorting (up to 16 grading categories)

Table 3: System use shifts from high throughput at harvest to quality-focused grading off-season.

Key Regulatory Requirements

All equipment must meet *UKCA (or CE)* marking requirements and conform to the *Supply of Machinery (Safety) Regulations*, ensuring safe design and operation. Additionally, systems must adhere to the *Provision and Use of Work Equipment Regulations (PUWER 1998)* (Legislation.gov.uk, n.d.), which mandate safe use, maintenance, and operator training. Hygienic design is particularly important for food-contact machinery, with stainless steel construction and cleanability features such as those seen in systems from ENE Group, which supports compliance with food safety standards. For systems incorporating automated grading decisions and rejection mechanisms, traceability and auditability are also critical, particularly in regulated supply chains such as seed potato production.

Regulatory Category	Relevant Standards / Bodies	Applicability to Systems	Key Requirements / Notes
Machinery Safety Compliance	UKCA / CE Marking	All grading systems	Equipment must meet safety design and manufacturing standards before deployment
Machinery Safety Regulations	Supply of Machinery (Safety) Regulations	All automated systems	Ensures safe design, guarding, and risk mitigation
Workplace Equipment Safety	PUWER 1998	Operators and employers	Safe use, regular maintenance, and operator training required
Food Hygiene & Design	Food safety standards (e.g. hygienic design principles)	Food-contact systems	Requires cleanability, corrosion resistance, hygienic materials
Hygienic Construction Example	ENE Group	Stainless steel grading systems	Supports washdown, contamination prevention, and compliance with hygiene standards
Traceability & Auditability	Seed potato schemes / supply chain standards	Optical and automated grading systems	Required for systems with automated rejection and grading decisions

Table 4: Outline of relevant safety, hygiene, and compliance standards.

Workforce Considerations

Labour shortage is a key driver behind interest in grading technology, particularly where manual sorting is difficult to resource.

Adopting new systems can reduce reliance on manual labour but does not remove the need for people. Instead, fewer staff are needed on the grading line, with more focus on running and monitoring equipment.

This leads to a shift in roles, with opportunities to upskill existing staff and move away from repetitive manual tasks. For many farms, this results in a smaller, more consistent team, with less dependence on seasonal labour.

Workforce Aspect	Example Providers	Impact of Automation	Key Characteristics / Notes
Traditional Labour Dependency	Mechanical grading systems	High manual involvement	Manual sorting, inspection, and handling required
Reduced Manual Sorting	Optical/AI systems	Reduced labour demand	Automation replaces repetitive sorting tasks
Skilled Operator Requirement	All modern systems	Increased technical skill demand	Operators required for HMI control, monitoring, and troubleshooting
Workforce Augmentation (Retrofit Systems)	Flikweert Vision	Supports existing workforce	Enhances productivity without full workforce replacement
Integrated Line Operations	Gillenkirch	Shift to supervisory roles	Focus on quality control, system oversight, and process optimisation
Training Requirements	All automated systems	Increased training needs	Skills in automation, electrical systems, and diagnostics required

Table 5: Summary of workforce roles, skills, and impacts of automation.

Space Limitations / Minimum Requirements

Space requirements vary widely depending on system configuration and level of integration. Compact retrofit solutions, such as optical modules from Flikweert Vision and Insort GmbH, can be incorporated into existing processing lines with minimal additional footprint, typically requiring only 1-3 metres of line space. Mobile grading systems, including those from Smart Grader (Gejo) and Tong Engineering, offer flexible deployment and are suitable for on-farm use where permanent infrastructure is limited. In contrast, fully integrated grading, sorting, and packing lines such as those provided by Haith Group and Newtec require substantial space, often spanning 15-40 metres or more in a linear configuration. These systems also necessitate additional space for material handling, maintenance access, and buffer storage.

System Category	Example Providers	Typical Space Requirement	Key Characteristics / Notes
Retrofit Optical Modules	Flikweert Vision, Insort GmbH	~1–3 m additional line space	Integrated into existing lines with minimal footprint

System Category	Example Providers	Typical Space Requirement	Key Characteristics / Notes
Mobile Grading Systems	Smart Grader (Gejo), Tong Engineering	Compact / trailer-based	Suitable for on-farm deployment, flexible and relocatable
Integrated Grading Lines	Haith Group, Newtec	~15–40+ m linear layout	Includes grading, sorting, and packing stages
Supporting Infrastructure	All large systems	Additional operational space required	Includes buffer zones, maintenance access, and material handling areas

Table 6: Comparison of space needs for different system configurations.

Minimum Functional Requirements

A baseline automated potato grading system must, at a minimum, provide reliable size grading, consistent throughput handling, and gentle potato handling to minimise damage. Most systems support multiple output grades, typically ranging from three to five categories. Modern industry expectations, however, increasingly include optical sorting capabilities to assess parameters such as colour, shape, and surface defects, as seen in solutions from Schouten Sorting and Ellips. Advanced systems extend these capabilities further through the use of AI and hyperspectral imaging technologies, such as those developed by inSystem and Insort GmbH. High-end systems can achieve fine-grained classification with up to 16 grading categories, as demonstrated by Newtec. As such, a minimum viable modern system must not only perform basic grading but also offer scalability toward advanced quality assessment and data-driven decision-making.

Functional Category	Example Providers	Minimum Requirement	Key Characteristics / Notes
Core Grading Capability	All systems	Size grading	Fundamental requirement across all systems
Throughput Handling	All systems	Continuous flow processing	Ensures operational efficiency and scalability
Gentle Handling	All systems	Damage minimisation	Critical for maintaining potato quality

Functional Category	Example Providers	Minimum Requirement	Key Characteristics / Notes
Multi-Grade Output	Most systems	3-5 grading categories	Standard capability in modern systems
Optical Sorting (Modern Standard)	Schouten Sorting, Ellips	Colour, shape, defect detection	Increasingly expected baseline in competitive systems
Advanced AI / Imaging	inSystem, Insort GmbH	AI-based classification	Enables deeper quality analysis and defect detection
High-Resolution Grading	Newtec	Up to 16 grading categories	Supports fine-grained sorting and market segmentation
Scalability & Data Capability	Advanced systems	Upgrade path to data-driven grading	Enables future integration with analytics and automation systems

Table 7: Overview of core and advanced grading capabilities required in modern systems.

2. Current Challenges

Potato grading is becoming harder to manage using traditional methods. Growers are facing labour shortages, changing retailer and export requirements, and rising costs, making it more difficult to consistently meet specification and maintain crop value.

At the same time, input costs, sustainability pressures, and variable weather conditions are adding further strain on operations. Together, these challenges are making manual and labour-intensive grading approaches less reliable and harder to scale, particularly during peak periods.

This report explores the current technology and market landscape for potato grading, helping growers understand the options available and make more informed decisions in response to these challenges.

2.1. What the Current Approach Relies On

Potato grading typically relies on mechanical sizing equipment supported by manual inspection, often at a picking table. Quality control depends heavily on experienced operators, who visually assess defects and ensure product meets specification.

However, this approach is labour-intensive and difficult to standardise, with consistency often affected when experienced staff are unavailable. It also

provides limited data or record-keeping, making it harder to track performance or demonstrate compliance over time.

2.2. Why the Status Quo Is Under Pressure

Three converging pressures are making the current approach progressively harder to sustain at the level of quality and consistency the market now requires.

- **Labour Shortages**

Post-Brexit has had an ongoing impact on labour, with reduced access to seasonal workers limiting the number of experienced grading staff available (The Scottish Farmer, 2025) . Several farms in the sector have already reduced planted area, in part because they cannot reliably resource post-harvest operations at current staffing level (Farmers Weekly , 2025) (The Scottish Farmer, 2025)

2.3. Tighter Retailer and Export Requirements

Retailer requirements for sizing precision, defect-free presentation, and traceability documentation have tightened over the past decade and show no sign of reversing. Export markets are also demanding stricter certification, increasing the need for accurate grading and clear documentation. As a result, grading decisions are now expected to be recorded and auditable.

