



e-shelf-labels

SMART
SOLUTIONS
FOR YOUR
SUCCESS

Industrial use cases

Compact Solution Guide: Digital labelling and process control for production, warehousing and intralogistics



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e-shelf-labels

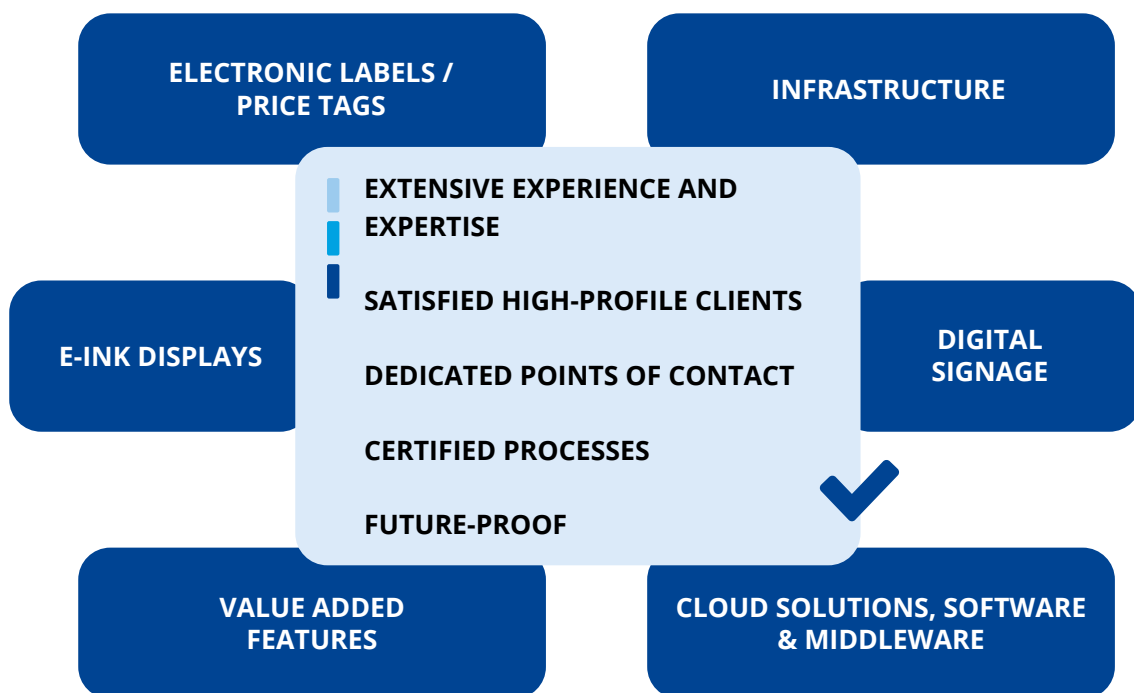
Your one-stop partner for electronic marking and labelling solutions

In production and logistics facilities, hours are lost every day – due to time spent searching for items, manual re-labelling and delayed restocking. Paper tracking slips go missing. Stock levels are identified too late. And the next step in the process isn't where it's needed: at the shelf, at the bin, at the workstation.

e-shelf-labels solves exactly that – with digital labelling that automatically delivers information to where decisions are made and goods are moved.

Our projects show that companies which replace manual processes with digital labelling today can save up to 8 hours a day on reordering in the eKanban sector, achieve 50% higher material availability and reduce capital tied up by up to 15% – with a return on investment that is typically achieved within 12 months.

