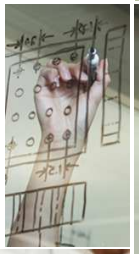


Material Replenishment & Flow (MR&F) / Replenishment Pull Systems (RPS)

SAP System Solutions for Lean Manufacturing

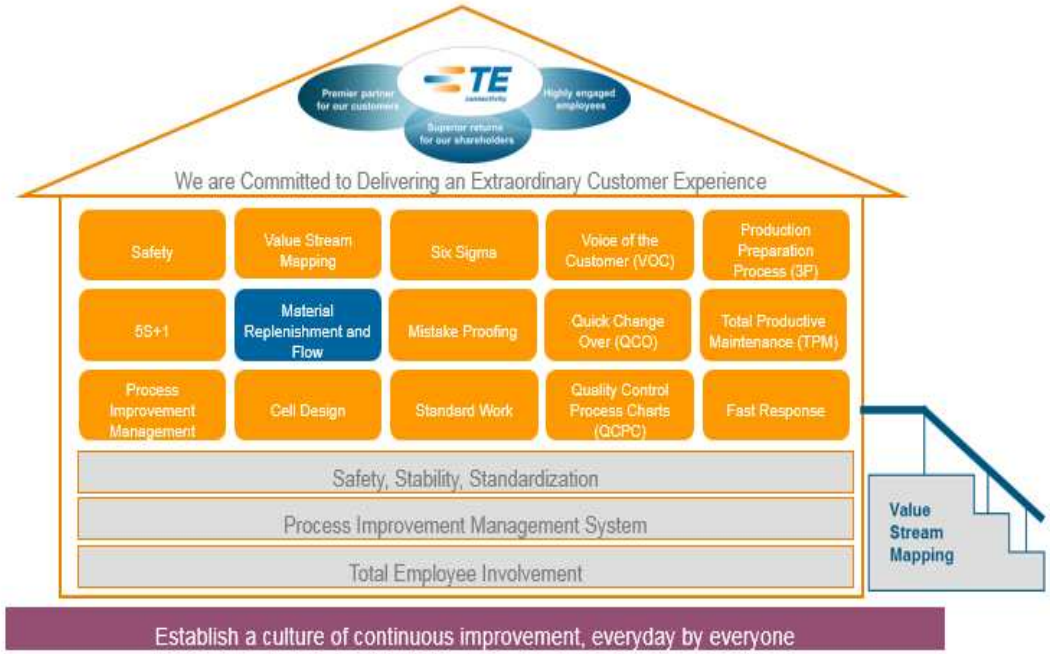
Introduction

TEOA and SAP – Connecting the Dots

TEOA, TE Digital Advantage & SAP

SAP Lean Manufacturing solutions are a digital means to enable and promote TEOA Lean Manufacturing methodology.

SAP supports operations in its daily execution by integrating Lean Manufacturing Solutions into core functions such as Inventory Management, Sales, Production, Purchasing, and Finance.



All Levels

Training Content

Training Content

PULL Strategies

- Kanban
  - Classic Kanban
  - Event Kanban
  - One-Card Kanban / Quantity Signal Kanban
- Trigger Point
  - Reorder Point (ROP)
  - Minimum / Maximum Inventory
  - Safety Stock

Training Content

Inventory Locations

- Supermarkets
  - On-site Supermarket
  - Vendor Supermarket (material provisioning for Subcontracting)
  - Remote Warehouse (Distribution Center holds components)

- Point of Use (POU) Stations
  - Wet POU
  - Dry POU

Training Content

Replenishment Strategies (Supply Elements)

- Internal Supply
  - Production Orders
  - Transfers from Warehouse to Supermarkets or Point of Use Stations (POU)
  - Transfer from remote Warehouse (components stored at a Distribution Center)

- External Supply
  - Purchase Orders / Scheduling Agreements
  - Subcontracting Orders
  - Stock Transport Orders

Training Content

Overflow Area

- What is an overflow area, how does it occur and where does it occur?
- How is it managed with SAP?

Training Content

Demand Spikes

- What is a demand spike?
- How does it occur?
- How does SAP handle demand spikes?

Training Content

Kanban Labels vs License Tags (LT)

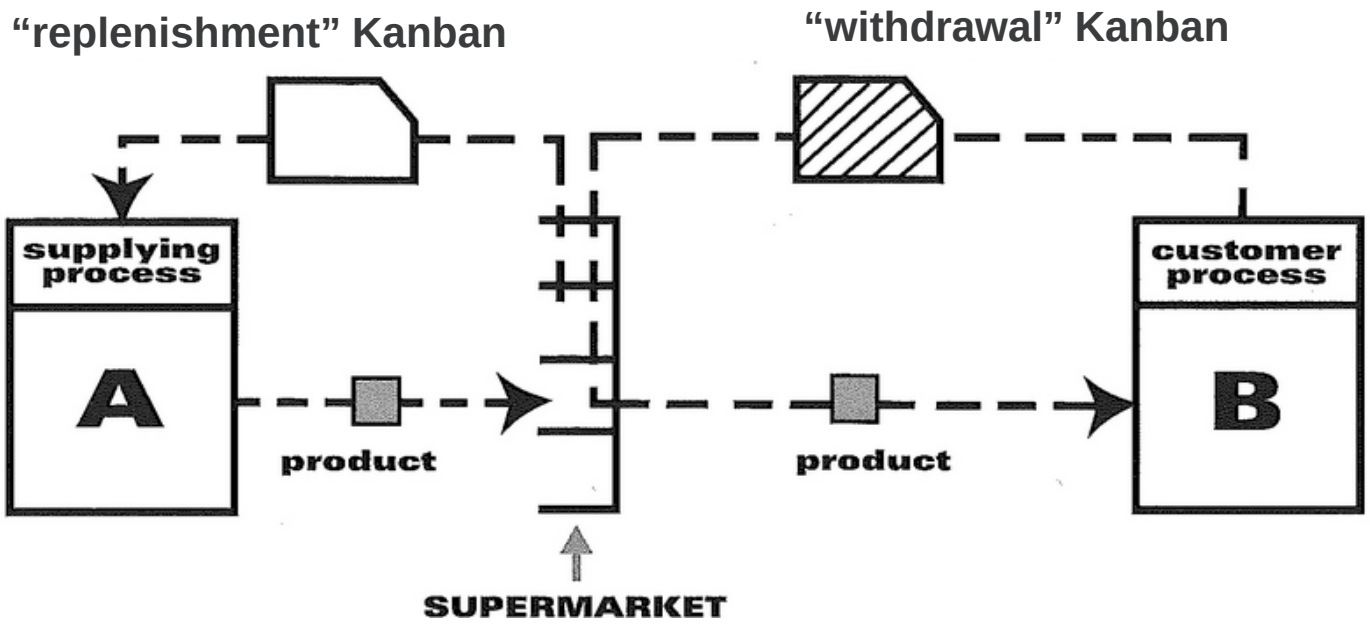
- What is a Kanban Label and why is it required?
- What is the difference between Kanban Label and an LT?
- If SAP eKanban is used, is an LT still required – and if so, why?

All Levels

The Basics

Manual Kanban Card System versus SAP System Supported eKanban

Kanban Flow – Card System



SAP eKanban Flow

Replenishment triggered in SAP automatically

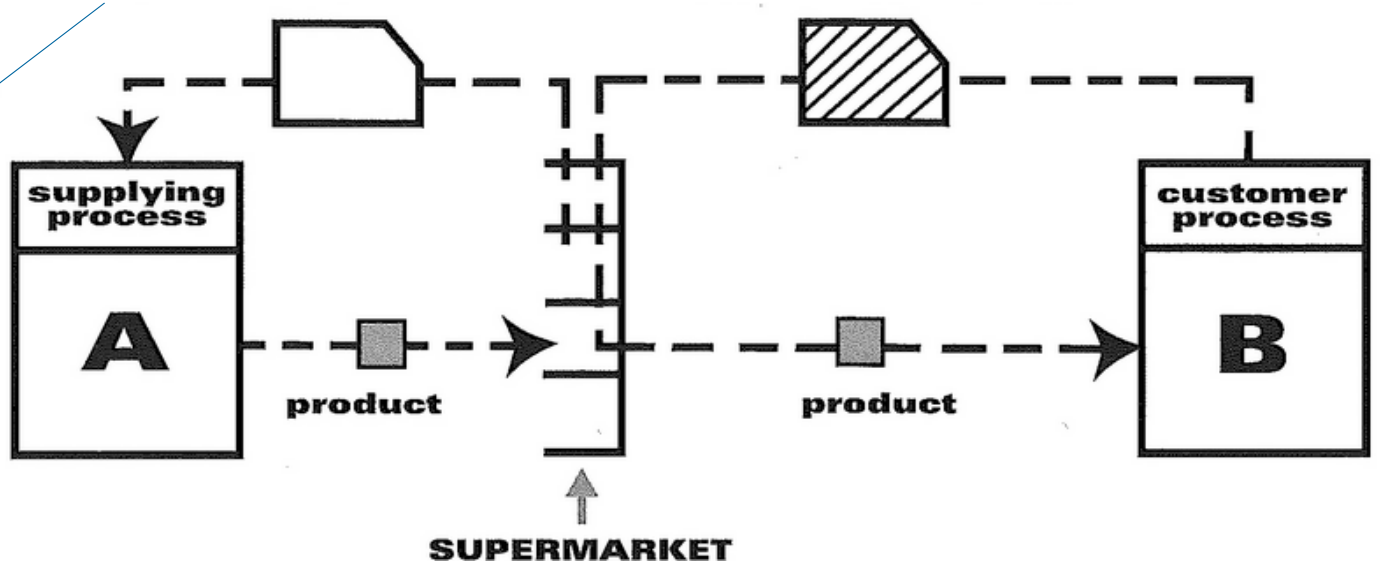
Classic Kanban	Reorder Point*
Event Kanban	Min / Max Inventory*
One-Card Kanban	Safety Stock*
Quantity Signal Kanban	