- **Cost and yield protection**

Inaccurate grading – whether its over-rejects of good product or passes of defective tubers has a direct financial consequence. In a market where domestic planted area has declined by more than 14% since 2021 and producers must compete on quality rather than volume; the cost of grading error is higher per tonne than it has historically been. The workshop participants highlighted that grading technology is not just about efficiency but about ensuring crop value isn't lost during grading.

2.4. What This Means for Technology Assessment

The practical implication of these pressures is that the threshold for what counts as an adequate grading solution has shifted. A system that replaces manual labour on volume alone maintaining current throughput at lower

staffing cost would meet only part of the need. The full case for technology adoption in this context rests on a combination of:

- Accuracy and consistency that meets or exceeds what experienced manual inspection achieves, with the ability to tune thresholds to different buyer specifications
- Auditability – the ability to record grading decisions and produce data that can be used for compliance documentation, buyer reporting, and internal quality analysis
- Reliability through the harvest window where uptime is critical and the consequences of machine failure during a short operational window are severe
- Accessibility for farm-scale operators in terms of capital cost, footprint, ease of operation, and the availability of local service and support. (UK Agritech Centre, 2024)

3. What to Consider When Exploring New Technologies

This section provides a focused assessment of technologies and products relevant to potato grading, building on the broader market context. It examines current solutions, technology trends, and key comparisons to support both strategic insight and practical decision-making for farmers.

3.1. Technology Trends

This subsection examines the direction of grading and sorting technology, identifying developments that are expanding what is technically possible and commercially accessible for farm-scale operators. It provides the lens through which the products in the following subsections should be read.

This subsection will cover:

- The shift from mechanical to optical and AI-assisted grading systems, and what is driving it
- Improvements in camera resolution, processing speed, and defect detection accuracy
- The integration of machine learning into quality assessment and how this is changing system capability over time

- Trends in system size, footprint, and power requirements and what this means for on-farm deployment
- The move toward integrated single-unit systems versus modular component-based approaches
- Connectivity, data capture, and whether grading systems are beginning to feed into broader farm management platforms

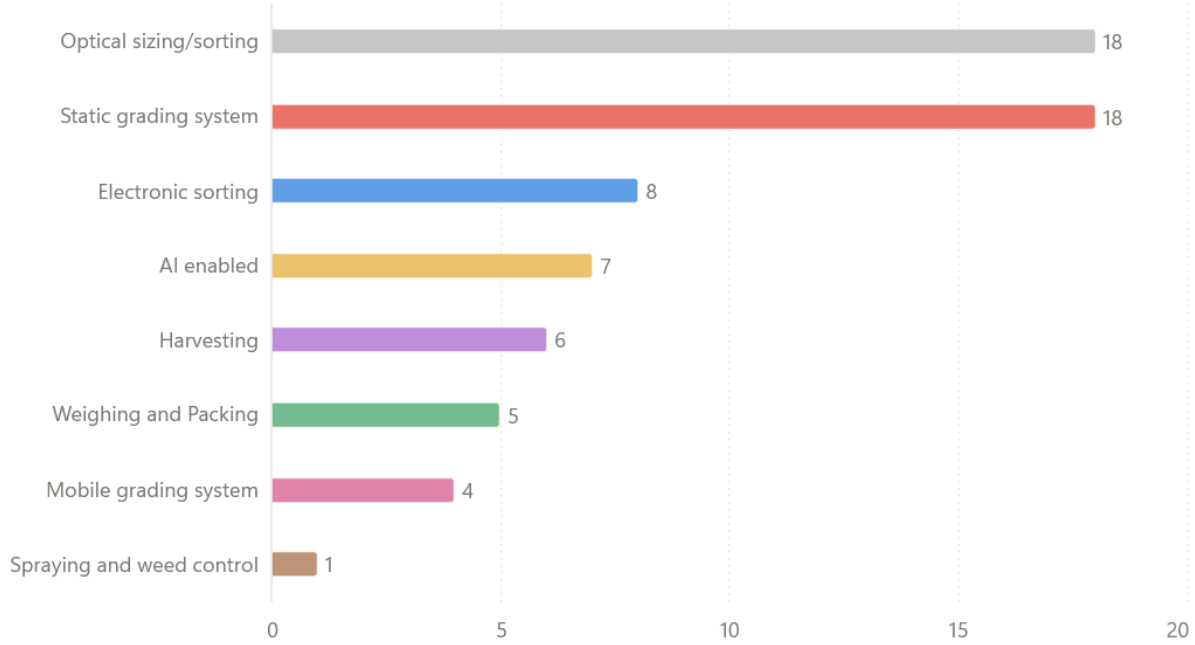


Figure 2: Number of manufacturers of potato grading systems for each technology type (numbers based on Appendix A – Company Directory).

From Mechanical to Optical and AI-Assisted Grading

The most significant shift in potato grading over the past decade has been from mechanical systems to optical and AI-assisted technologies. This transition is being driven by labour shortages, increasing quality requirements from retailers and export markets, and improvements in imaging and processing capabilities.

Optical systems now represent the growth segment of the market. These systems enable faster and more consistent detection of defects compared to manual inspection, improving grading accuracy and throughput. Advanced solutions can also integrate additional sensing technologies, although these are typically found in higher-end, large-scale operations.

For Scottish seed potato producers, this shift is particularly relevant, as the Seed Potato Classification Scheme (SPCS) requires accurate and documented grading. Optical systems can support this through improved consistency and record keeping. (The Seed Potato Classification Scheme , 2025)

Camera Resolution, Processing Speed, and Defect Detection

Camera and sensor technology has advanced rapidly. Multi-angle camera arrays used by systems such as the Wevano U-Vision and Flikweert QualityGrader now capture full surface views of each tuber as it passes through the machine, removing the blind spots inherent in single-camera setups. Processing speed has kept pace: modern systems can handle throughput rates relevant to commercial farm and packhouse scale, typically in the range of 10-25 tonnes per hour depending on configuration, without sacrificing detection accuracy.

Defect detection specificity has also improved. Rather than a binary pass/failure, current systems can be configured to detect and categorise multiple defect types independently such as scab severity, greening extent, mechanical damage depth, and shape deviation and apply different acceptance thresholds for each. This matters operationally because different buyers (retailers, processors, seed certifiers, export markets) have different tolerance levels for specific defect types, and a system that cannot be tuned to those thresholds will either over-reject at cost to the producer or under-reject at cost to the buyer.

Machine Learning Integration

Machine learning is increasingly embedded in commercial grading systems, though at different levels of maturity depending on the supplier and product tier. At the leading edge, AI models trained on large datasets of defect images can be updated over time as new defect patterns emerge, for example, new disease variants or novel varieties without requiring hardware changes. Some suppliers offer remote model updates as part of a service contract.

For farm-scale operators, the practical implication is that AI-enabled systems may continue to improve in accuracy after installation, and that calibration to local crop and soil conditions may be possible through a learning period rather than manual threshold adjustment alone. However, this also introduces

dependency on the supplier's update and support infrastructure, which is a relevant factor in assessing the viability of suppliers with limited UK presence.

System Size, Footprint, and On-Farm Deployment

A consistent theme in the workshop with potato farmers was that system size matters – smaller is better for on-farm deployment, particularly where storage space is constrained or where the grader must be positioned within an existing handling building. The market currently offers range of mobile and compact modular options alongside traditional fixed-line installations.

Mobile graders offered by Tong Engineering, Haith Group, and others provide flexibility for farms that need to move the machine between sites or store it seasonally. These typically sacrifice some throughput capacity and automation sophistication compared to fixed-line systems but offer a significantly lower capital cost and simpler integration. Retrofit modules, such as the Flikweert QualityGrader, represent a third approach: adding optical quality detection to an existing mechanical grading line without replacing the whole system, reducing both cost and disruption.

Integrated Systems versus Modular Approaches

The market currently offers two broad architectural approaches. Integrated single-unit systems combine size sorting, quality grading, and outlet management in one machine which is typically easier to operate and calibrate but less flexible if requirements change. Modular component-based approaches allow operators to combine a mechanical sizer, an optical quality module, and a packing or bagging system from the same or different suppliers which provides more flexibility but requiring more careful integration, commissioning, and maintenance.

