

PASSIVE TERAHERTZ EMPLOYEE SCREENING IN RETAIL DISTRIBUTION

Modernising Loss Prevention Through Passive Terahertz Technology
Prepared for retail, logistics, loss prevention and security leadership.



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EXECUTIVE SUMMARY

Retail distribution has become one of the most challenging environments in which to balance security, operational efficiency, and workforce experience. Global supply chains have grown increasingly complex, e-commerce fulfilment has accelerated, and organised retail crime continues to evolve in sophistication and scale. At the same time, distribution centres must process hundreds or even thousands of employees through security screening every day without disrupting productivity or creating friction for the workforce.

£1.4 BN¹

UK distribution-centre theft,
of £7.9bn total retail theft

\$56.3 BN²

US internal theft cost to
retailers, 2023

~30%³

Of US retail shrinkage attributed
to employee theft

The scale of the problem is significant on both sides of the Atlantic. In the UK, employee theft from distribution centres alone accounts for an estimated £1.4 billion of the annual £7.9 billion retail theft problem, and retailers now spend a record £1.8 billion each year on crime prevention even as losses continue to rise. In the United States, internal theft cost retailers an estimated \$56.3 billion in 2023, with employee theft accounting for nearly 30% of total retail shrinkage.

¹ SOURCE: Retail Economics, The cost of Retail Crime, 2023

² SOURCE: Jack L Hayes International, 2023

³ SOURCE: National Retail Security Survey, National Retail Federation, 2023

AT A GLANCE

Retail distribution organisations require screening solutions that can:

- ▼ Detect both metallic and non-metallic concealed items
- ▼ Process high employee volumes during shift changes
- ▼ Reduce shrinkage and deter organised retail crime
- ▼ Support rapid, in-line alarm resolution
- ▼ Minimise unnecessary pat-downs and secondary searches
- ▼ Respect employee privacy and dignity
- ▼ Fit unobtrusively into busy distribution centre entrances and exits
- ▼ Deliver measurable business outcomes and rapid ROI

Passive terahertz screening addresses these requirements through real-time passive imaging, flexible deployment options, and a proven operational track record across global retail and logistics environments.

Traditional employee screening approaches, including manual searches, walk-through metal detectors, and aviation-derived imaging systems, were developed for different operational environments such as checkpoints and gateways, where static people are typically screened in turn. While each offers certain advantages, many struggle to detect the wide variety of metallic and non-metallic merchandise found in retail distribution facilities or can create operational bottlenecks that reduce efficiency.

Passive terahertz screening, with the capability to deliver detection-at-range on moving people, represents a new generation of employee screening technology specifically aligned with the operational requirements of modern retail distribution. By combining real-time imaging, operator-assisted decision-making, high throughput, and privacy-conscious design, organisations can strengthen loss prevention while improving employee experience and maintaining operational flow.

The table below summarises the practical advantages of passive terahertz screening for retail distribution compared with active millimetre-wave screening and walk-through metal detector archways. Each of the topics is discussed further in this paper.

CAPABILITY	PASSIVE TERAHERTZ SCREENING	ACTIVE MILLIMETRE WAVE SCREENING	WALKTHROUGH METAL DETECTOR ARCHWAYS
Detects metallic items	✓	✓	✓
Detects non-metallic retail goods	✓	✓	✗
Shows size, shape and location	✓	✗	✗
Real-time operator decision-making	✓	✗	✓
Removes need for pat-downs and secondary searches	✓	✗	✗
Handles shift-change throughput	✓	✗	✓
Mobile / pop-up / covert deployment	✓	✗	✓
Low operational disruption	✓	✗	✗
Low power consumption	✓	✗	✓

This paper examines the changing retail security landscape, evaluates the strengths and limitations of current screening approaches, and explores how passive terahertz technology is helping organisations modernise employee screening **without compromising productivity, dignity, or workforce trust.**

THE GLOBAL RETAIL SHRINKAGE CHALLENGE

Retail theft is no longer viewed as a localised operational issue, it has become a global business risk affecting retailers, manufacturers, logistics providers, and third-party distribution partners alike. Inventory shrinkage impacts profitability, customer satisfaction, operational resilience, and shareholder value.

While customer theft often receives significant media attention, employee theft, organised retail crime, supply chain diversion, and internal collusion collectively account for billions of dollars in annual losses worldwide. In the UK, distribution centres are increasingly being targeted by organised criminal groups, and in the US, employee theft alone now accounts for close to a third of all retail shrinkage.