Recorded in SAP[1]

“replenishment” Kanban

“withdrawal” Kanban

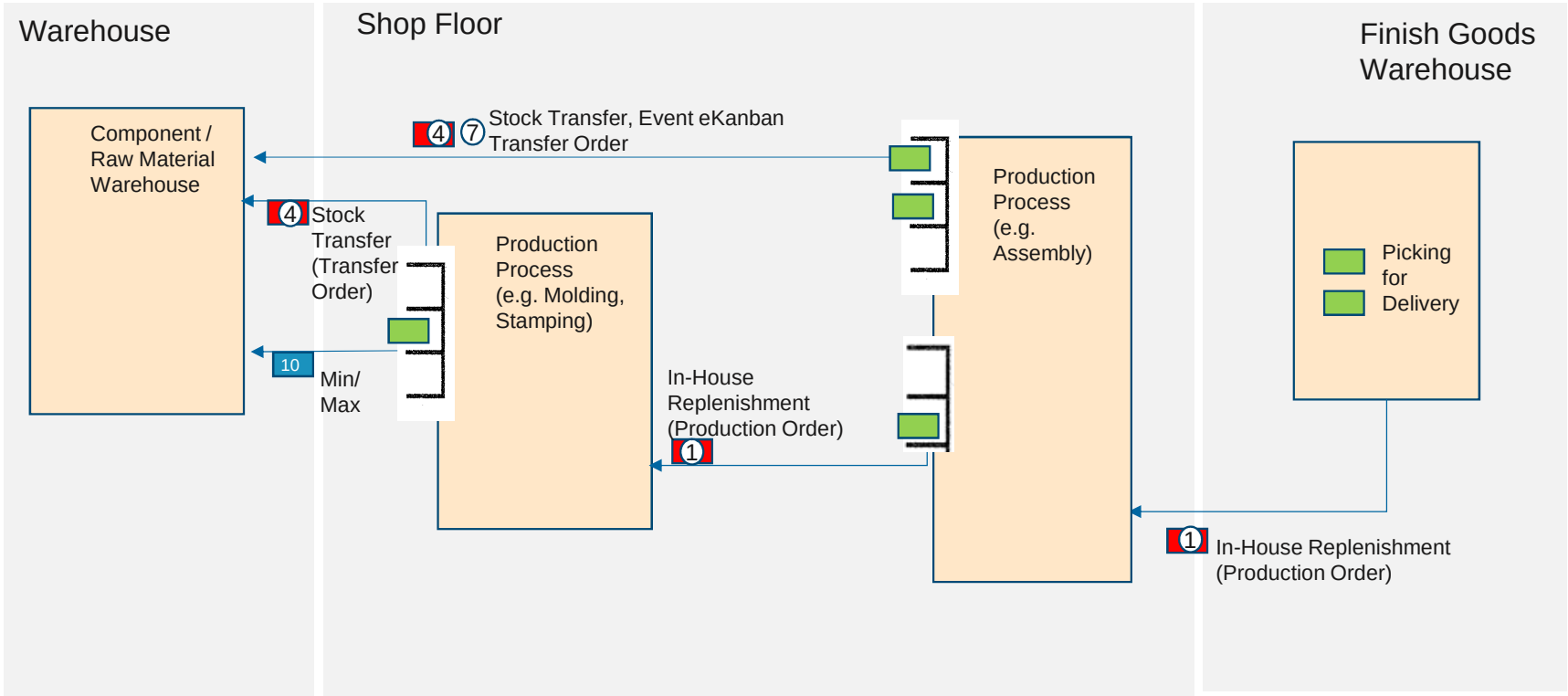
Production Orders
Warehouse Transfers
Purchase Orders
Subcontracting
Stock Transport Orders
Deliveries



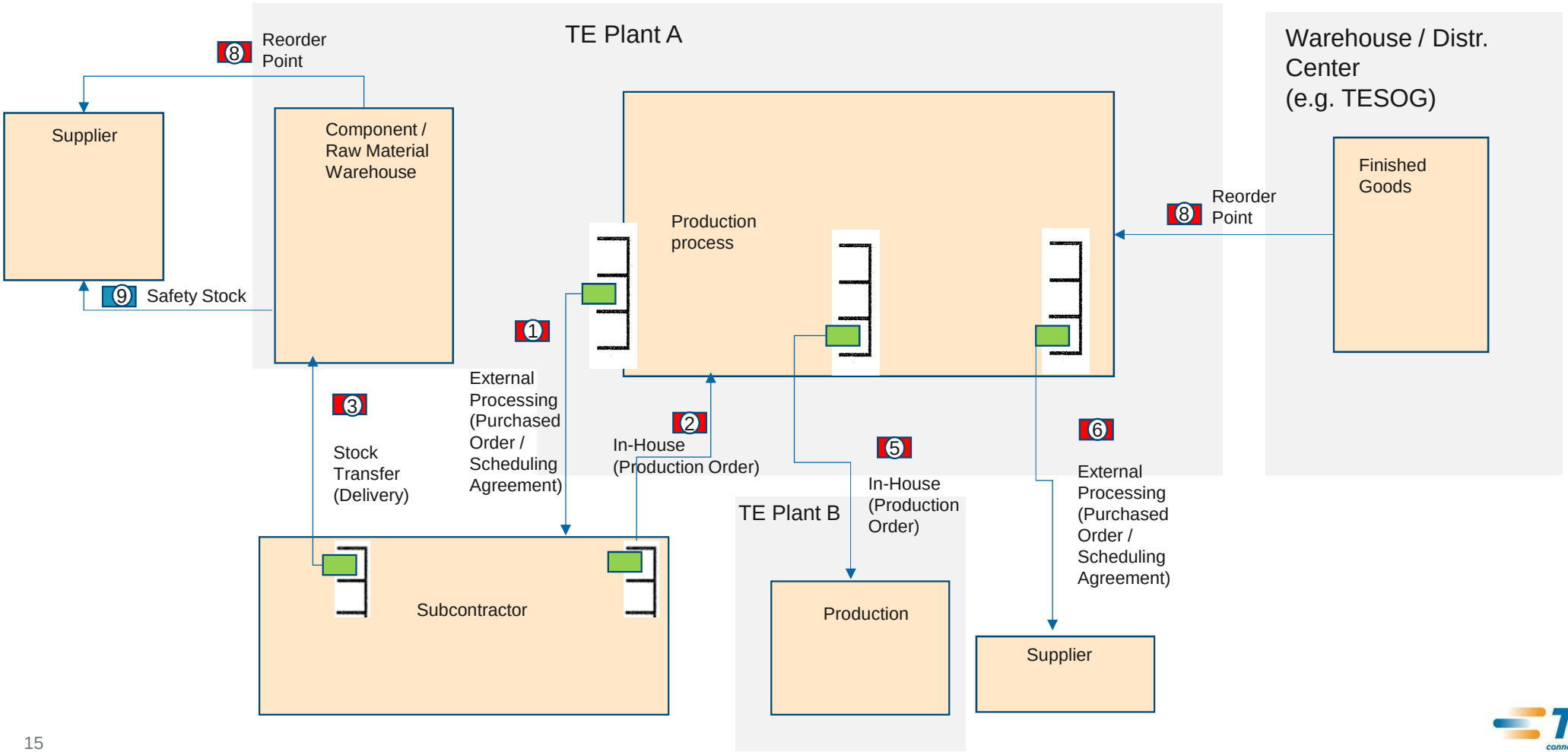
* Not considered Kanban from an SAP systems perspective

[1] Manually or via RF Scan (License Tag or Kanban Id)

Pull Strategies Overview – Within the Plant



Pull Strategies Overview – Outside the Plant



Pull Strategies – Overview Summary

Available eKanban Solutions

1. eKanban via In-House Manufacturing
2. eKanban via External Supplier (ext. sourced raw materials / components / packaging materials)
3. eKanban via Subcontracting (SC)
4. eKanban via Internal Transfers
5. eKanban via Cross Plants
6. eKanban integrated into Supplier Portal including container visibility and label integration
7. eKanban (Event Kanban) to replenish Dry Point of Use (POU) Stations

Alternate Replenishment Strategies

8. Reorder Point (ROP)
9. Safety Stock
10. Min / Max Inventory Level

All Levels

SAP eKanban

Differences in eKanban

SAP eKanban Strategies

Classic Kanban

- Each container represents the same quantity.
- Each container is replenished with the same quantity.
- Supports batch manufacturing; e.g. Kanban cycle has 10 containers, replenish 4 containers at a time instead of each individual container.