Farmers specifically identified the desire to combine size sorting and quality grading into a single-pass operation rather than requiring two separate machines or passes. Both integrated and retrofit-modular solutions exist that can meet this requirement, and it is addressed in the comparative analysis in Solution Comparisons.

Connectivity and Data Capture

The most advanced systems are beginning to connect grading output data to broader farm management platforms, enabling traceability from field to pack and generating records that can be used for compliance documentation, yield analysis, and buyer reporting. At the time of the horizon scan, this capability is

most developed in high-end processing-line systems and is not universally available at farm and packhouse scale.

Connectivity and statistics capture are identified as a MUST have requirement from the farmer spoken to. The ability to pull grade records, throughput statistics, and quality outcomes over time is important for demonstrating SPCS compliance, supporting retailer audits, and informing agronomic decisions. The current availability of this feature across the shortlisted solutions is assessed in the comparative analysis.

3.2. Product Profiles

These four solutions below were selected from the wider product database on the basis of technology relevance to the use case, verified UK or Scottish market access, and the availability of sufficient information to support comparison. The four solutions are: Tong Engineering (UK), Haith Group (UK), Flikweert Vision (Netherlands, with UK agent), and Wevano / U-Vision (Netherlands, with Scottish agent).

Full profiles for all products identified during the horizon scan are provided in Appendix A – Company Directory. The profiles below focus on information directly relevant to the MoSCoW requirements established during the farmer workshop.

Each profile will cover:

- Manufacturer overview and technology origin
- Core product capability and intended use case
- Key technical specifications and performance characteristics
- Dirty potato handling capability and integration requirements (Static or Mobile system)
- Indicative cost, where available from public sources or direct inquire noted explicitly where not available
- Scottish or UK agent/company and route to market
- Assessed suitability and any notable limitations or improvements for the operational context defined in Section 3.

Profile 1 – Tong Engineering (Visar Sortop)

Tong Engineering | UK – East Yorkshire	
Core product	Mechanical and optical grading lines; Visar Sortop electronic/optical sorter; mobile grader range
Technology type	Mechanical size grading (roller/web) combined with optical colour and defect sorting (Visar Sortop).
Key capability	Size sorting by roller/web grade; optical defect detection including colour, shape, and surface quality; multi-outlet lanes for simultaneous size and quality separation
Dirty potato handling	Mechanical pre-cleaning and destoning equipment available in line; optical sorter accuracy may be affected by heavy soil load - pre-cleaning recommended upstream of optical unit
System type	Static line and mobile grader options; modular line configuration
Indicative cost	Not publicly stated. Direct enquiry required. Mobile graders typically more accessible for farm scale; full optical lines at higher investment level.
UK / Scotland access	Headquartered East Yorkshire; dealer and service network across UK. Direct sales model for larger systems.
Notable update	Integrating the Tomra FPS optical sorter meant inspection staff can now focus on grading for quality rather than debris removal. (Tong Engineering, n.d.)
Website	tongengineering.com

> *Tong Engineering is one of the longest-established UK potato machinery manufacturers and offers the strongest combination of local service, parts availability, and technology range for farm and packhouse operators in Scotland and the wider UK.*

Profile 2 – Haith Group (Vision Add-on / Mobile Grader)

Haith Group (Tickhill Engineering) | UK – Armthorpe, Doncaster, South Yorkshire	
Core product	Mobile and static grading lines; vision system add-on module; bespoke packhouse line design and build; Rota-Tip box handling systems
Technology type	Mechanical grading lines (roller, web, elevator) with optional vision inspection add-on. Specialisation in gentle handling and root crop processing.
Key capability	Grading, washing, destoning, weighing, and pre-pack systems. Vision module enables surface quality inspection. Bespoke line configuration to customer specification.
Dirty potato handling	Robust mechanical handling for dirty crop. Haith lines are commonly deployed in direct-from-field packhouse contexts. Optical vision accuracy affected by heavy soil – recommend upstream soil removal.
System type	Mobile grader for farm scale; static packhouse lines for larger operations; fully bespoke integrated lines
Indicative cost	Not publicly stated. Bespoke line pricing on application. Mobile graders available at lower entry point.
UK / Scotland access	HQ South Yorkshire. Direct UK sales and service team. European representative: SWP Machinery. Exports to Europe, Japan, Israel, Canada, USA.
Market penetration	Estimated 95% of UK supermarket potato suppliers use Haith equipment (Potato News Today, 2022). Two Queen's Awards for Enterprise (Innovation).
Website	haith.co.uk

> *Haith Group's exceptional penetration across the UK supermarket potato supply chain combined with local manufacturing and direct service makes it one of the most strategically relevant UK suppliers for any operator working within major retailer supply chains.*

Profile 3 – Flikweert Vision (Divider + QualityGrader)

Flikweert Vision | Netherlands (UK agent: CC Powell Ltd; Scottish use case: Wellhill Farm, Moray)	
Core product	QualityGrader – optical quality sorter; Divider – automated stone, clod, and debris separation unit
Technology type	Multi-camera optical inspection system for surface defect detection (scab, greening, damage, shape). Designed to retrofit into existing grading lines. AI-assisted defect classification.
Key capability	Surface quality grading including adjustable tolerance thresholds per defect type (e.g. % scab allowed); stone and foreign object removal; variety/foreign material differentiation. Can detect potato vs stone and potato vs non-potato material.
Dirty potato handling	Divider unit specifically designed to remove stones, soil, and non-potato material upstream of the QualityGrader. System has been deployed in Scottish field conditions (Fresh Plaza, 2025)
System type	Retrofit modular – integrates into existing mechanical grading lines. Compact footprint.
Indicative cost	Not publicly stated. Retrofit module pricing on application via CC Powell Ltd (UK) or direct from Flikweert.
UK / Scotland access	UK agent: CC Powell Ltd (UK-wide). Scottish case study: Wellhill Farm, Moray Coast – two units installed 2025, threefold increase in pre-sorting capacity, reduced labour. (Fresh Plaza, 2025)
Adjustable tolerance	Key differentiator: scab percentage threshold and other defect tolerances can be set per buyer specification, allowing the same machine to serve multiple supply chains.

Website	flikweertvision.nl

> *Flikweert Vision is the only AI-enabled optical sorter supplier in this shortlist with a documented, active Scottish installation (Wellhill Farm, 2025), giving it a directly relevant operational reference point for seed potato producers in Scotland considering similar technology adoption.*

Profile 4 – Wevano / U-Vision Grader

Wevano | Netherlands (Scottish agent: Agropack Solutions, Lossiemouth)	
Core product	U-Vision Grader – integrated optical sizing and quality grading system
Technology type	Multi-angle camera optical system combining size sorting and surface quality detection in a single integrated unit.
Key capability	Optical sizing and quality grading in one pass; up to 5 simultaneous grade categories; designed explicitly for dirty and unwashed potatoes; multi-angle camera coverage for full tuber surface assessment.
Dirty potato handling	Explicitly designed for dirty and unwashed potatoes – key differentiator relative to systems requiring clean product before optical assessment.
System type	Static integrated grading system. Single-unit combining size and quality functions.
Indicative cost	Not publicly stated. Contact Agropack Solutions (Scotland) or Wevano direct for indicative pricing.
UK / Scotland access	Scottish agent: Agropack Solutions, Lossiemouth, Moray – providing sales, installation, and after-sales support in Scotland and the wider UK.

Notable advantage	Scottish-based agent provides local support, installation, and maintenance without dependency on remote or European service – important for time-critical harvest windows.
Website	wevano.nl | agropacksolutions.com

> *Wevano's explicit design capability for dirty and unwashed potatoes combined with a Scotland-based agent in Lossiemouth makes it particularly relevant for seed potato producers on the Moray Coast and Aberdeenshire who cannot or prefer not to pre-wash crop before grading.*

3.3. Solution Comparisons

The table below draws together the individual profiles into a structured comparative assessment against the requirements identified during the MoSCoW workshop with potato farmers which are crucial to decision-making.