Distribution facilities are particularly vulnerable because they consolidate high-value inventory in a single location while processing large workforces across multiple shifts. Merchandise such as cosmetics, pharmaceuticals, electronics, luxury goods, apparel, trading cards, and consumer packaged goods can often be concealed without triggering conventional metal detection technologies. As supply chains continue to accelerate, organisations must implement security solutions capable of protecting assets without slowing the movement of people or products.

Retailers and supply chain operators cannot simply treat all employees as criminals. A proportionate balance between security, operational efficiency, and respect for the privacy and dignity of the workforce, particularly the vast majority who do not engage in theft, is required.

WHY DISTRIBUTION CENTRES PRESENT UNIQUE SECURITY CHALLENGES

Unlike airports, government facilities, or public venues, retail distribution centres are designed for continuous operational flow. Employees move rapidly between receiving, storage, picking, packing, and shipping operations. Shift changes often require hundreds of employees to be screened within narrow-time windows, making throughput as important as detection capability.

Security leaders must balance several competing priorities:

▼ **ASSET PROTECTION**

Prevent theft, diversion, and inventory shrinkage.

▼ **OPERATIONAL EFFICIENCY**

Avoid bottlenecks that reduce productivity.

▼ **EMPLOYEE EXPERIENCE**

Maintain respectful, consistent, and transparent screening procedures.

▼ **OPERATIONAL FLEXIBILITY**

Adapt to changing workforce sizes, facility layouts, and seasonal demand.

▼ **WORKPLACE SAFETY**

Prevent contraband entering the distribution centre.

The most successful organisations recognise that effective security is achieved by balancing all five objectives, not by maximising one at the expense of the others.

WHY TRADITIONAL TECHNOLOGIES ARE REACHING THEIR LIMITS

Modern retail theft rarely involves only metallic items. Distribution centres increasingly require security technologies capable of identifying concealed:

- ▼ Apparel and accessories
- ▼ Cosmetics and pharmaceuticals
- ▼ Consumer electronics and mobile devices
- ▼ Food products
- ▼ Trading cards and collectibles
- ▼ Cash and data-bearing devices
- ▼ Luxury goods, bags, and wallets

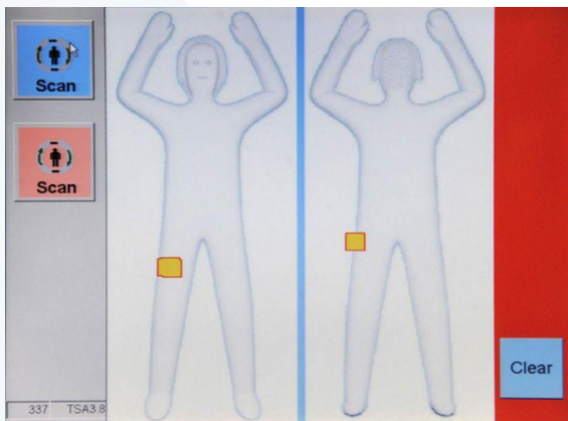
Many of these items contain little or no metal, limiting the effectiveness of traditional metal detection systems. A security process that only alarms on metal will not address the underlying commercial risk. At the same time, organisations seek to reduce manual searches, improve throughput, and minimise disruption during peak operational periods. These changing requirements have accelerated interest in passive imaging technologies specifically designed for high-throughput operational environments.

PASSIVE TERAHERTZ SCREENING: A DIFFERENT APPROACH

Passive terahertz screening differs fundamentally from many conventional screening technologies, including active millimetre-wave scanners. Rather than transmitting energy toward an individual, passive terahertz systems observe naturally occurring terahertz radiation emitted by the human body and surrounding environment. Concealed objects disrupt these natural emissions, allowing trained operators to identify anomalies beneath clothing.

Comparison of typical aviation-style avatar (LEFT)

Thruvision screening image (RIGHT)



Source: Transportation Security Administration (US Department of Homeland Security), public domain

For retail distribution, this approach provides several practical advantages:

- ▼ Detection-at-range of both metallic and many non-metallic objects
- ▼ Continuous operational flow, with no pause-and-pose requirement
- ▼ Contactless screening
- ▼ Rapid, in-line alarm resolution
- ▼ Flexible, mobile, or fixed deployment
- ▼ Removes the need for secondary searches and pat downs

Because passive imaging displays a moving detection image, much like a CCTV camera, the operator can assess the size, shape, and location of a concealed object in real time as the person stands in front of them. This supports proportionate and efficient resolution: a colleague can be asked to remove an item from a specific pocket or area, rather than being escalated automatically to a secondary search. These characteristics make passive terahertz technology particularly well suited to high-volume employee screening environments.