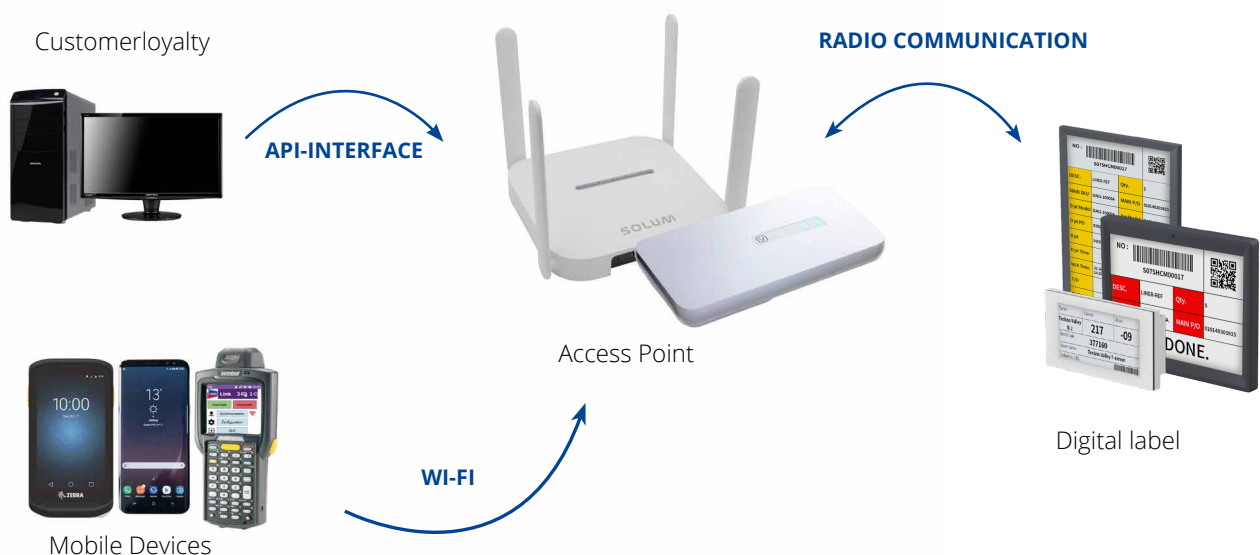
On the following pages, you will find our **10 industrial use cases** – from eKanban to temperature monitoring. Concrete, tried and tested, and easily integrated.



2. ESL - meaning & advantages

Electronic labels / Electronic Shelf Labels / Digital price tags / Digital labels – many names for **centrally updatable and energy-efficient display and interaction units designed for digital labelling at the point of use**. They can display information such as stock levels, barcodes, product codes, product descriptions, prices or other details for the labelling of storage locations, containers, shelves and workstations. In this context, ESLs act as a key component of digitalisation.

As a standalone technology, ESLs are particularly suitable when information changes frequently and must be visible directly on the object; however, as components within a **networked system**, they support, amongst other things, picking, replenishment control, container labelling, worker guidance and stock visualisation. This is because, in industry, product variety, the pace of change and demands for stock accuracy, traceability and supply security are on the rise. Digital labelling helps to make information available where decisions and material movements actually take place: on the shelf, on the container, at the workstation and within the material flow. The measurable benefits arise from reduced search times, fewer media breaks, greater process reliability and faster responses to deviations.



Your benefits at a glance, from goods receipt to dispatch:

- **Higher productivity:** better routes, less searching and less paperwork
- **Better quality:** clear statuses/batches, confirmations, blocking logic
- **Better traceability:** visible status information and integrated event logging
- **Shorter response times** in replenishment and greater transparency for more demand-driven inventory control
- **Lower risk of errors in picking**, allocation and confirmation processes thanks to visual guidance and clear status indicators
- **Optimal readability:** even in sub-optimal conditions thanks to E-Ink technology
- **Resource savings:** long battery life, reduction in consumables
- **Centralised management**

Why ESL – and when not?

ESL are particularly effective when ...	Other technologies may be more appropriate when ...
Information changes frequently and needs to be visible on the item.	only a one-off, static label is required.
Staff need clear visual instructions.	only automatic identification without a visual display is required – in which case RFID may be the preferred option.
Status, identification and feedback need to interact.	Extremely fast, cycle-synchronised operating signals are required – in which case classic pick-by-light can dominate.
Paper, manual re-labelling or search efforts currently result in significant losses.	Complex inputs, longer dialogues or document views are required – in which case industrial terminals or tablets are often more suitable.
Only static, one-off labelling is required.	Barcode labels or RFID tags without a display are sufficient; discover the range from auto-ID 24/7 and All About Cards
Automated internal transport in addition to labelling	ESL as a status indicator + AMR/AGV for transport; discover the combined range from e-shelf-labels and log-robot

Not sure what's right for your process? In our free digitalisation quick scan (90 minutes, on-site or remotely), we analyse your processes and recommend the right combination of technologies – with no sales pressure and concrete results.

Personalised advice on process optimisation

The first step towards transparent and efficient processes.