Requirements are grouped by MoSCoW priority: MUST (non-negotiable), SHOULD (important but not blocking), and COULD (desirable if achievable within cost). Assessments marked TBC require direct supplier enquiry. Pricing was not available from any of the four suppliers through public sources.

Key to Table

Yes	Confirmed capability	**Partial**	Partially meets requirement or conditional
TBC	To be confirmed (direct enquiry recommended)	**No**	Not available or not applicable

Requirements marked TBC indicate that the information was not publicly available at the time of writing and that a direct enquiry to the supplier is recommended before procurement decision. Pricing information was not available from any of the four suppliers through public sources and is not

included in the comparison; all four should be contacted for indicative quotations.

Capability gap analysis based on MoSCoW requirements

Requirement (MoSCoW)	Priority	Tong Engineering	Haith Group	Flikweert Vision	Wevano / U-Vision
Sort potatoes by size	**MUST**	**Yes** *Size grading standard on all platforms*	**Yes** *Standard feature*	**Yes** *QualityGrader includes size lanes*	**Yes** *Up to 5 grade categories*
Quality grading / defect detection	**MUST**	**Yes** *Visar Sortop optical sorter detects surface defects*	**Yes** *Vision add-on module; bespoke line options*	**Yes** *Core capability - scab, damage, greening*	**Yes** *Multi-angle camera; up to 5 grades*
Handles dirty / unwashed potatoes	**MUST**	**Partial** *Mechanical lines tolerate some soil; optical sensor accuracy reduced with heavy dirt*	**Partial** *Handling lines robust; optical accuracy affected by soil load*	**Yes** *Divider stone/soil removal unit upstream; designed for dirty crop*	**Yes** *Explicitly designed for dirty/unwashed potatoes*
Accuracy rating ≥90%	**MUST**	**TBC** *Not publicly stated; enquiry recommended*	**TBC** *Not publicly stated; enquiry recommended*	**TBC** *Not publicly stated; enquiry recommended*	**TBC** *Not publicly stated; enquiry recommended*
Does not damage potatoes	**MUST**	**Yes** *Gentle elevator and roller systems*	**Yes** *Gentle handling explicitly cited as design priority*	**Yes** *Soft-fall reject system*	**Yes** *Optical non-contact assessment; gentle conveyance*

Requirement (MoSCoW)	Priority	Tong Engineering	Haith Group	Flikweert Vision	Wevano / U-Vision
Easy to operate / good UI	**MUST**	**Yes** *Touch-screen interface; 90+ yrs operator-focused design*	**Yes** *Well-established operator interface; UK training support*	**Yes** *Clean touchscreen HMI; simple tolerance adjustment*	**Yes** *User-friendly interface; adjustable grade settings*
Size sorting to separate bags/bins	**MUST**	**Yes** *Multi-outlet size lanes standard*	**Yes** *Configurable multi-outlet lanes*	**Yes** *Separate outlets per grade*	**Yes** *Up to 5 simultaneous grade/size outputs*
Statistics & records over time	**MUST**	**Partial** *Data export available; farm management integration not confirmed*	**Partial** *Grade data logging; full platform integration TBC*	**TBC** *Grade and throughput reporting; cloud connectivity TBC*	**TBC** *Grade data capture; long-term reporting capability TBC*
Service / maintenance support (UK)	**MUST**	**Yes** *Headquartered East Yorkshire; UK dealer network*	**Yes** *HQ South Yorkshire; direct UK service team*	**Yes** *CC Powell Ltd agent UK-wide; Agropack Solutions Scotland*	**Yes** *Agropack Solutions, Lossiemouth - Scottish agent*
Tuber counting	**MUST**	**TBC** *Not confirmed; enquiry required*	**TBC** *Not confirmed; enquiry required*	**Partial** *Camera-based counting feasible; confirm with supplier*	**TBC** *Not confirmed; enquiry required*

Requirement (MoSCoW)	Priority	Tong Engineering	Haith Group	Flikweert Vision	Wevano / U-Vision
Size consideration – compact footprint	**SHOULD**	**Partial** *Mobile grader available; static line larger footprint*	**Partial** *Mobile system available; static line larger*	**Yes** *Retrofit module - minimal additional footprint*	**Partial** *Modular unit; footprint confirmation recommended*
Size sorting integrated into grading line	**SHOULD**	**Yes** *Integrated single-line system*	**Yes** *Fully integrated bespoke lines*	**Yes** *Retrofits into existing line*	**Yes** *Integrated optical sizing and quality line*
Self-cleaning machine	**COULD**	**TBC** *Not publicly stated; enquiry required*	**TBC** *Not publicly stated; enquiry required*	**TBC** *Not publicly stated; enquiry required*	**TBC** *Not publicly stated; enquiry required*
AI variety detection (pot vs stone)	**COULD**	**Partial** *Electronic sorting includes foreign object detection; variety ID limited*	**Partial** *Vision add-on can be configured; potato vs non-potato detection possible*	**Yes** *Camera system differentiates potato from stone, clod, debris*	**Partial** *Multi-angle camera; foreign object detection; variety AI TBC*
Adjustable tolerance levels (e.g. % scab)	**COULD**	**Partial** *Threshold settings available; granularity TBC*	**Yes** *Bespoke line configuration supports threshold adjustment*	**Yes** *Sliding scab tolerance a core feature – adjustable by buyer spec.*	**Yes** *Grade thresholds adjustable per customer specification*

Table 8: Capability gap analysis of shortlisted example potato grading solutions from database against MoSCoW workshop requirements. Assessments based on publicly available product information, supplier websites, and cited industry sources ((IntelMarket Research, 2025); FreshPlaza 2025; Farmers Weekly; Potato News Today 2022). TBC items require direct supplier enquiry. Indicative only – confirm all capabilities with supplier before procurement.

Several patterns emerge from the comparative analysis that are relevant to procurement decision-making:

- All four solutions meet the core MUST requirements for size sorting, quality grading, and non-damaging gentle handling. The differentiation between them lies in how well they handle dirty potatoes, how accessible they are for Scottish operators, and how transparently their accuracy and statistics capabilities can be confirmed.

- Dirty potato handling is the most significant differentiator for the Scottish seed potato context. Wevano explicitly designs for unwashed potatoes; Flikweert addresses the issue through the upstream Divider unit; Tong and Haith offer mechanical pre-treatment options, but optical accuracy should be verified for the specific soil conditions on each farm.

- Adjustable scab tolerance identified as a COULD requirement in the workshop but commercially important given the diversity of buyer specifications in the Scottish market which is most clearly documented for Flikweert Vision and Wevano. Both Tong and Haith likely support threshold configuration on their optical platforms, but this should be confirmed.

- Statistics and records capability is marked as Partial or TBC across all four suppliers. This is a notable gap relative to the MUST requirement from the workshop. All four suppliers should be specifically asked about their data export, logging, and farm management integration capabilities before decision-making.

- Scottish and UK market access is strong for all four. Tong and Haith are UK-manufactured with direct service teams. Flikweert operates via CC Powell (UK-wide) with an existing Scottish deployment at Wellhill Farm. Wevano operates via Agropack Solutions in Lossiemouth which is the closest geographically to the main Moray and Aberdeenshire seed growing regions.

- Accuracy ratings were not publicly available for any of the four solutions. This is a significant information gap for a requirement rated MUST. All four suppliers should be asked to provide accuracy data, ideally verified in a potato-grading context comparable to Scottish seed production conditions.

Summary

The technology landscape for potato grading is well-developed, with multiple commercially available solutions spanning a range of technology types, price points, and deployment models. The following observations summarise the key findings for carrying forward into recommendations:

- The overall maturity and accessibility of available technology relative to the use case
- Any gap in the current market that represents an unmet need
- Key uncertainties or outstanding information such as pricing not yet obtained etc.

Overall Maturity and Accessibility

Optical grading technology is mature and commercially accessible at farm and packhouse scale. The four profiled solutions all represent established products with documented installations, not experimental or prototype systems. The market bifurcates between UK-manufactured platforms (Tong, Haith) with strong local support and parts availability, and European specialist systems (Flikweert, Wevano) with Scottish-based agent coverage that reduces the service risk associated with overseas suppliers.