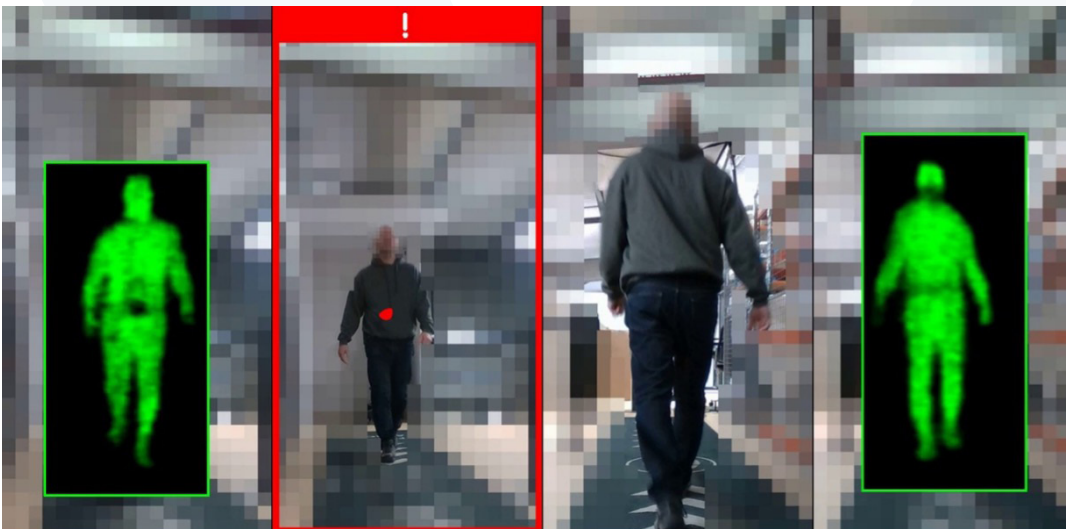
HUMAN DECISION-MAKING IN AN AI-ENABLED ENVIRONMENT

Artificial intelligence has transformed many aspects of physical security. Automated detection algorithms improve consistency and can accelerate decision-making. However, employee screening remains fundamentally a human-centred process. Retail theft methods evolve continuously, new products, packaging, concealment techniques, and new organised crime tactics emerge regularly.

The most effective screening environments therefore combine advanced sensing technology, intelligent software, trained security operators, and clearly defined operational procedures. Rather than replacing human judgment, technology should enhance it by providing operators with the information needed to make proportionate, informed decisions in real time. Because the operator retains a vital role in the decision process, they can apply their own training, experience and intuition to decide which detections require further investigation or escalation.

Thruvision's AI-based DynamicDETECT software, with DDAIAlert, automatically highlights all areas of potential interest to the Operator by placing clear red-overlays on the CCTV image, to indicate their size, shape and location in real-time. DDAIAlert goes further by making a binary decision about whether a person being screened is likely to have a concealment, or not, whilst still indicating the location and approximate size and shape of any suspected concealment.

Thruvision's DDAIAlert AI-based detection software – simultaneous front and back walkthrough screening



However, this approach does not completely remove the operator from the process. It allows the operator to concentrate on managing the screening process and generates a visual and audible alert to the operator when a suspected concealment is detected. Crucially, it retains the ability to view real-time terahertz imagery and to resolve detections through a real-time stand-off interaction with the screening subject.

THROUGHPUT AND REAL-TIME RESOLUTION

For most retail distribution operations, security effectiveness is only one measure of success. A screening process that identifies every concealed item but creates excessive delays, staffing challenges, or employee dissatisfaction ultimately fails to support business objectives.

Distribution centres are designed around throughput. Employees often enter and exit facilities in concentrated waves during shift changes, meal breaks, and overtime periods. During peak seasons, these workforce movements may involve hundreds within a matter of minutes. Any screening technology that interrupts this flow introduces operational inefficiencies that can quickly outweigh its security benefits.