Every business is different. During a personal consultation, we will work with you to analyse your processes, operating conditions and objectives. Based on this, we will assess how e-shelf-labels and digital solutions can be effectively implemented in your business – from a technical, organisational and economic perspective.

We offer you a full-service solution:

- We link containers, locations and orders with digital identities, status indicators and defined event logic, so that relevant changes can be promptly transferred to downstream systems.
- Rules and workflows support a faster and more decisive response on the shop floor.
- KPIs and dashboards highlight effects and causes – enabling quick, informed decisions.

Book your appointment with our **experts** for the **Digitalisation Quick Scan** using our contact form:



3.1. eKanban & visual replenishment in the material flow

Identify demand, trigger replenishment and manage routes – directly at the point of use.

Typical challenge

In supermarket aisles, Kanban shelves and assembly areas, stock-outs are often detected too late. This results in search times, unnecessary safety stock and, in the worst-case scenario, supply gaps on the production line.

Solution

Smart or industrial labels on the bin display the current status directly at the location. Empty notifications via button, sensor or confirmed process event automatically trigger a replenishment order. LED signals and defined priority rules support fast and unambiguous processing.

Workflow

1. An empty, low-stock or priority event is detected at the point of consumption.
2. The platform generates a replenishment order based on defined rules and priorities.
3. The responsible employee or a connected transport vehicle is directed to the correct source and destination.
4. Container exchange and confirmation are carried out via button, scan or system feedback.
5. The status is updated in the ERP, WMS or eKanban system and logged for KPI analysis.



Tools & Integration

- Industrial labels with push-button/LED, robustly designed for use on shelves, in compartments or on containers, depending on the application
- Gateways or wireless infrastructure compatible with the label technology used
- Process logic / workflow platform for prioritisation, task generation and event control
- Integration with ERP, SAP, WMS or material flow systems
- Optional scanners, wearables, sensors or pick-by-light components

Specific benefits

2 hours a day time saved when reordering	50 % higher material availability	15 % less capital tied up	< 12 months typical ROI timeframe
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3.1. eKanban & visual replenishment in the material flow

Wittenstein Reference Project (48+ assembly stations, global rollout)

- 40 hours less manual effort per assembly station per year
- 0% error rate in material delivery following implementation
- 800,000 manual individual operations per annum completely eliminated

Important for implementation

eKanban works particularly reliably where there are recurring consumption patterns and fixed supply points. Our pilot package is usually up and running within 4–6 weeks — from process analysis to the first productive station.

We'll work with you to determine whether eKanban will deliver maximum benefit for your organisation during the Digitalisation Quick Scan. In 90 minutes, you'll know which stations are suitable for the pilot and what a realistic business case looks like.

3.2. Digital consignment & order documents

Paperless orders and status updates at the container – always up to date and audit-proof.

Typical challenge

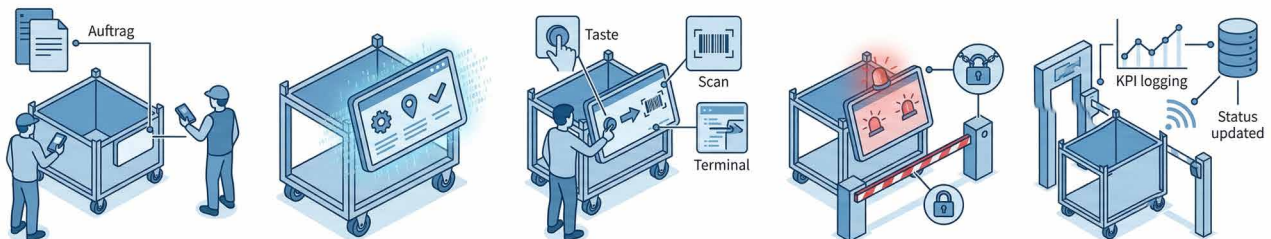
Paper work orders get lost, become illegible or are no longer up to date. This leads to queries, data gaps and uncertainty regarding status, batch or the next step in the process.

Solution

E-ink labels on the container or WIP carrier display order-specific information directly on the object, such as order number, batch, status or the next process step. Changes are updated digitally; updates can be triggered via scan, button or terminal and fed back into the host system.

Workflow

1. An order is assigned to a container, WIP carrier or workpiece carrier.
2. The label displays the current order, the next work step and relevant status information.
3. Status changes are triggered via button, scan, terminal or integrated process logic.
4. In the event of quality incidents, blocking or escalation rules are triggered.
5. Automatic feedback to the host systems takes place at the handover point or goods issue.