Gaps in the Current Market

Two areas represent genuine gaps or uncertainties in what the market currently offers at farm scale for Scottish seed potato producers:

Transparent accuracy data: no supplier publicly states verified accuracy figures for potato-specific grading applications. This is standard practice in the sector but means buyers must rely on supplier claims and reference site visits rather than independently verified performance data.

Statistics and data integration: while all four systems capture some grade data, the maturity of data export, historical reporting, and farm management platform integration varies and is not clearly documented for farm-scale deployments. This capability is increasingly expected by retailers and certifiers, and its absence or immaturity could become a procurement barrier.

Key Uncertainties and Outstanding Information

The following items should be addressed through direct supplier engagement before any procurement decision is made (this applies to not only the four suppliers compared for example above, but any supplier listed in Appendix A – Company Directory):

- Accuracy rating (%) for each system in potato-specific grading conditions
- Statistics, data logging, and reporting capability – confirm scope and format
- Self-cleaning capability – none confirmed; direct enquiry required for all
- Tuber counting – confirm availability and method (Flikweert Vision most likely candidate among the four compared)
- Indicative capital cost and available finance options – none publicly stated
- Installation timeline, commissioning support, and training provision for each supplier
- Compatibility with existing mechanical grading lines for retrofit approaches such as Flikweert Vision.

4. The Market Landscape

This section maps the commercial and technological environment relevant to the defined use case. It is intended to give the farmers a clear picture of who is operating in this space, what the overall market looks like, and how it is evolving. This section will provide the strategic context needed to interpret the more detailed product-level analysis in the technology landscape section.

4.1. Market Overview

The market for technologies addressing this use case sits within the broader agritech sector, which has experienced sustained growth in investment and commercial activity over recent years. While the market is still maturing in many respects, there is an evident shift from proof-of-concept deployments to commercial-scale adoption in several sub-sectors, driven by improvements in

hardware reliability, reductions in unit cost, and greater confidence among agricultural operators in the value of automation.

This subsection will investigate the potato growing sub-sector and the specific market segment in terms of the following.

- UK and Scotland market size
- Geographic spread
- Investment Trends

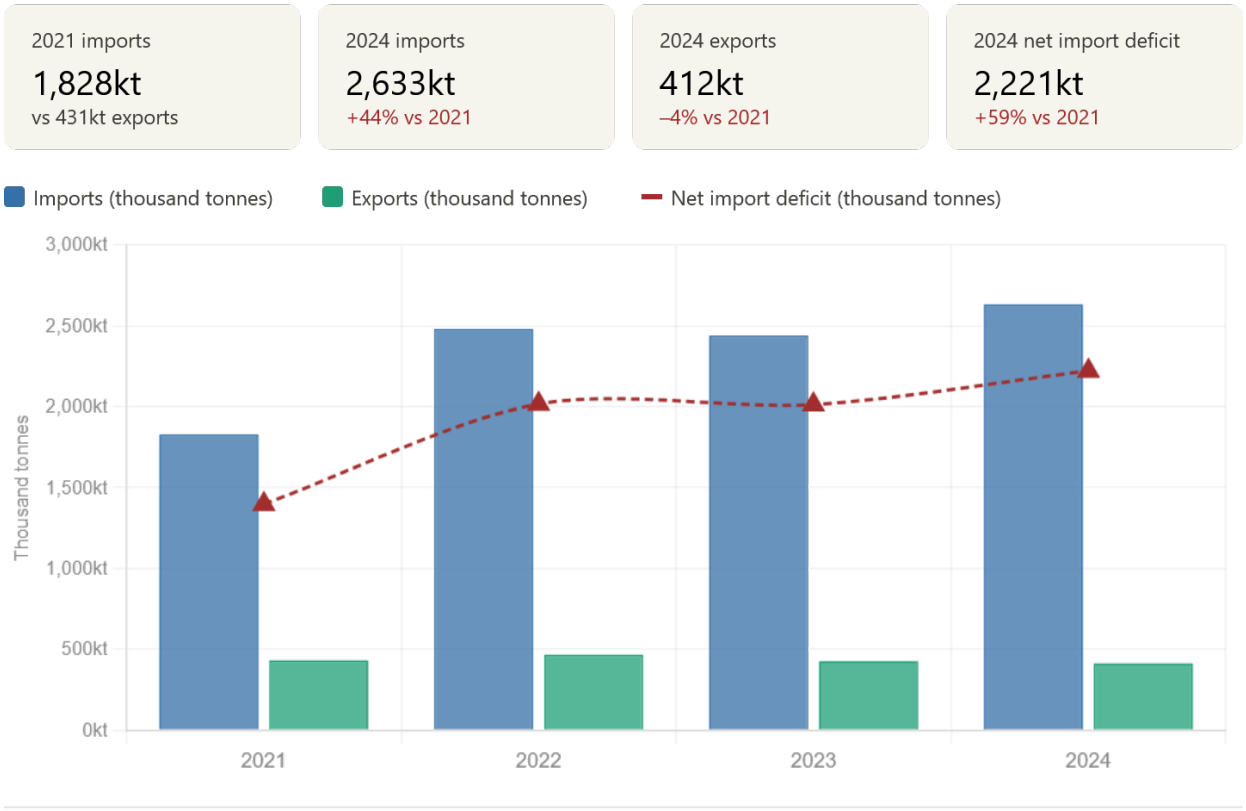
UK and Scotland Market Size

The potato grading market sits inside the wider agritech and post-harvest automation space, where growers and packhouses are increasingly investing in technologies that reduce labour dependency, improve consistency, and help meet retailer and export specifications. In the UK, potato production remains strategically important because potatoes are a core staple crop and a large share of supply is domestic rather than fully imported, although the market continues to face pressure from land-use shifts, cost inflation, and variable demand. (UK Agritech Centre, 2024)

Figure 3: UK potato planted area and production value, 2018-2024; dual-axis chart showing planted area (thousand ha) and production value (£ million). Source: (Agriculture in the United Kingdom, 2018 - 2024)

Annual output data from 2018 to 2024 underlines the structural pressure the sector faces. Planted area fell from a recent peak of 144,000 hectares in 2019 to 115,000 hectares in 2023 - a decline of approximately 20% over four years before a modest recovery to 118,000 hectares in 2024 (Agriculture in the United Kingdom, 2018 - 2024). This contraction in area has not translated into a fall in market value; production value rose from £652 million in 2018 to almost £1.5 billion in 2024, driven largely by sustained price increases rather than volume growth. Over the same period, import dependency has increased, with imports rising from approximately 31% of total supply in 2021 to around 36% by 2024, while exports have declined modestly from 431,000 to 412,000 tonnes (Department for Environment, 2018 - 2024). Domestic producers must therefore compete on quality, efficiency, and specification compliance rather

than volume alone making grading technology a value-protection investment rather than a discretionary upgrade.



Notes: Net import deficit = imports minus exports. Positive values indicate net import position in all years shown. 2022 and 2023 figures taken from the later-published DEFRA release (Agriculture in the United Kingdom 2024) where they differ from earlier editions.

Figure 4: UK potato imports rose by 44% between 2021 and 2024 while exports declined, widening the net import deficit and increasing competitive pressure on domestic producers. Source: (Agriculture in the United Kingdom, 2018 - 2024)

In Scotland, the opportunity is especially well defined. The Scottish Potato Classification Scheme (SPCS), administered by SASA, recorded 10,393 hectares of classified seed potato area in 2024, representing a year-on-year increase of 6.3%. Scotland's role as the primary seed potato producer in Great Britain means the emphasis is not merely on volume throughput, but on accurate sorting, inspection, and compliance with formal classification standards. This gives precision grading a commercial imperative that is more acute than in purely commodity-driven settings south of the border.

Geographic Spread

Europe is the dominant regional market for potato grading equipment globally, accounting for a disproportionate share of premium fully automatic systems. This reflects the region's highly developed agricultural sector, stringent food quality and safety standards, and the scale of potato processing for both domestic consumption and export. Key countries include the Netherlands, Germany, Belgium and the UK as well as all major potato producing and processing nations.