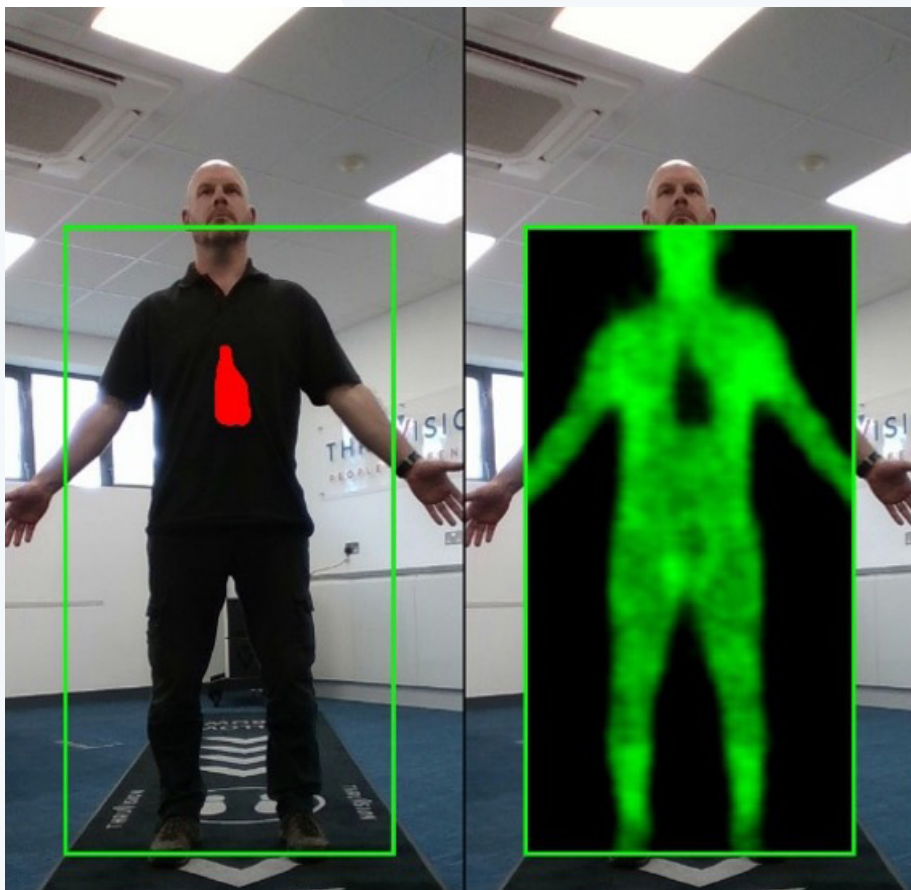
Because it provides a real-time video feed rather than a snapshot, Passive terahertz screening supports this operational philosophy by allowing employees to move naturally through screening areas while enabling security personnel to evaluate potential concealed items in real time. Operators can resolve potential detections 'in lane' without having to stop the flow to perform lengthy stop-and-search procedures, reducing disruption for both employees and security staff.

Organisations increasingly recognise that operational efficiency is itself a security advantage: when screening is quick and respectful, compliance increases and deterrence becomes more consistent throughout the workforce.

PRIVACY BY DESIGN & WORKFORCE ACCEPTANCE

Modern employee screening processes operate within an increasingly complex legal and social environment. Organisations must balance legitimate business interests in protecting inventory with equally important responsibilities relating to employee privacy, dignity, and regulatory compliance. Workforce acceptance has become a critical success factor for any security initiative.

Employees expect screening procedures to be fair, consistent, transparent, respectful, and non-discriminatory. Security technologies perceived as intrusive or inconsistent can create resistance, reduce compliance, and negatively affect employee engagement.



Respectful passive terahertz screening imagery: sufficient resolution to support a decision without being intrusive

Leading organisations increasingly adopt “privacy by design” principles when implementing physical security technologies, including minimising unnecessary personal information, restricting access to screening data, maintaining human oversight, and ensuring screening procedures remain proportionate to operational risk. Passive terahertz technology aligns closely with these principles. Rather than producing anatomically detailed images, passive terahertz systems provide operators with sufficient information to detect concealed objects while preserving individual privacy.

This operational approach delivers several important benefits:

- ▼ Reduced physical contact
- ▼ Faster screening resolution
- ▼ Stronger workforce trust and acceptance

As privacy regulations continue to evolve across North America, Europe, Asia-Pacific, and Latin America, organisations should evaluate screening technologies not only for their detection capabilities but also for their ability to support long-term regulatory compliance and workforce trust.