Tools & Integration

- Industrial or E-Ink labels for containers and workpiece carriers
- Gateways and device management
- Workflow or digital twin platform for status rules and order logic
- Integration with ERP and MES, optionally with QA or Andon systems
- Optional additional label printing for external logistics partners

Specific benefits

- Fewer media breaks and reduced administrative effort
- Clearer status overview directly on the container or WIP carrier
- Faster and more traceable feedback
- Greater process reliability for lock and release statuses

Important for implementation

Particularly suitable for WIP control, returnable containers, batch-based production and high-variety manufacturing. Not every entry should be made directly via the label; depending on the process, combining it with a scanner or terminal is advisable.

3.3. Stock monitoring and supply chain transparency

Stock levels, thresholds and replenishment rules are transparent and kept up to date in accordance with set rules – transparency rather than safety stock.

Typical challenge

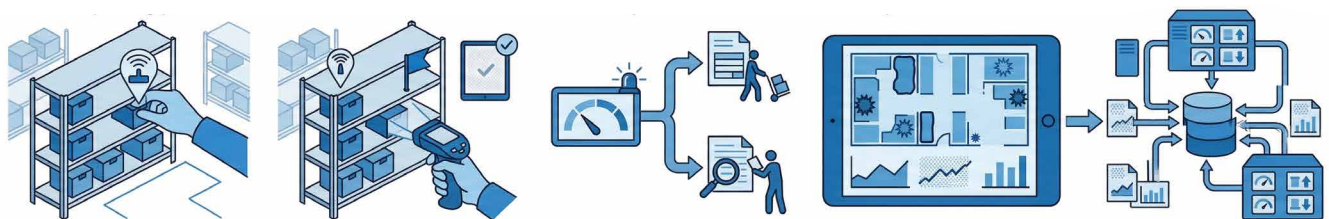
In supermarkets, storage areas or decentralised picking zones, there is often no up-to-date view of actual stock levels. Safety stock levels rise, yet stock-outs still cannot be reliably prevented.

Solution

Stock levels are recorded via label confirmations, sensors or scan events. Defined thresholds and rules automatically trigger replenishment orders or warnings as required. This transforms a static storage location into an actively monitored supply unit.

Workflow

1. A measurement or reporting point is defined for a shelf, bin or zone.
2. Stock changes are recorded via sensors, scans or confirmations.
3. If stock falls below defined thresholds, replenishment or inspection orders are triggered.
4. Status and hotspots are displayed on the dashboard.
5. Results are incorporated into replenishment and stock parameters.



Tools & Integration

- Labels, sensors or scan events as data sources
- Rules for thresholds, exceptions and priorities
- Integration with ERP, WMS or material flow logic
- Optional computer vision or weight sensors for specific use cases

Specific benefits

- Higher stock accuracy at critical picking points
- Fewer out-of-stock events whilst maintaining a more controlled safety stock
- Earlier detection of hotspots and replenishment patterns
- Better data foundation for continuous improvement and parameterisation

Important for implementation

To ensure reliable data quality, business logic, signal quality and master data must be clearly defined. Sensors do not replace physical stock-taking, but can significantly increase operational transparency.

3.4. SAP-Middleware & ERP/WMS/MES Integration

Seamlessly link master data and transactions – bidirectional, traceable, reliable.

Typical challenge

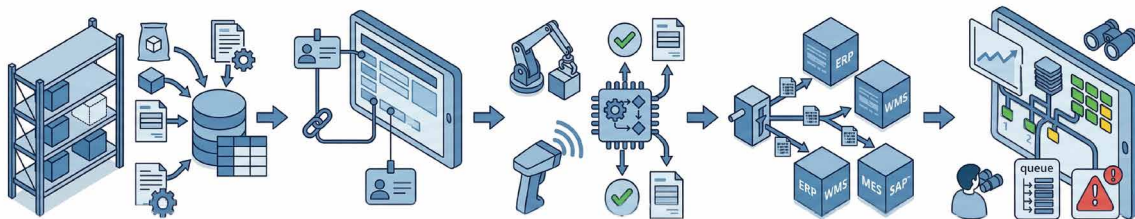
Many digitalisation initiatives fail not because of the business process itself, but due to manual master data, unclear responsibilities and unstable interfaces between the shop floor, middleware and ERP.