Within the UK, the geographic concentration of the grading market follows the structure of potato production itself. Scotland is particularly significant as the primary supplier of seed potatoes for Great Britain and a major export source. Seed potato production in Scotland is concentrated in areas such as Angus, Perthshire, Aberdeenshire, and the Moray Coast, where farms combine scale with high classification requirements. The ware potato and processing market is more geographically distributed across England, with notable centres in East Anglia, the East Midlands, and Yorkshire.

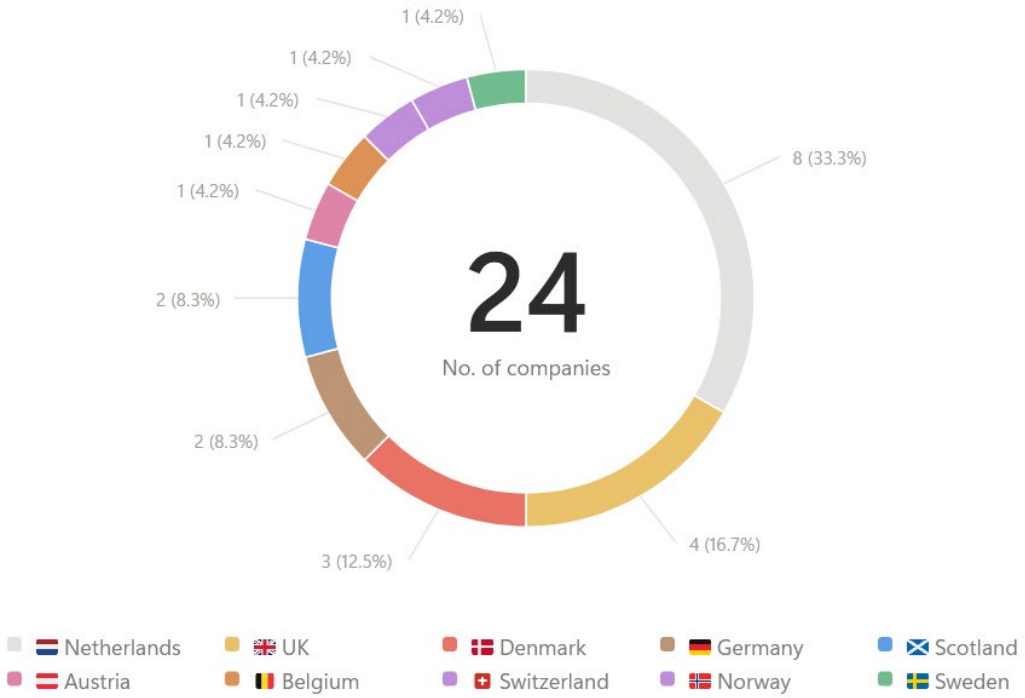


Figure 5: Number of manufacturers of potato grading solutions in the UK and from major European countries.

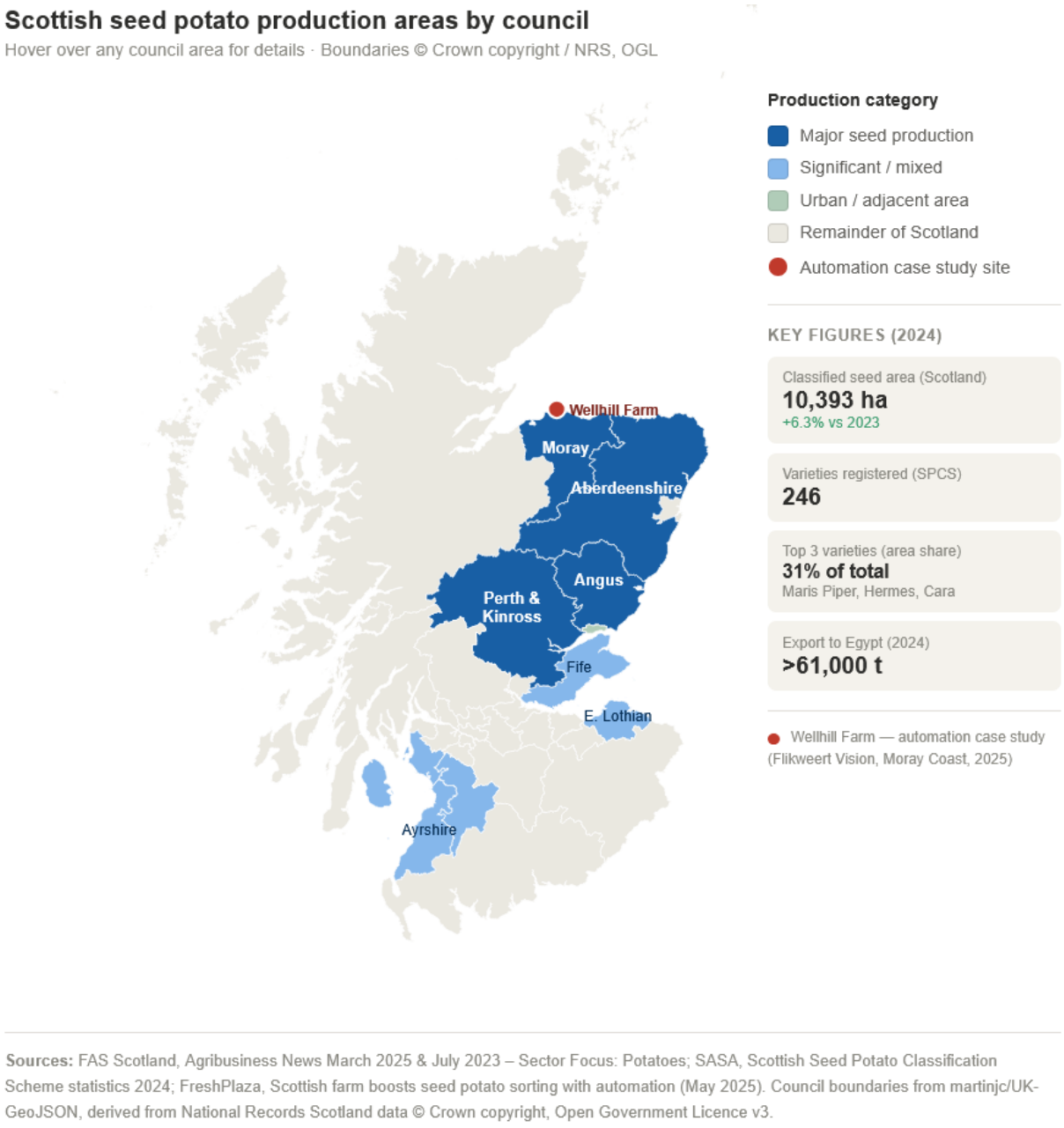


Figure 6: Scottish seed potato production is concentrated in defined growing regions, each subject to SPCS classification requirements that reinforce demand for accurate grading technology. (Farm Advisory Service, Scotland, 2025)

Interactive version of this map is available using this link

This geographic differentiation matters for the grading technology market. Scottish producers typically face higher accuracy and compliance thresholds than ware producers, making them an attractive customer

segment for more sophisticated optical and machine-vision systems. Export-oriented seed producers in particular have a strong incentive to invest in grading that meets or exceeds the standards of foreign buyers in markets such as Egypt, which received over 61,000 tonnes of Scottish seed potatoes in 2024. (Farm Advisory Service, Scotland, 2025). Variety-level data in Scotland is shown in Figure 3 below supports the case for flexible grading systems capable of handling a range of tuber sizes and shapes.