WORKPLACE SAFETY

Retail Distribution organisations are increasingly at risk of being targeted by organised crime gangs. Among retailers that reported an increase in employee theft in a 2023 study by Retail Economics and Thruvision, a high 70% stated that they had seen an increase in organised crime in distribution centres. Whilst theft-at-scale is one objective of organised criminals, other objectives may typically follow, such as the supply of drugs and narcotics to other employees.

This represents a different challenge for organisations. As well as outbound screening to prevent theft, there is a growing need to screen employees as they enter a distribution centre to prevent the entry of items that may facilitate theft, or cause a danger to themselves or other employees, and identify those engaging in organised criminal activity.

Due to its compact size and detection-at-range capabilities, passive terahertz screening technology is also ideally suited to covert deployment, where the technology is hidden within infrastructure or other 'furniture' that is not part of the visible screening process. This provides organisations with an opportunity to screen employees without their knowledge, which may be a desirable tool in the fight against organised crime infiltration.

SUSTAINABILITY AND COST OF OPERATION

Organisations are increasingly expected to consider the energy and sustainability profile of physical security infrastructure. Passive terahertz screening supports this agenda through low power consumption, around a third of that used by an average active millimetre-wave system, a modest physical footprint, and flexible deployment that avoids the complex checkpoint infrastructure required where it is not needed.

The relatively compact size of passive terahertz systems also has a role to play. Mobility means that a single system can be used to deliver pop-up screening at different times in several locations within a distribution centre. This both increases the deterrent effect, employees do not know where or when they may be screened, and increases value for money, as a smaller number of systems can cover a greater number of exits.

MEASURING BUSINESS VALUE AND RETURN ON INVESTMENT

Historically, physical security investments were often evaluated as necessary operating expenses. Today, executive leadership increasingly expects measurable business outcomes that justify capital investment and demonstrate ongoing operational value. Modern employee screening programs contribute to multiple areas of organisational performance beyond simple loss prevention:

▼ REDUCED INVENTORY SHRINKAGE

Where even modest percentage improvements in shrinkage can translate directly into significant annual savings for large distribution operations.

▼ IMPROVED OPERATIONAL EFFICIENCY

Reducing delays during shift changes and allowing employees to leave the facility or begin productive work more quickly.

▼ LOWER SECURITY OPERATION COSTS

Reducing time-consuming manual searches and improving the productivity of existing security personnel, who can be freed up to carry out other tasks.

▼ INCREASED DETERRENCE

Where highly visible screening processes create a powerful deterrent effect.

▼ ENHANCED EMPLOYEE EXPERIENCE

Where respectful screening processes reduce friction between employees and security personnel and support a positive workplace culture.

▼ RISK REDUCTION

Contributing to broader enterprise risk management by preventing the unauthorised removal of intellectual property, sensitive data, proprietary materials or hazardous items.

HOW THRUVISION SOLVES THE PROBLEM

Thruvision people-screening technology is proven in real-world operational conditions across a range of operational models and market sectors, including retail distribution, prisons and corrections, aviation worker screening, entrance security, and customs and borders.

Key features of Thruvision people-screening solutions include:

- ▼ A patented, high-performance terahertz sensor
- ▼ Advanced AI-based detection software that supports and assists the operator
- ▼ Compact size with a range of mounting options, including gantry, pillar, and floor-mounted configurations
- ▼ Mobile, ergonomic solutions suited to pop-up and multi-site deployment
- ▼ The capability to support covert deployments, where employees do not know that they are being screened

Thruvision people screening has been used in retail distribution for more than a decade, **with early deployments in major retail environments dating back to around 2014. Since then, the footprint has grown to several hundred deployments within retail distribution across more than 20 countries.** This experience matters, because retail distribution screening is an operational discipline, not just a technology purchase. Successful deployments require lane design, colleague communication, operator training, alarm-resolution processes, privacy-aware procedures, and integration with existing loss-prevention and guarding models.

Thruvision solutions can quickly and seamlessly drop in alongside existing infrastructure and facilities, to respond quickly to spikes in theft. Flexibility around operational requirements, mean they are compatible with existing security processes, and modest power consumption, combined with the ability to operate as a standalone system, avoids complex and costly retrofit or rework to building power and data infrastructure. The customer benefit is not only the technology; it is the ability to implement a screening model that works in the real world.