Solution

Master and transaction data can be exchanged in a structured manner between ERP, MES, WMS and the ESL or IIoT level via middleware or standardised connectors. This ensures that status changes, postings and object information are processed and reported back in a traceable manner.

Workflow

1. Objects such as containers, locations, materials, orders and batches are transferred into a consistent data model.
2. Master data is linked to the display points.
3. Shop floor events are translated into status or posting logic based on rules.
4. Confirmations are transmitted to SAP, ERP, WMS or MES in a controlled manner.
5. Interfaces, queues and error messages are monitored.



Tools & Integration

- Connectors or middleware for REST, MQTT, Webhooks, RFC, IDoc or other project-specific mechanisms
- Integration with SAP ECC or S/4HANA as well as with WMS, LVS or MES systems
- Authorisation and security concept
- Monitoring, retry mechanisms and operational documentation

Specific benefits

- Fewer incorrect postings and reduced manual rework
- More stable, traceable data flows between the shop floor and business systems
- Better scalability across multiple departments or plants
- Higher acceptance of the solution, as the display corresponds to the actual system status

Important for implementation

The key factors are business process definition, responsibilities and test cases – not just the available API. Particularly in SAP environments, it should be clear which system remains the business leader.

3.5. IIoT & Digital Object Identity - Capture events, trigger rules, generate KPIs

A digital identity for every object – status, event history and rule logic as the basis for KPIs and shop floor management.

Typical challenge

In many factories, data points are generated, but no robust overall logic is established. Material flow, quality and status information remain isolated, and decisions are made reactively rather than based on rules.

Solution

Every container, every storage location and every order is assigned a unique digital identity – complete with status, event history and defined action rules. This forms the data foundation upon which digital twin concepts and OEE analyses are built.

Signals from labels, sensors or scans update the status in real time, trigger defined follow-up actions and create a consistent basis for KPIs, shop floor management and continuous improvement.

Workflow

1. An object or location is assigned a unique digital identity.
2. Status changes are recorded via labels, scans, sensors or other event sources.
3. Rules derive actions, prioritisation or locks from this.
4. Timestamps and causes are logged and evaluated.
5. CIP, shop floor management and operational control access the same database.



Tools & Integration

- Platform for device, object and workflow management
- Integration of labels, sensors, gateways and operational source systems
- ERP, MES, WMS and BI integration

Specific benefits

- Greater transparency regarding causes rather than merely observing symptoms
- Faster response to deviations
- Better basis for OEE-related analyses, throughput time and quality assessments

Important for implementation

Added value is only realised once the digital twin has been technically modelled and is not merely collecting data. Overly complex models without a clear operational purpose quickly lead to unnecessary implementation costs.

3.6. RTLS & location-based process control

Track objects in real time and make use of zone events to reduce search times and losses.

Typical challenge

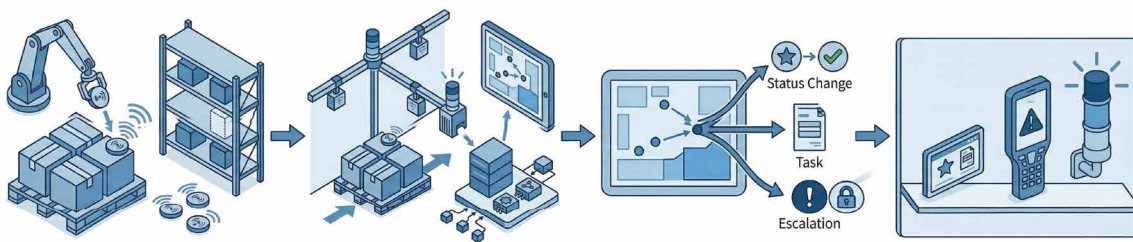
If items cannot be reliably located within the factory, this leads to search times, internal delays and unnecessary safety stock in circulation.

Solution

RTLS complements ESL in situations where, in addition to status, the current location is also relevant. Tags and localisation infrastructure record positions or changes of zone, from which search aids, automatic hand-overs or escalations can be derived.

Workflow

1. Objects are fitted with a tracking device.
2. The infrastructure determines position or zone affiliation.
3. Location events trigger status changes, tasks or escalations.
4. ESL, scanners or Andon visualise the resulting actions.