Event Kanban

- There is no set number of containers defined.
- A replenishment request is placed once the source sends the trigger to replenish.
- Assumes a set quantity to be replenished; i.e. each trigger will place a replenishment request for a set quantity.

SAP eKanban Strategies

One Card Kanban / Quantity Trigger

- Cycle has two containers
- Once trigger quantity has been reached (by means of material consumed), a replenishment order is triggered.
- Replenishment is for one container only
- Replenishment is for a preset quantity

All Levels

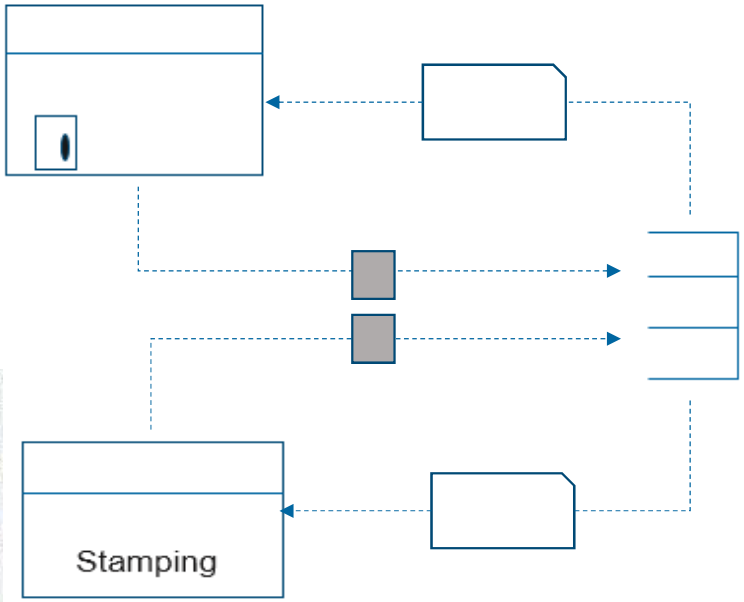
Replenishment Pull (RPS) and SAP eKanban

Supermarket

RPS via eKanban for Supermarkets – Internal Supply Sources

Warehouse

In-House Manufacturing



Supermarket

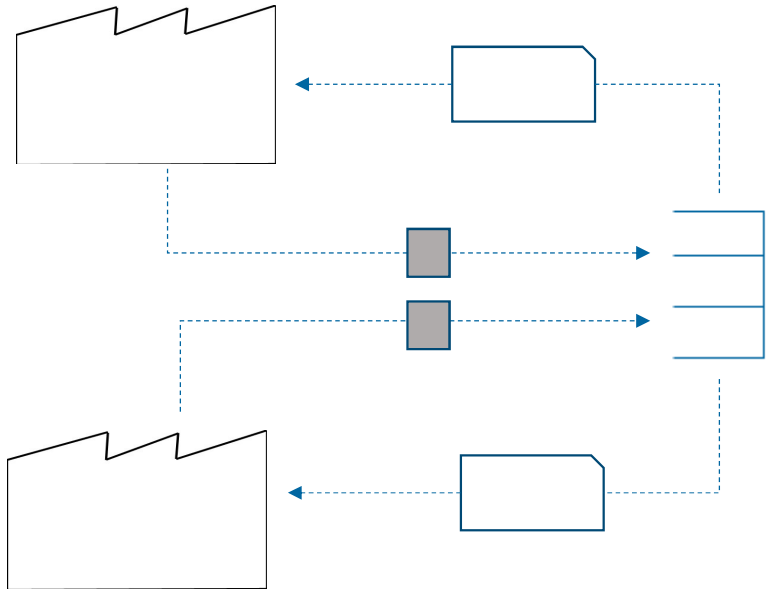
Production Supply Area linked to a Storage Location

RPS via eKanban for Supermarkets – External Supply Sources

External Vendor & Subcontractor

TE Affiliate / Interco

Sourcing from a different SAP Plant



Supermarket

Production Supply Area linked to a Storage Location

RPS via eKanban for Supermarkets

Key Take-Away's:

- A given material (component) within a given Supermarket (Production Supply Area / PSA) may has one source of supply / replenishment strategy and therefore one eKanban strategy.
- Recommended eKanban Strategies:
  - Classic Kanban
- Possible, but not recommended, eKanban Strategies:
  - One Card Kanban / Quantity Signal Kanban
  - Event Kanban
- Recommended Replenishment Strategies:
  - In-house manufacturing
  - Warehouse
  - TE Affiliate / Interco
  - External Suppliers (including Subcontracting)

Advanced Level

Replenishment Pull (RPS) and SAP eKanban

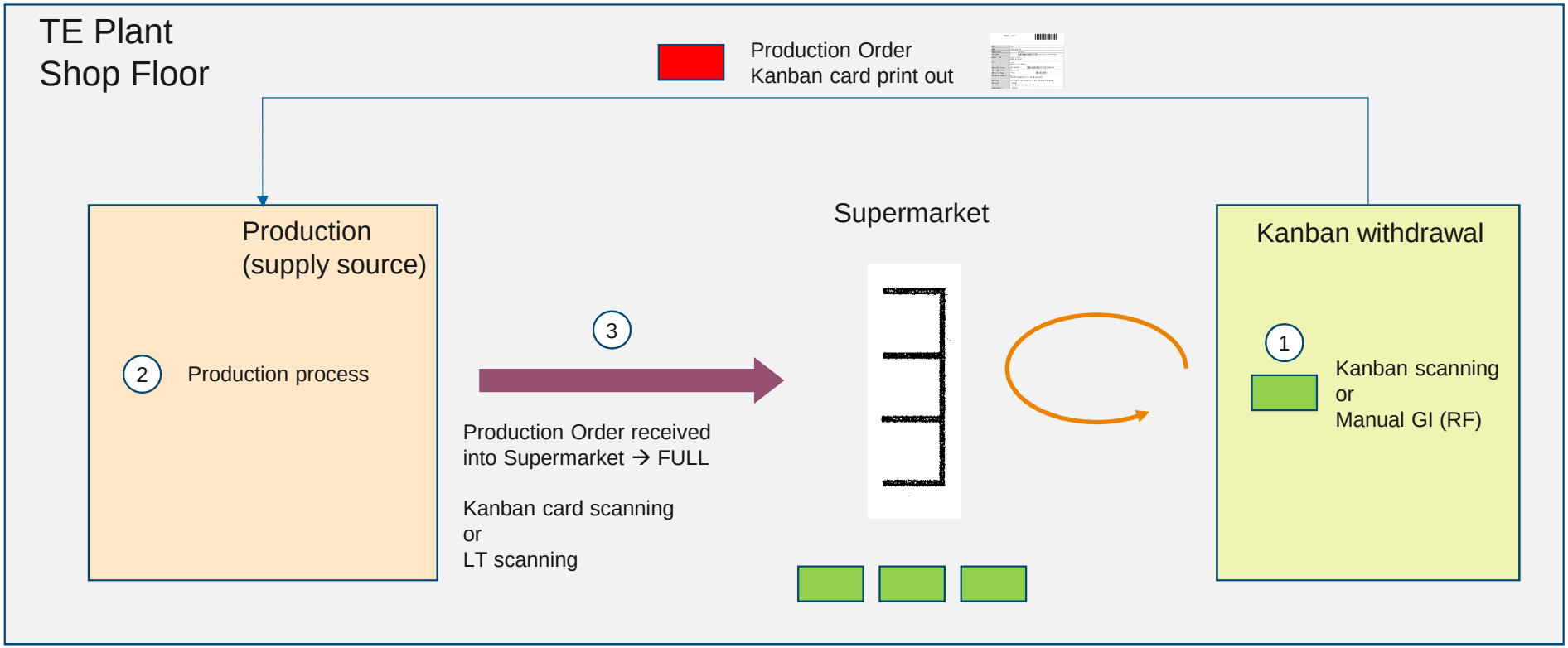
Supermarket Replenishment via In-House Manufacturing