Variety	Total 2023 (ha)	Total 2024 (ha)	Area Difference (ha)
1.MARIS PIPER	931.40	1100.47	+169.07
2.HERMES	950.97	1080.79	+129.82
3.CARA	1115.84	1043.07	−72.77
4.DESIREE	390.86	406.20	+15.34
5.ATLANTIC	332.94	340.36	+7.41
6.LADY ROSETTA	242.13	327.15	+85.02
7.INNOVATOR	335.70	291.35	−44.35
8.ROYAL	311.99	262.50	−49.50
9.BROOKE	222.28	251.15	+28.87
10.ELLAND	136.27	213.90	+77.63

Figure 7: Top ten varieties by planted area in the Scottish SPCS administered by SASA, with Maris Piper, Hermes, and Cara representing 31% of total area. Note that these data are based on published final grades. Source: (Farm Advisory Service, Scotland, 2025)

Asia-Pacific is the fastest-growing regional market globally for grading equipment, though adoption is currently centred on semi-automatic systems due to fragmented farm structures and more favourable labour economics. This divergence reinforces the conclusion that the UK and Scottish market is positioned at the premium end of global demand, where throughput, accuracy, and serviceability command higher investment.

Public Funding and Support Landscape

For most growers, the challenge isn't knowing that new grading technology exists but it's knowing what's worth investing in and whether it will pay off.

There is growing support across Scotland and the UK to help with this. While funding is competitive, support is available to trial ideas, get independent advice, and part-fund early-stage work before committing to a full system.

Organisations such as Innovate UK, Scottish Enterprise, Highlands and Islands Enterprise and South of Scotland Enterprise provide funding and innovation support, often linking businesses with academic partners through Interface. Alongside this, sector bodies like SRUC, Agriculture and Horticulture Development Board (AHDB), and Scottish Agricultural Organisation Society offer technical insight, trials, and opportunities to collaborate with others facing similar challenges.

Places like the National Robotarium sit within this ecosystem and can help bring it together by working with farmers to understand the options, connect into the right support, and define what's needed before any major investment is made.

4.2. Market Structure & Trends

Building on the market overview above, this section examines how the supplier landscape is organised and the broader services shaping its direction. Understanding market structure is important in determining what types of engagement are realistic, whether that is direct procurement from an established supplier, partnership with an emerging player, or support for co-development at an earlier stage of maturity. The trends identified here are noted to provide forward-looking context and to flag where the landscape may shift materially within the relevant investment horizon.

This subsection will cover:

- How the supplier market is segmented (by technology type, geographic origin, and target customer)
- The competitive dynamics between manufacturers, distributors, and agents operating in the Scottish and UK market

- Route-to-market structures and what they mean for farmers in terms of access, pricing, and after-sales support
- Any regulatory, food safety, or retailer specification changes likely to drive adoption demand

Supplier Segmentation

The supplier market is best understood as a layered ecosystem rather than a simple buyer-seller market. At one end are equipment manufacturers producing graders, optical sorters, conveyors, and vision systems; in the middle are distributors, integrators, and agents who localise, install, and service the equipment; and on the customer side are growers, seed producers, packhouses, and processors with different needs and budgets.

Segment Dimension	Categories	Relevance for Scotland / UK
By Technology	Mechanical size-based, web/roller; weight-based; optical sorting; machine vision; AI defect detection	Advanced optical and AI systems most relevant for seed certification; mechanical systems remain cost-competitive for smaller operators
By Geography of Supplier	UK (Haith Group, Tong Engineering, Agropack solutions); European (Tomra, Dewulf, Flikweert, Kiremko, Tolsma-Grisnich); others with UK agents	European manufacturers dominate the premium end; UK suppliers offer strong local support and parts availability
By Customer Type	Seed growers; ware potato farmers; packhouses; processors; exporters	Scottish seed growers have highest accuracy and compliance requirements; packhouses and processors prioritise throughput
By Route to Market	Direct from manufacturer; UK distributor / agent; integrator with service contract	Local distributor and integrator support is critical given seasonal harvest pressures and uptime requirements

Table 9: Supplier segmentation for the potato grading technology market by technology type, supplier geography, customer type, and route to market.

Within the technology dimension, mechanical and web-based grading systems remain important where flexibility and lower upfront cost matter, while optical and AI-enabled solutions are gaining share where throughput, consistency, and defect detection are priorities. In Scotland, where seed certification and quality assurance are especially important, more advanced grading and inspection systems have stronger commercial relevance than in purely commodity-driven settings.

Competitive Dynamics

The competition in the grading equipment market is primarily between established grading equipment vendors with deep agricultural roots such as Tomra, Dewulf, and Tong Engineering, and newer AI and vision-led entrants. Tomra currently holds the strongest market position globally, commanding significant revenue share through its advanced optical sorting solutions and near-infrared spectroscopy capability combined with machine learning. Dewulf and Tolsma-Grisnich maintain strong positions through comprehensive product portfolios and IoT-enabled grading systems that allow real-time quality monitoring.

For the Scottish and UK market specifically, European manufacturers dominate the premium end, while UK-based manufacturers and suppliers such as Haith group and Tong Engineering offer competitive advantages in local availability, service responsiveness, and familiarity with the operational context. The case of Flikweert Vision at Wellhill Farm illustrates that Dutch and other European specialist manufacturers are also active in Scotland, typically through direct engagement following demonstration visits abroad.

Purchasing decisions in this market are shaped by throughput capacity, grading accuracy, labour savings, and serviceability. Pricing is only one factor: after-sales support, spare-parts availability, operator training, and the ability to support operations during time-critical harvest windows can be decisive. This gives established distributors and agents with local presence a structural advantage over online or export-only purchasing models.

Route-to-Market Structures

For Scotland and the UK, route-to-market matters because buyers often need installation, calibration, maintenance, software updates, and seasonal support rather than just a one-off machine purchase. Farmers and packhouses may buy directly from manufacturers for larger, more bespoke systems, or through distributors and agents where local support and finance packages are more important.

Three principal route-to-market structures operate in this sector:

- **Direct manufacturer sales**: typically for larger, higher-specification systems where the customer has the technical capacity to manage installation and integration. Common for major packhouse operators and larger commercial farms.
- **Distributor and agent networks**: the dominant channel for smaller to mid-size operations in Scotland and the UK, where local knowledge, installation capability, and ongoing service relationships are central to the purchase decision.
- **Integrator-led procurement**: where a third-party systems integrator designs and installs a complete post-harvest handling solution incorporating graders alongside conveyors, storage, and packaging equipment. Increasingly relevant as farms invest in whole-packhouse upgrades rather than standalone machines.

The implication for Scottish farmers is that adoption decisions are influenced not only by capital cost, but by reliability, operator skill requirements, spare-parts access, and whether the supplier can service and support the machine during busy harvest windows. Leasing, hire-purchase, and seasonal finance options are also increasingly offered by established distributors and may lower the effective barrier to entry for mid-size operations.

Regulatory and Specification Drivers

The most relevant regulatory backdrop for the Scottish and UK potato grading market is the Seed Potato Classification Scheme (SPCS), which defines inspection standards and grade requirements for the marketing of seed

potatoes. In Scotland, the scheme is administered by SASA (Science and Advice for Scottish Agriculture) (Seed & Ware Potatoes, n.d.); in England and Wales it is administered by APHA on behalf of DEFRA. The SPCS classifies potatoes by health, trueness to variety, and freedom from mixtures, assigning grades across three categories: Pre-basic, Basic, and Certified.

These rules matter directly for the grading technology market because they create a formal operational need for accurate sorting, inspection, and documentation at the point where seed potatoes are graded and marketed. Only Pre-basic and Basic grade seed may be marketed within the protected regions of Scotland which include the main seed potato growing areas reinforcing the importance of achieving and demonstrating classification compliance. The SPCS explanatory guide (Animal & Planth Health Agency, GOV.UK, 2025) sets out the standards that crops must meet after inspection and grading, which in practice means that grading machinery must be capable of reliably meeting these thresholds.

Beyond the classification scheme, retailer and food-safety expectations are an additional driver of technology adoption. Retailer specifications increasingly push producers towards more consistent sizing, lower defect rates, and better traceability throughout the supply chain. The UK's Food Safety Act and associated standards, combined with the ongoing development of Assured Produce and related assurance schemes, mean that documented and auditable quality control at the grading stage is increasingly expected rather than optional.