Tools & Integration

- RTLS infrastructure with tags/labels and tracking logic
- Platform for zone rules and event processing
- Integration with WMS, ERP or material flow control

Specific benefits

- Reduced search time and lower probability of loss
- Greater transparency regarding travel and dwell times
- Earlier escalation in the event of deviations or restricted zone violations

Important for implementation

RTLS is cost-effective when mobile search objects, waiting times or mix-ups are actually a significant cost driver. Accuracy, the radio environment and investment costs must be realistically assessed in advance.

3.7. NB-IoT / Infraless

Connecting sensors with minimal reliance on local infrastructure – suitable for outdoor areas and dispersed sites.

Typical challenge

Satellite depots, trailer yards, temporary sites or partner locations can often only be connected to local networks at considerable expense. As a result, relevant information remains outside the scope of digital processes.

Solution

NB-IoT or LTE-M-enabled devices transmit status data directly to the platform via mobile networks. This allows inventory, environmental data or status updates to be digitally recorded even in areas with poor infrastructure and integrated into central workflows.

Workflow

1. Devices are provisioned and connected to the platform.
2. Status or sensor data is transmitted via mobile networks.
3. Events trigger alarms, tasks or status changes.



Tools & Integration

- NB-IoT or LTE-M-enabled sensors / end devices
- Cloud or hybrid gateway
- Anbindung an Plattform, ERP und Analytics

Specific benefits

- Faster rollout in hard-to-reach areas
- Reduced reliance on local infrastructure
- Cost-effective connection of distributed sites

Important for implementation

NB-IoT is not suitable for every real-time or indoor application. Reception conditions, data volume, latency requirements and battery management must be assessed for each use case.

3.8. Production supply & Assembly automation using AMR/AGV

Identify requirements, prioritise transport orders and execute them autonomously – ensure timely delivery and avoid traffic jams.

Typical challenge

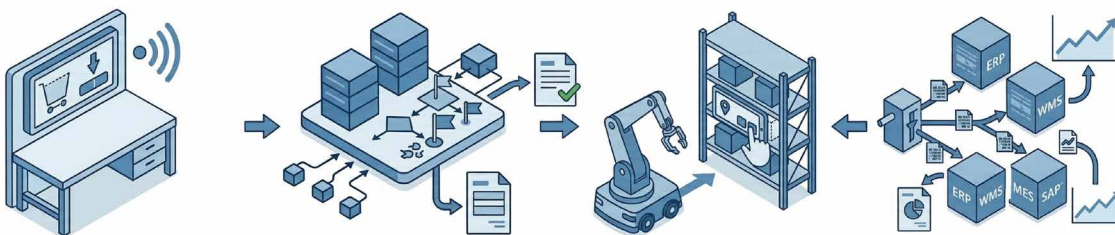
Unplanned replenishment, a lack of prioritisation and inefficient internal transport place a strain on both assembly and intralogistics. Bottlenecks are often only identified once the supply situation has already become critical.

Solution

Signals from the point of consumption – such as empty notifications, completion notifications or defined ERP events – can trigger transport orders for AMR, AGV or trolley train processes, depending on order logic, layout and the degree of automation. Labels and visual guidance support handover, acknowledgement and clear allocation to source and destination.

Workflow

1. A demand signal is generated at the point of consumption or collection.
2. The platform prioritises and generates a transport order.
3. AMR, AGV or trolley train receive the task; ESLs support source and destination with status display and acknowledgement.
4. Feedback is fed back into material flow and ERP systems.



Tools & Integration

- Industrial labels at source and destination
- Order and prioritisation logic
- Interface to AMR, AGV or trolley train control
- Integration into ERP, MES, WMS and, where applicable, Andon

Specific benefits

- More stable supply to the production line
- Fewer ad hoc transports and better prioritisation
- Greater transparency regarding internal transport services

Important for implementation

Significant benefits, particularly for standardised transport routes and clear supply rules. Without coordinated handover points, layout and exception processes, automation quickly remains stuck at the pilot stage.

3.9. Temperature & Condition Monitoring

Monitor the cold chain, vibrations and condition – seamless, audit-proof, GxP and HACCP compliant.