Course Content

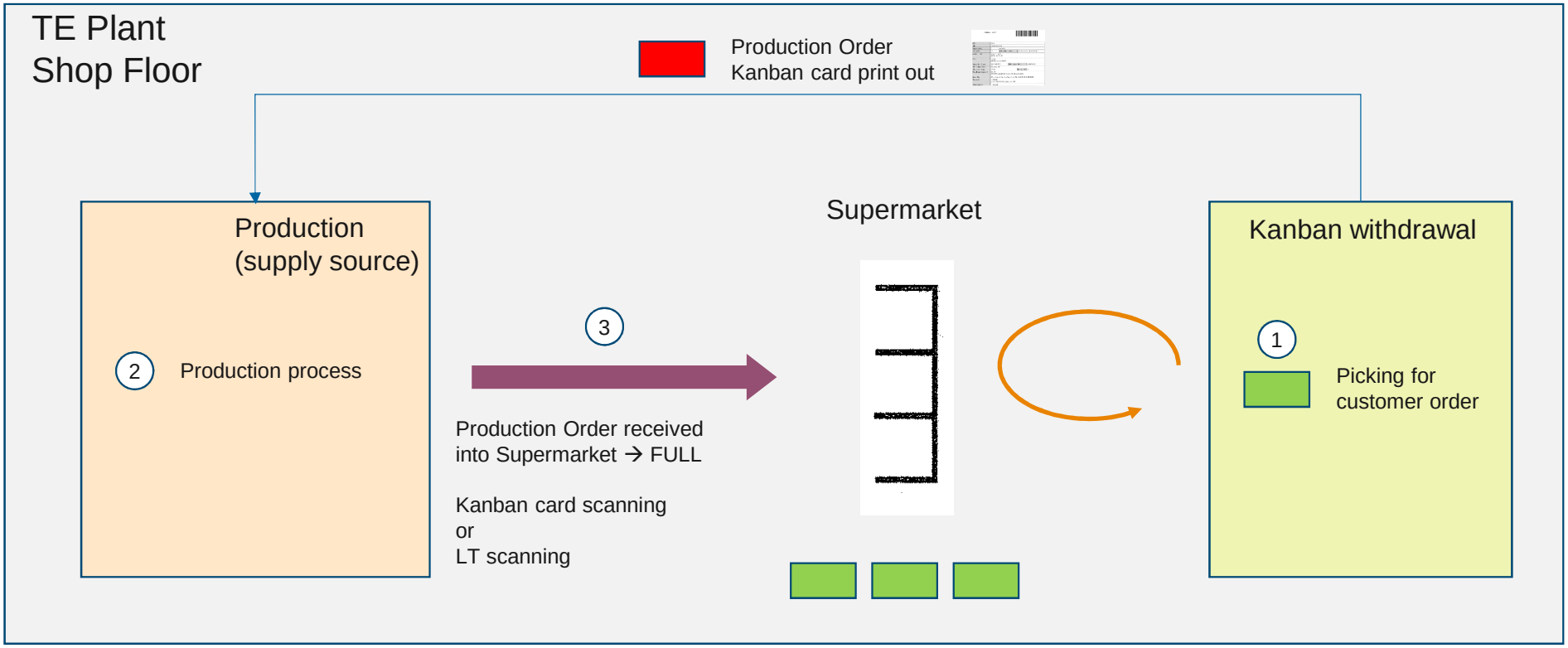
On-site (within the plant) Supermarket Replenishment for:

- Subassemblies
- Finished Goods
- Recording of consumption and triggering replenishment via production orders.

On-Site Supermarket Replenishment for a Subassembly via In-House Manufacturing



On-Site Supermarket Replenishment for Finished Goods via In-House Manufacturing



1 Kanban Consumption via Scanning Kanban card (Subassemblies)

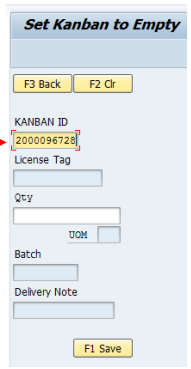
Kanban units are withdrawn from Kanban Supermarket and moved to the production location (Point of Use Station not eKanban managed) where these are required.

This is a physical movement, which has no impact on the available stock at the Supermarket.

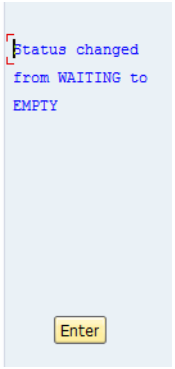
Kanban units are physically consumed in the production process of a parent material. This consumption may not yet be reported in the system.

When a production order confirmation is entered in the system, Kanban units will be consumed from Supermarket stock via backflushing, updating inventory level at the Supermarket.

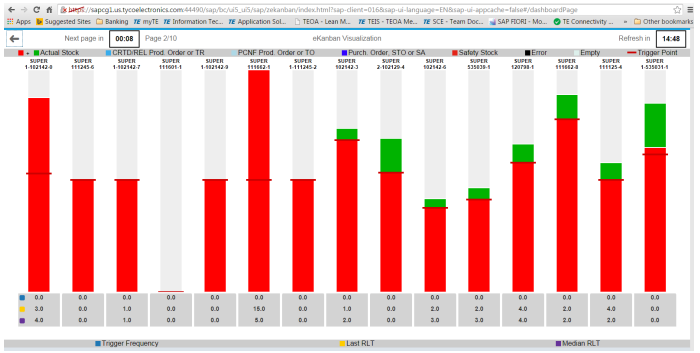
A new replenishment order will be triggered by scanning the Kanban card, once the container is physically empty.



Scan to EMPTY



Kanban container status changes may be displayed via the eKanban Visualization Board



1 Kanban Consumption via Goods Issue to Production Order

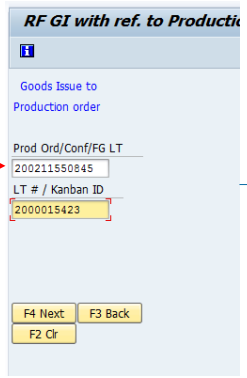
(Subassemblies)

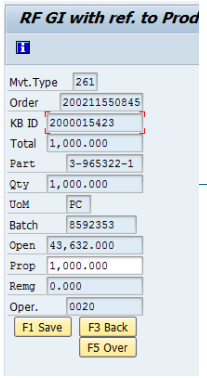
Kanban units are withdrawn from Kanban Supermarket and moved to the production location (Point of Use Station not eKanban managed) where these are required.

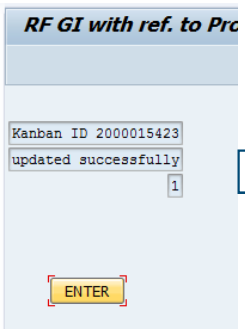
This is a physical movement, which has no impact on the available stock at the supermarket.

Kanban units are physically consumed in the production process of a parent material. Consumption is reported in the system, as it happens, which causes inventory and actual Kanban quantity to be reduced.

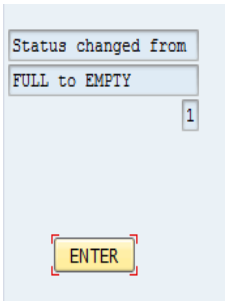
Once actual Kanban quantity reaches zero, a new replenishment order is automatically generated.



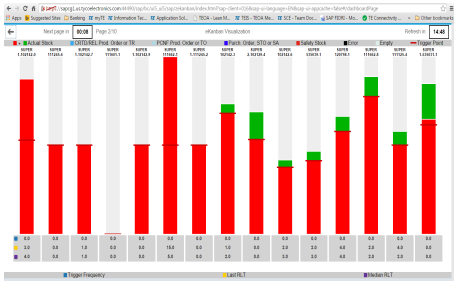




Automatic update



Kanban container status changes may be displayed via the eKanban Visualization Board

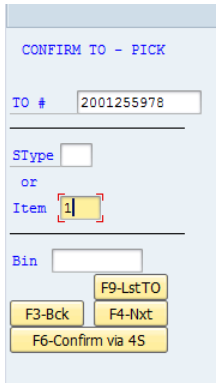


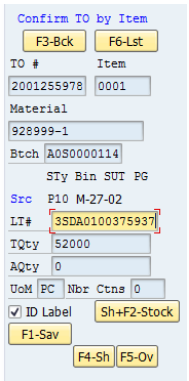
1 Kanban Consumption when Material is Picked for Customer Order (Finished Goods)

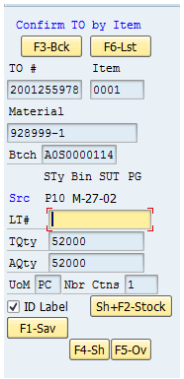
Material to be shipped to a customer is picked from the Kanban Supermarket via confirming a Transfer Order (aka Confirm Picking).