> *Regulation is not the only adoption driver, but it amplifies the commercial case where compliance and consistency directly affect saleability. The Scottish classification scheme and the SPCS explanatory guide both support the idea that grading is embedded in market access rather than being a purely operational choice.*

The combination of the SPCS framework, retailer specification requirements, and export market standards, particularly for seed potato exports to markets such as Egypt (>61,000 tonnes in 2024) and the potential re-opening of EU

markets, creates a strong and durable demand signal for grading technology that can be reliably calibrated, documented, and audited. Over the investment horizon, tighter retailer specifications, continued labour scarcity, and pressure to reduce waste through more accurate grading are the most likely demand drivers.

5. Appendices

5.1. Appendix A – Company Directory

S.No.	Company	Country	Website	Video Demo	Key Technology
1	Wevano (+U-Vision)	Netherlands	https://wevano.nl/en/home-2/	https://www.youtube.com/watch?v=W48kVcAuX6w	Optical sizing + quality, dirty potatoes, multi-angle camera, up to 5 grades
2	Agropack Solutions	Scotland	https://agropacksolutions.com/		Agent for Wevano in UK/Scotland
3	Schouten Sorting	Netherlands	https://schoutensorting.com/	https://www.youtube.com/watch?v=R__2VEK4Y60	Optical quality (Optica Q) + optical sizing (Optica CS) - modular separate units
4	Smart Grader (Gejo)	Netherlands	https://smartgrader.com/en/	https://www.youtube.com/watch?v=G-DZo86JA6I	Optical grading, integrated line - Schouten brand
5	Alan Mackay Machinery	Scotland	https://www.alanmackay.co.uk/		Agent for Schouten in Scotland
6	Skals	Denmark	https://skals.dk/	https://www.youtube.com/watch?v=V1e3lTKxbKc	Mechanical jump sizing + optical quality - budget option
7	Flikweert Vision	Netherlands	https://flikweertvision.nl/	https://www.youtube.com/watch?v=LknGglImJv8	Optical quality only, retrofits into existing lines, popular UK choice
8	CC Powell Ltd	UK	https://ccpowell.co.uk/		Agent for Flikweert Vision in UK
9	Tong Engineering	UK	https://tongengineering.com/	https://www.youtube.com/watch?v=kMgCiczl9m0	Mechanical grading lines, mobile graders, optical sorting (Visar Sortop), 90+ yrs
10	Haith Group	UK	https://www.haith.co.uk/		Mobile & static grading systems, vision add-on,

					bespoke lines, gentle handling
11	ENE Group	UK	https://enegroupltd.com/		Custom stainless-steel graders, standalone or line integration, auto rejection
12	Tolsma-Grisnich	Netherlands	https://www.tolsmagrisnich.com/	https://www.youtube.com/watch?v=R__2VEK4Y60	Harvesting & handling, destoning, integrated grading lines
13	TOMRA Food	Norway	https://www.tomra.com/food/categories/potatoes	https://www.youtube.com/watch?v=Q02FLahTkmY	AI/deep learning optical sorting, field sorter (100t/hr), full processing range
14	Newtec	Denmark	https://www.newtec.com/	https://www.youtube.com/watch?v=d9uYfainXVM	Optical sorting (Celox-P-UHD), weighing & packing, up to 16 grade categories
15	Ellips	Netherlands	https://ellips.com/		High-speed optical grading, harvest optimisation, pioneer since 1989
16	Dewulf	Belgium	https://www.dewulfgroup.com/en/		Harvesting & handling, destoning, integrated grading lines
17	AgroIntelli	Denmark	https://agrointelli.com/		Autonomous field robots (Robotti), spraying & weed control
18	AGEC AB	Sweden	https://agec.se/		Electronic sorting, root crop specialist, potato & onion
19	Inovaa	Netherlands	https://inovaa.nl/	https://www.youtube.com/watch?v=W48kVcAuX6w	Optical sorting technology, U-Vision optical potato grader

20	Karevo	Germany	https://www.karevo.de/en/	https://www.youtube.com/watch?v=rxWi6HZpuJs	AI-based optical sorting
21	inSystem	Netherlands	https://www.insystem.io/		Hyperspectral imaging + deep learning, V-Light optical sorter
22	Kiremko	Netherlands	https://kiremko.com/	https://www.youtube.com/watch?v=cJ8_NfLTrwk	Specialised grading and sorting solution
23	Insort GmbH	Austria	https://www.insort.at/	https://www.youtube.com/watch?v=3Cdx3n4OOoc	Chemical imaging technology (CIT) utilising hyperspectral imaging
24	Bühler	Switzerland	https://www.buhlergroup.com/global/en/products/sortex_fb.html	https://www.youtube.com/watch?v=GaQnsil1mCk&t=3s	Optical sorting and processing technology which includes Secondary sorting too.
25	Gillenkirch	Germany	https://www.gillenkirch.com/en/	https://www.gillenkirch.com/en/media-library/films/	Full processing lines and optical sorter (3 in 1)

5.2. Appendix B – Bibliography

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5.3. Appendix C – Glossary

Term	Definition
AHDB	Agriculture and Horticulture Development Board – UK statutory levy board providing research, market intelligence, and knowledge transfer for the farming and horticulture sectors.
AI (Artificial Intelligence)	Computational systems using algorithms and training data to perform tasks such as defect detection and quality classification, capable of improving accuracy over time.
APHA	Animal and Plant Health Agency – administers the Seed Potato Classification Scheme (SPCS) in England and Wales on behalf of DEFRA.
Auditability	The ability of a grading system to record and produce documented evidence of grading decisions for compliance reporting to retailers, certification bodies, and export markets.
CE / UKCA Marking	CE – European conformity mark for machinery safety. UKCA – UK Conformity Assessed, the post-Brexit equivalent required for machinery placed on the Great Britain market.
Defect Detection	Automated identification of quality issues in potatoes including scab, greening, mechanical damage, and shape deviation assessed by optical cameras or AI systems.
DEFRA	Department for Environment, Food & Rural Affairs – UK government department responsible for agricultural policy, food standards, and rural affairs.
Edge Computing	On-machine data processing that analyses large datasets (e.g. camera feeds) locally without cloud dependency, enabling real-time grading decisions at line speed.
HMI (Human-Machine Interface)	The touchscreen or control panel used by operators to configure, monitor, and adjust grading system settings including defect tolerance thresholds.

Horizon Scanning	A structured, forward-looking method for systematically examining the current state of a technology domain to identify products, trends, gaps, and risks for future decisions.
Hyperspectral Imaging	A sensing technology capturing data across a wide range of light wavelengths to detect internal defects or chemical properties not visible to standard cameras.
MoSCoW	A requirements prioritisation framework: Must have, Should have, Could have, Won't have. Used in this report to categorise farmer requirements for grading systems.
NIR Spectroscopy	Near-Infrared Spectroscopy – sensing technology used to detect internal quality characteristics (e.g. dry matter content) beyond surface-level optical inspection.
Optical Sorting / Grading	Technology using cameras and image-processing software to assess and classify potatoes by size, shape, colour, and surface defects, replacing or augmenting manual inspection.
PLC	Programmable Logic Controller – an industrial control system automating and coordinating the mechanical and electronic components of a grading line.
PUWER 1998	Provision and Use of Work Equipment Regulations 1998 – UK legislation requiring that work equipment is safe, properly maintained, and that operators are appropriately trained.
Retrofit Module	An optical or AI-based quality detection unit designed to integrate into an existing mechanical grading line without replacing the whole system, minimising cost and disruption.
SASA	Science and Advice for Scottish Agriculture is the Scottish Government agency responsible for administering the SPCS in Scotland.
SPCS	Seed Potato Classification Scheme is the regulatory framework governing the inspection, grading, and marketing of seed potatoes in Great Britain. Grades: Pre-basic, Basic, and Certified.

Throughput	The volume of potatoes processed by a grading system per unit of time, typically expressed in tonnes per hour (t/hr). A key operational performance measure.
TBC	To Be Confirmed is used in the capability comparison table where specific information (e.g. accuracy ratings, data logging scope) was not publicly available and requires direct supplier enquiry.
Ware Potatoes	Potatoes grown for direct human consumption (e.g. retail bags, crisps), as distinct from seed potatoes grown for replanting and subject to SPCS classification.

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