Typical challenge

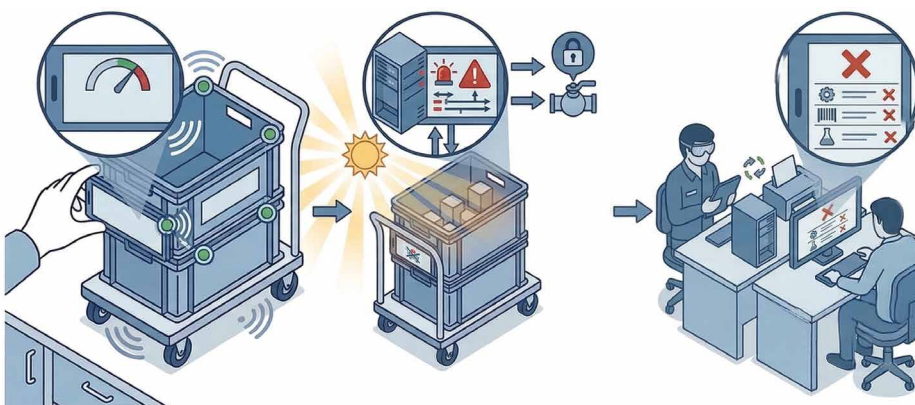
In many processes, temperature deviations, vibrations, or unacceptable conditions are detected too late. The consequences range from quality risks and customer complaints to scrap and increased quality assurance costs. This is particularly critical in regulated industries: In pharmaceutical and food production, complete temperature logs in accordance with GxP, GDP, and HACCP are required by law. A violation of limit values without documented evidence can, in cases of doubt, lead to a batch hold—or regulatory consequences.

Solution

Sensors measure defined status values directly on the container, the load carrier, or the relevant material flow object. In conjunction with a label and the corresponding platform logic, this makes it possible to identify violations of threshold values early on and clearly, trigger targeted alarms, and, based on this, initiate blocking or quarantine processes.

Workflow

1. Sensors monitor defined process parameters.
2. Violations of limit values trigger an alarm, a shutdown, or an inspection order.
3. The affected container or batch is clearly marked.
4. Quality assurance and operational departments use the same status information.



Tools & Integration

- Sensors for temperature, humidity, vibration, or charge level
- Industrial labels for status display and acknowledgment
- Integration with ERP, MES, batch management, and quality assurance systems



3.9. Temperature & Condition Monitoring

Specific benefits

- Earlier response to limit violations
- Greater traceability of deviations and corrective actions
- Reduced risk of unnecessary rejects or delayed escalations
- Complete, audit-proof documentation of temperature deviations for GxP, GDP, and HACCP requirements
- Automatic batch/quarantine labeling directly on the container - no manual rework for QA teams

Important for implementation

Key factors include calibration, measurement intervals, threshold logic, and clear mapping to the relevant material or batch. Not every use case requires a visible label; in some cases, a digital alert running in the background is sufficient. For regulated industries (pharmaceuticals, food, medical technology): Please contact us early on regarding the validation requirements for your system. We provide support with documentation and IQ/OQ processes.

3.10. Container upgrade with Smart Label

Automated reorder process (e.g. eKanban) & visual pick-up indicator – directly on the container.

Typical challenge

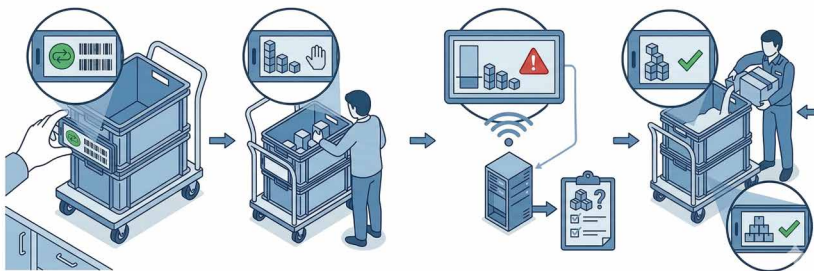
Particularly with C-parts, small parts or decentralised consumption points, there is often a lack of direct, up-to-date information on the container. The need for replenishment is identified too late, and status information remains in people's minds or on paper.

Solution

Retrofittable smart labels transform existing containers into digital information carriers. Product information, minimum stock levels, status or simple replenishment signals are displayed directly on the container and can be integrated into eKanban or inventory management systems.