GLOBAL CUSTOMER EXPERIENCES



UK RETAILER AND THIRD-PARTY LOGISTICS PROVIDER

The customer was among the earliest retailers to adopt passive terahertz screening and has worked collaboratively with Thruvision since to optimise screening lane design, operator training and alarm resolution procedures.

The collaboration has created a truly scalable screening model that is now rolled out in every one of its distribution centre sites.



USA MAJOR SPORTSWEAR BRAND

The organisation has implemented passive terahertz screening across multiple North American distribution centres to replace traditional handheld metal detector wands while maintaining efficient employee movement during shift changes.

Thruvision has helped reduce shrink from hundreds of thousands of dollars to almost no measurable losses within months of deployment.



USA LEADING THIRD-PARTY LOGISTICS PROVIDER

As one of the world's leading third-party logistics providers, the customer required a security screening solution for both inbound and outbound security screening to assure its support for a leading online retailer with strict loss targets.

By standardising screening procedures across geographically dispersed facilities, the customer has demonstrated how consistent security processes can be replicated while allowing individual locations to adapt procedures to local operational requirements.



USA LEADING SPORTSWEAR RETAILER

The organisation required an employee screening solution to protect fulfilment operations supporting licensed sports merchandise and collectibles, including products with significant resale value.

Passive terahertz screening provided flexibility to integrate into existing fulfilment operations while supporting expansion across multiple locations as business requirements evolved.

100%

OF EMPLOYEES SCREENED by Thruvision WalkTHRU solution, up from **10%** prior to installation

Major UK
Retailer &
Logistics
Provider

25%

REDUCTION IN SCREENING TIME
compared to metal detector archways used previously

~75%

REDUCTION IN SHRINK
following Thruvision installation

56%

REDUCTION IN SHRINK
in first month of deployment

Global
Luxury
E-Commerce
Provider

51%

FURTHER REDUCTION IN SHRINK
in second month of deployment

60%

REDUCTION IN SHRINK
over peak trading period in 2022

High-profile
UK Retail
Chain

47%

REDUCTION IN SHRINK
over full 12-month period in 2022/23

ROI

ROI IN 3 MONTHS - estimated £2M
of lost revenue saved to date

100%

ROLLOUT AT ALL DCS following a measured
proof of concept looking at theft of razors, cosmetics
and tobacco

Leading
Supermarket
Chain

£8K

ESTIMATED SAVING OF £8K
per site, per week

ROI

PROVEN ROI IN UNDER 12 MONTHS
with additional savings from reduced guarding costs

Multinational
Contract Logistics
Provider

ABOUT THRUVISION

Thruvision is a global leader in passive terahertz people-screening technology, providing advanced solutions for retail distribution, logistics, aviation worker screening, corrections, customs, and critical infrastructure. For more than a decade, Thruvision has worked alongside leading retailers and logistics providers to develop employee screening solutions specifically designed for high-throughput operational environments.

Unlike technologies originally developed for airport passenger screening or other public security applications, Thruvision's approach has evolved through real-world deployment in retail distribution facilities, where operational efficiency, employee experience, and inventory protection must coexist. Today, Thruvision solutions are deployed in Retail Distribution across more than 20 countries, supporting organisations that require rapid, respectful, and effective screening capable of detecting both metallic and non-metallic concealed items.

By combining passive terahertz imaging, intelligent AI-based software and privacy-conscious design, Thruvision enables organisations to modernise employee screening while maintaining the speed, flexibility, and professionalism demanded by today's global supply chains.

CONCLUSION

Retail distribution has entered a new era in which traditional approaches to employee screening are no longer sufficient to address increasingly sophisticated theft methods, evolving workforce expectations, and growing operational demands. Organisations no longer need to choose between effective security and efficient operations.

Advanced passive terahertz screening demonstrates that high detection performance, operational throughput, workforce dignity, and privacy-conscious design can coexist within a single integrated security strategy. As retailers and logistics providers continue investing in resilient, technology-enabled supply chains, employee screening will become an increasingly strategic component of enterprise risk management.

Those organisations that adopt purpose-built solutions designed specifically for retail distribution, rather than technologies adapted from aviation or public-venue security, will be better positioned to reduce shrinkage, strengthen deterrence, improve operational performance, and protect both their assets and their workforce for years to come.