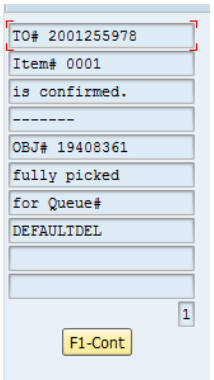
If a Kanban container = 1 pallet: When all cartons from a pallet are picked, a new Kanban replenishment order is automatically generated.

If a Kanban container = 1 carton. When the carton is picked, a new Kanban replenishment order is automatically generated.

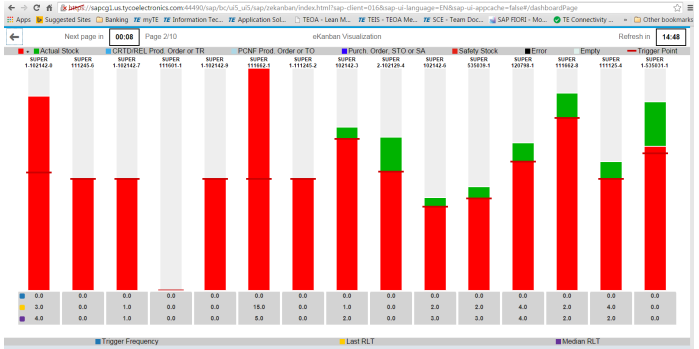








Kanban container status changes may be displayed via the eKanban Visualization Board



2 Production Process: Kanban Production Order

Production orders generated via Kanban processing have following features:

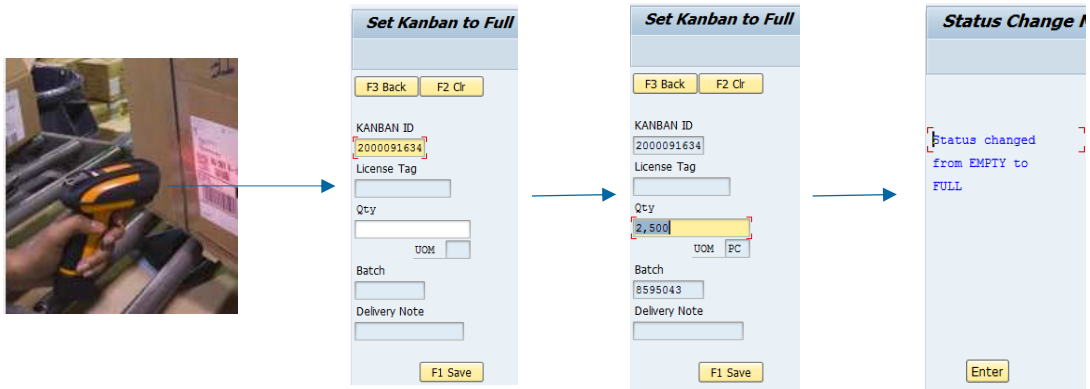
- Production order is automatically generated as a result of material consumption and Kanban container status change (set to status EMPTY).
- Kanban production orders can be easily be identified since a unique order type is used (ZKAN). This is helpful for operators to differentiate Kanban replenishment orders from other (Push) replenishment orders.
- Kanban production orders are scheduled in forward mode from current date. It is assumed production can start timely.
- Kanban production orders are usually released during the create process. However, these production orders can also be generated in “create” status only. In this case, an additional step to release the production order is required (performed by the In-plant Scheduler).
- No components / capacity check is performed during the creation / release of the Kanban production orders since it is assumed to be available.
- Printing of Shop Floor Documents and License Tags (if applicable) will be done as previously (before material move to pull system)

3 Supermarket Replenishment via a Production Order

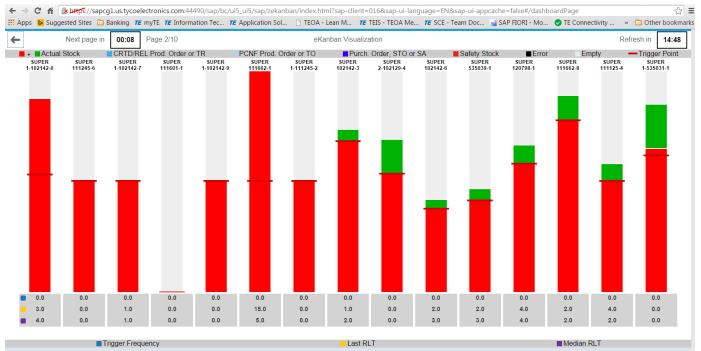
If Kanban cards / labels are used, material produced is received into the supermarket via a Kanban card scan.

By doing so the following actions are executed:

- Kanban container changes from status EMPTY to FULL.
- Goods receipt is executed against the production order: inventory increases at the Supermarket location



Kanban container status changes may be displayed via the eKanban Visualization Board

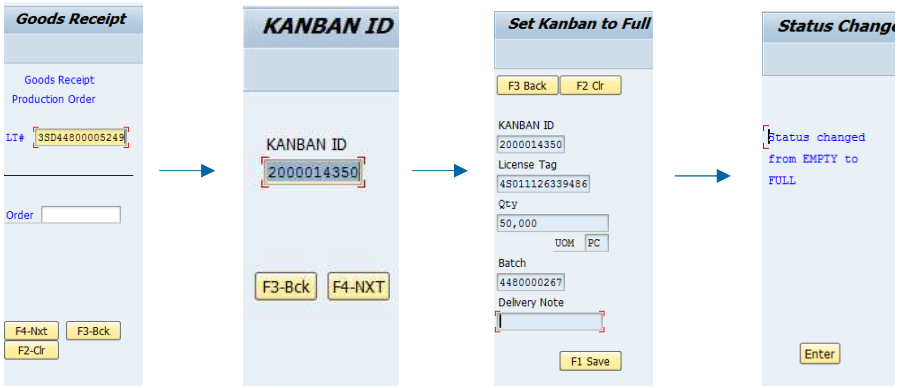


3 Supermarket Replenishment via a Production Order (continued)

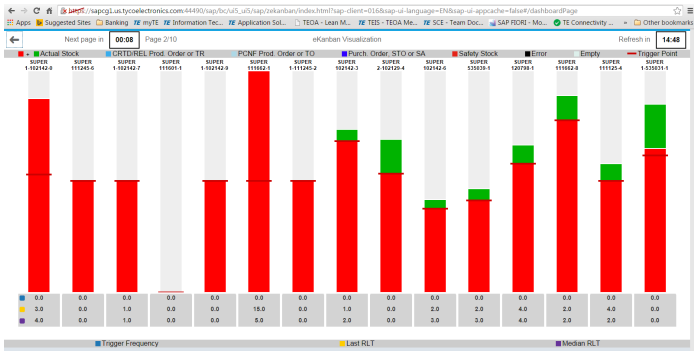
If goods receipts has to be processed with reference to License Tags, the material produced is received into the Supermarket via scanning the License Tag.

By doing so the following actions are executed:

- Kanban container changes from status EMPTY to FULL
- Goods receipt is executed against the production order: inventory increases at the Supermarket location



Kanban container status changes may be displayed via the eKanban Visualization Board