Workflow

1. The container is fitted with a label or display featuring clear information logic.
2. Recorded withdrawals or defined stock levels are displayed on the container.
3. When the threshold is reached, a replenishment process is triggered or prepared.
4. Replenishment updates the status on the container.



Tools & Integration

- Suitable container mount and mechanically robust fastening
- Smart label / display on the container
- Integration with eKanban or replenishment logic

Specific benefits

- Greater supply reliability at decentralised picking points
- Fewer missing parts and fewer informal replenishment signals
- Paperless and better standardised picking processes

Important for implementation

Particularly suitable for C-parts, supermarkets, picking areas and standardised container circuits. The economic benefits depend heavily on how frequently replenishment events occur and how high the current manual control effort is.

4. Mounts & Mounting Solutions

The right label in the right place – securely attached, clearly legible, integrated close to the process.

Typical challenge

Digital labels only deliver their full value when they are clearly visible, accessible, and protected in everyday use. Since application locations—such as shelves, containers, workstations, machines, or transport carts—vary greatly, so do the requirements for viewing angles, mounting, and durability.

Solution

With the right mounts, ESLs are integrated where information is needed: on the material, shelf, load carrier, or process point. Depending on the application, strips, clips, adapter plates, magnetic, adhesive, or custom solutions are used—for good visibility and mechanically sound integration.

Workflow

1. The application location and surface determine whether the ESL is clamped, glued, screwed, magnetically attached, or hung.
2. Viewing angle, operating height, and user position determine how well the display can be read and operated during the process.
3. In Kanban, WIP, and warehouse processes, labels should be able to be quickly mounted, exchanged, or relocated.
4. Environmental factors (dust, cleaning, vibration, frequent handling) determine the appropriate choice of mounting.

Applications	Suitable mounting types
Shelves & Storage Units	Universal rails, TLS-H rails, clamp rail adapters, shelf profiles
Containers & Crates	Transparent clips, adapter plates, clips, magnetic or adhesive versions
Workstations & Counters	Single stands, base stands, angled mounts
Machines & Metal Surfaces	Wall mounts, magnetic adapters, adhesive mounts
Hanging Labels	Hanging hooks, hanging adapters, telescopic or rod solutions
Special Applications	Custom special mounts in a defined shape or color

Specific benefits

- Secure mounting directly at the process-relevant location
- Better visibility from the correct working angle
- Less rework due to standardized rather than improvised mountings
- Greater scalability during rollout, maintenance, and future expansions

Important for implementation

The mounting should be considered early in the project—ideally as early as the pilot setup. In addition to label size and manufacturer, the substrate, cleaning requirements, operating height, replacement frequency, and process logic are also critical. For special cases, custom mounts in various shapes or colors can be evaluated and tailored.

4. Efficiency doesn't stop at the shelf - A seamlessly integrated portfolio.

Digital labelling, identification and transport automation throughout the entire material flow.

Our solutions work together where industrial processes gain efficiency, and together they form an integrated system – from information and identification to the automated movement of goods:

All About Cards enables secure identification and access control.

e-shelf-labels provide up-to-date, digital labelling.

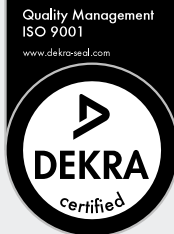
log-robot supports the automation of standardisable transport processes.

auto-iD ensures reliable data capture throughout the entire material flow.



e-shelf-labels
S&K Solutions GmbH





 Sailerwöhr 16, 94032 Passau
 +49 851 200930-30
 info@sk-solutions.com | info@e-shelf-labels.com
 www.sk-solutions.com | www.e-shelf-labels.com



e-shelf-labels Hungary

 Futó utca 37-45, 1082 Budapest
 +36 1 6005230
 info@e-shelf-labels.hu
 www.e-shelf-labels.hu



e-shelf-labels Czech Republic / Slovenia

 Impact Hub Brno, Cyrilská 7, 60200 Brno
 +420 734 115 584
 info@e-shelf-labels.cz
 www.e-shelf-labels.cz

e-shelf-labels Poland

 +48 735 379 638
 info@e-shelf-labels.pl
 www.e-shelf-labels.pl

e-shelf-labels Benelux

 info@e-shelf-labels.nl
 www.e-shelf-labels.nl