Advanced Level

Replenishment Pull (RPS) and SAP eKanban

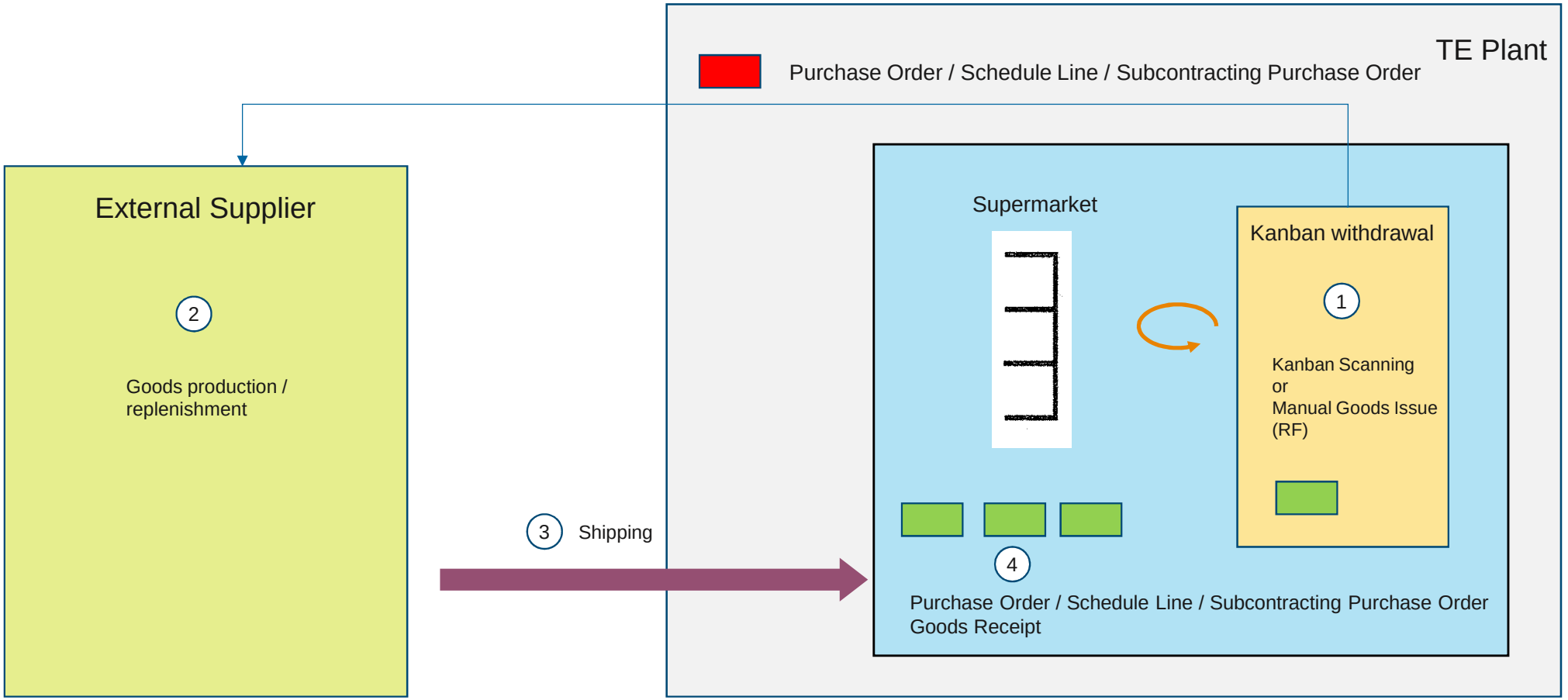
Supermarket Replenishment via External Supply Sources

Introduction

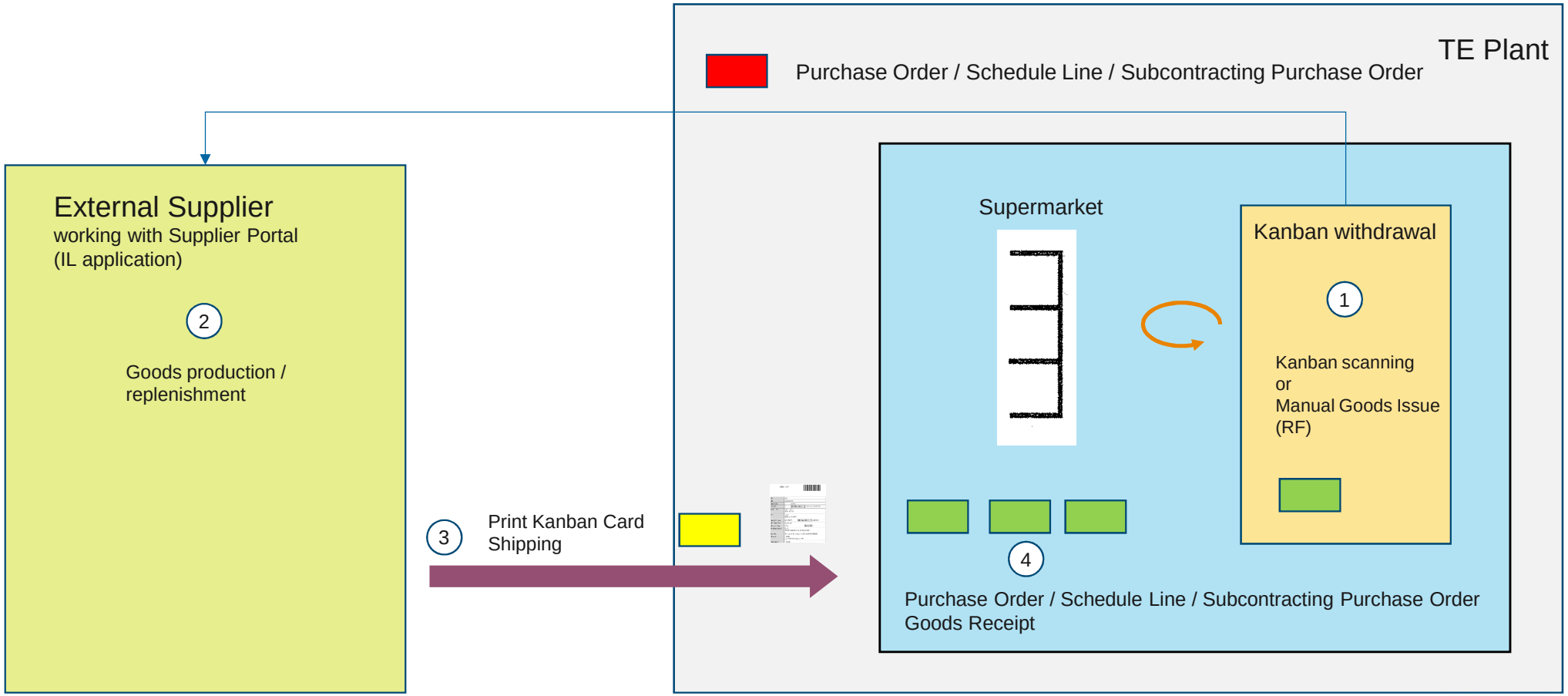
On-site Supermarket Replenishment for components / sub-assemblies using:

- Purchase Orders / Scheduling Agreements
- Subcontracting Orders
- Stock Transport Orders

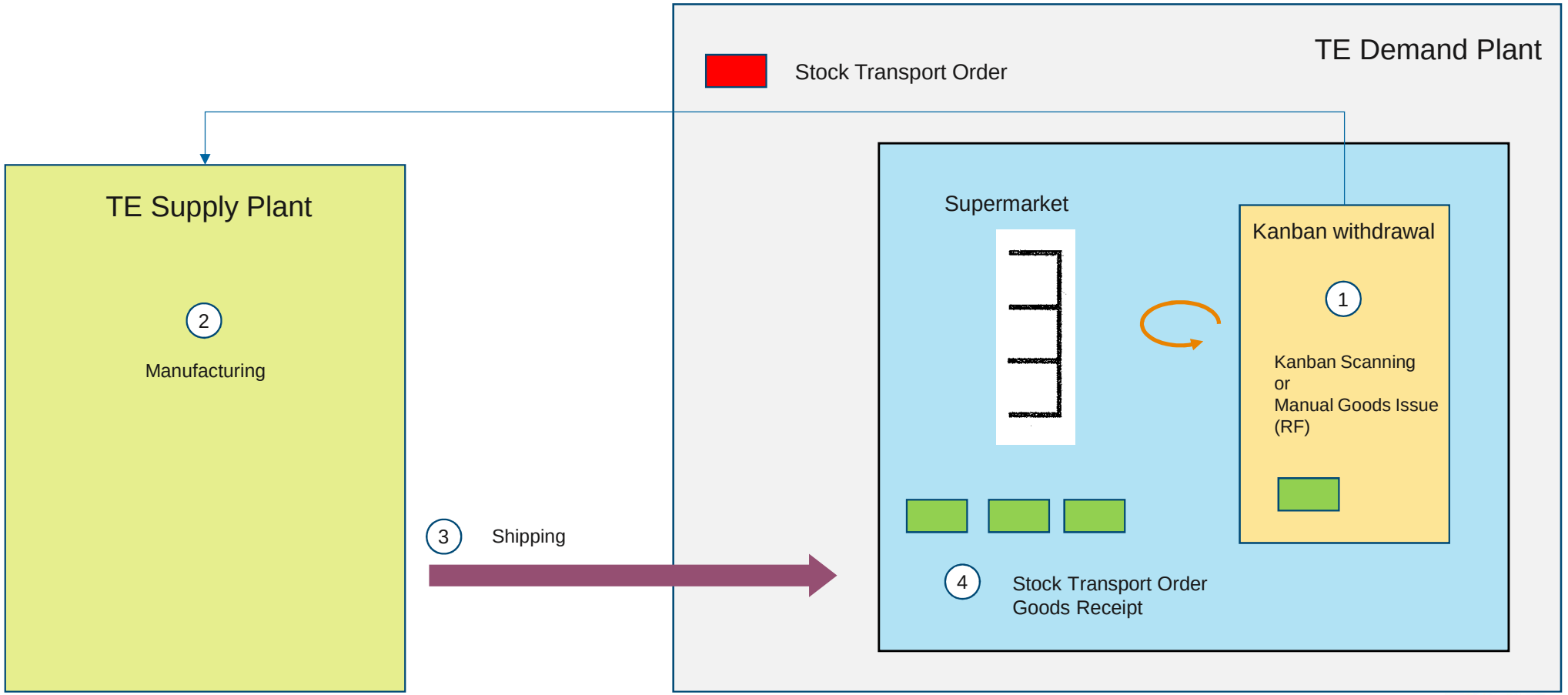
On-Site Supermarket Replenishment from External Vendor via Purchase Orders, Schedule Agreements or Subcontracting Purchase Orders



On-Site Supermarket Replenishment from External Vendor, using Supplier Portal, via Purchase Orders, Schedule Agreements or Subcontracting Purchase Orders

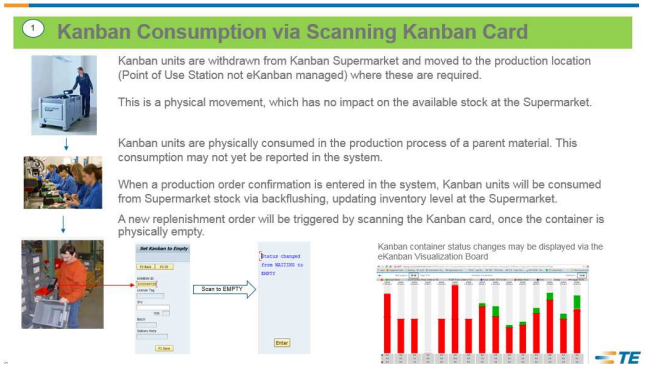


On-Site Supermarket Replenishment from another TE Plant via Stock Transport Orders



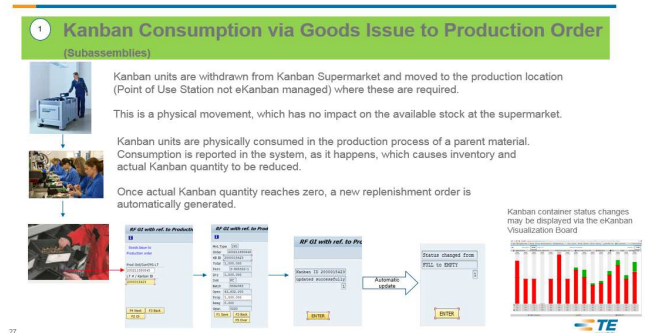
1 Kanban Consumption via Scanning Kanban Card

Same process as for Supermarket via In-House Manufacturing – refer to previous slides



1 Kanban Consumption via Goods Issue to Production Order

Same process as for Supermarket via In-House Manufacturing – refer to previous slides



1 Replenishment Orders

For the scenarios described, one of following replenishment orders may be generated via Kanban processing:

- (Standard) Purchase Orders:
  - Delivery due date is calculated using the lead-time as maintained on the purchasing info-record.
  - Purchase Orders generated via Kanban, are flagged as “Kanban” Purchase Orders
  - These purchase orders may be auto submitted via fax or email to the vendor.

- Schedule Lines:
  - Delivery due data is calculated using the lead time as maintained on the Schedule Agreement.
  - Schedule Agreements to be used in Kanban have to be flagged as “Kanban”
  - Schedule Line may be submitted via fax or email to vendor

1 Replenishment Orders (continued)

For the scenarios described, one of following replenishment orders may be generated via Kanban processing:

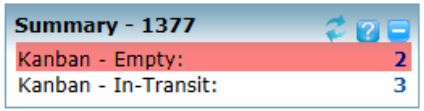
- Subcontracting Purchase Orders:
  - Same features as standard Purchase Orders apply.
  - In addition, Subcontracting Contracts have to be created and maintained as part of the Kanban master data.

- Stock Transport Orders:
  - Demand and Supply Plant must belong to the same Company Code
  - Purchase Order is created at the demand source (aka Demand Plant)
  - Release Orders is created at the supply source (aka Supplying plant)

1 Replenishment Orders (continued)

Kanban container status EMPTY may be displayed in the eKanban Board and also in the Supplier Portal (assumes external Vendor / Subcontractor is set-up for the same).

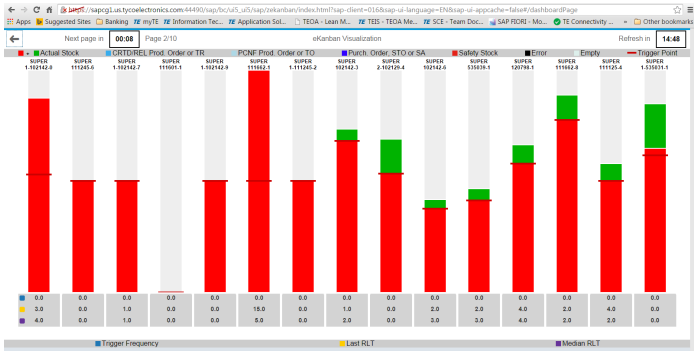
Supplier Portal



Kanban List

Kanban ID	Status	Order#	Line #	Part No	Qty	Lic. Tag
2000039480	Empty	2490884844	1	439089-000	2,100 PC	No
2000039479	Empty	2490903222	1	439089-000	2,100 PC	No

Kanban container status changes may be displayed via the eKanban Visualization Board



2 Replenishment Process

Depending on the scenario, the External Vendor or the Subcontractor, produces the goods and proceeds with shipment.

Shipments made by the external Vendor or Subcontractor may be visualized in the eKanban Board and or Supplier Portal, assuming Supplier Portal (Internet Labeling) has been enabled.

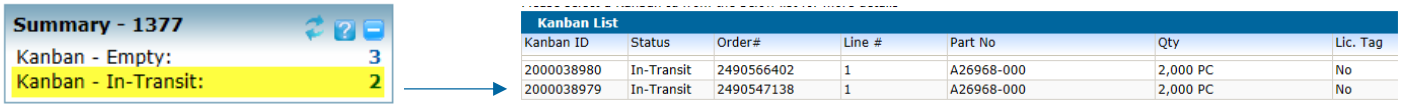
3 Shipping

Shipments made by the external Vendor or Subcontractor may be visualized in the eKanban Board and or Supplier Portal as “In-Transit”, assuming Supplier Portal (Internet Labeling) has been enabled.

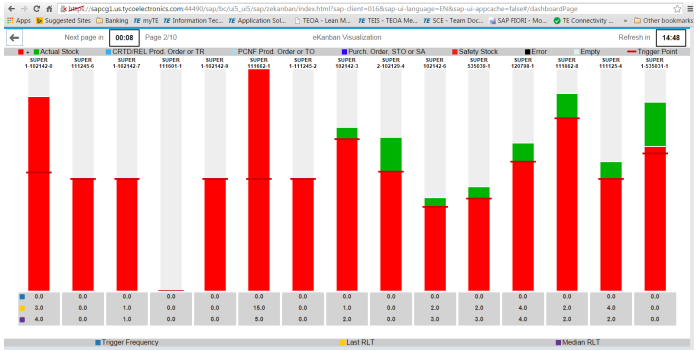
Supplier Portal:

- External Vendor or Subcontractor confirms Kanban container is finalized
- Triggers automatic Kanban status change to IN-TRANSIT.
- Kanban cards may be printed by External Vendor or Subcontractor.

Supplier Portal



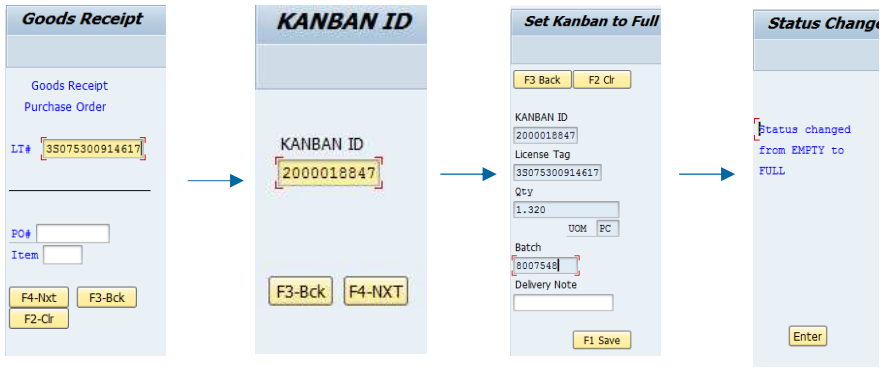
Kanban container status changes may be displayed via the eKanban Visualization Board



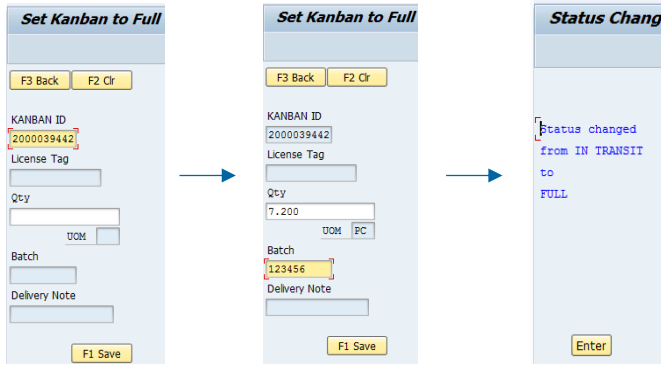
4 Goods Receipt into Supermarket

Inbound processing upon goods arrival at the Demand Source:
Goods Receipt processing takes place for Supermarket replenishment and Kanban container status changes to FULL.

Goods Receipt processing via License Tags:



Otherwise, Kanban card may be scanned

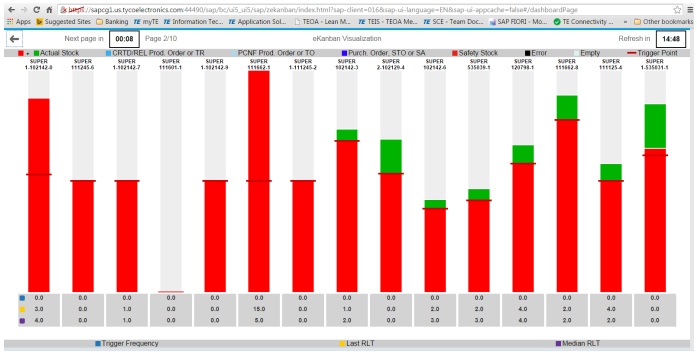


Status In-Transit only applicable if Supplier Portal is used.

4 Goods Receipt into Supermarket

Kanban containers in status FULL are NOT displayed in the Supplier Portal: External Vendor or Subcontractor may not have info about FULL containers in the TE Plant.

Kanban container status changes may be displayed via the eKanban Visualization Board

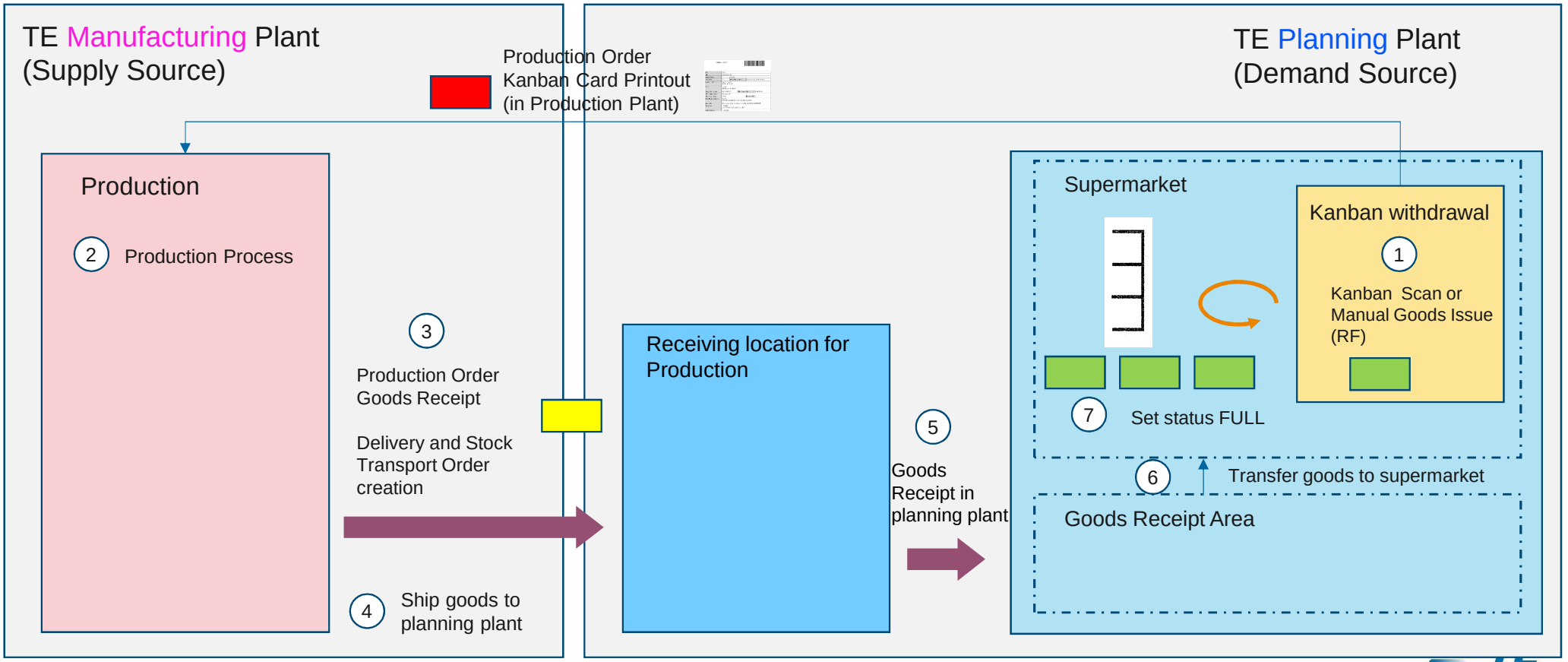


Advanced Level

Replenishment Pull (RPS) and SAP eKanban

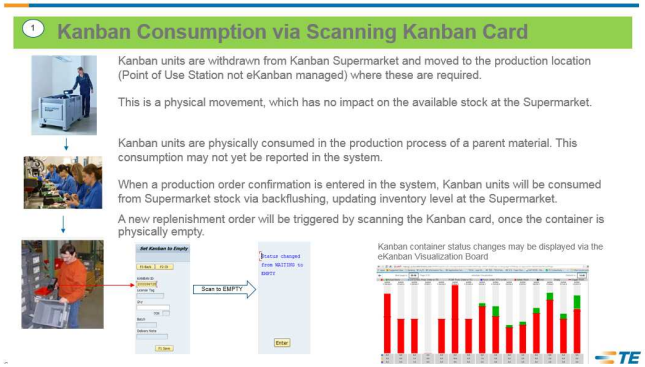
Supermarket Replenishment via Manufacturing in Alternate Plant (MIAP)

On-site Supermarket Replenishment via MIAP



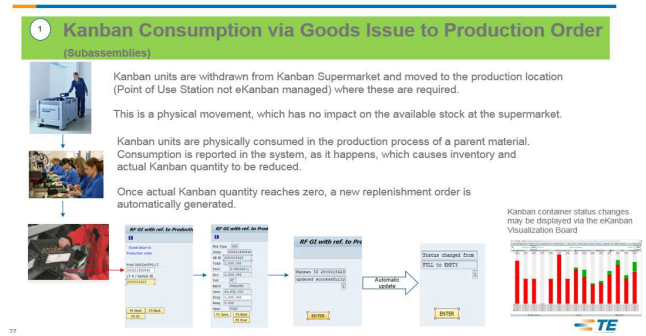
1 Kanban Consumption via Scanning Kanban Card

Same process as for Supermarket via In-House Manufacturing – refer to previous slides



1 Kanban Consumption via Goods Issue to Production Order

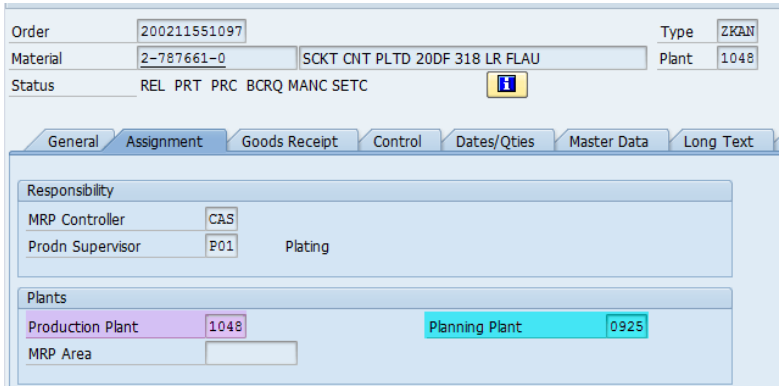
Same process as for Supermarket via In-House Manufacturing – refer to previous slides



2 Production Process: Kanban Production Order in Alternate Plant (MIAP)

Production orders generated via Kanban processing have following features:

- Production order is automatically generated in the Manufacturing Plant as a result of material consumption and Kanban container status change (set to status EMPTY) at the Demand Source.
- Kanban production orders can be easily be identified since a unique order type is used (ZKAN).
- Kanban production orders are scheduled in forward mode from current date. It is assumed production can start timely.

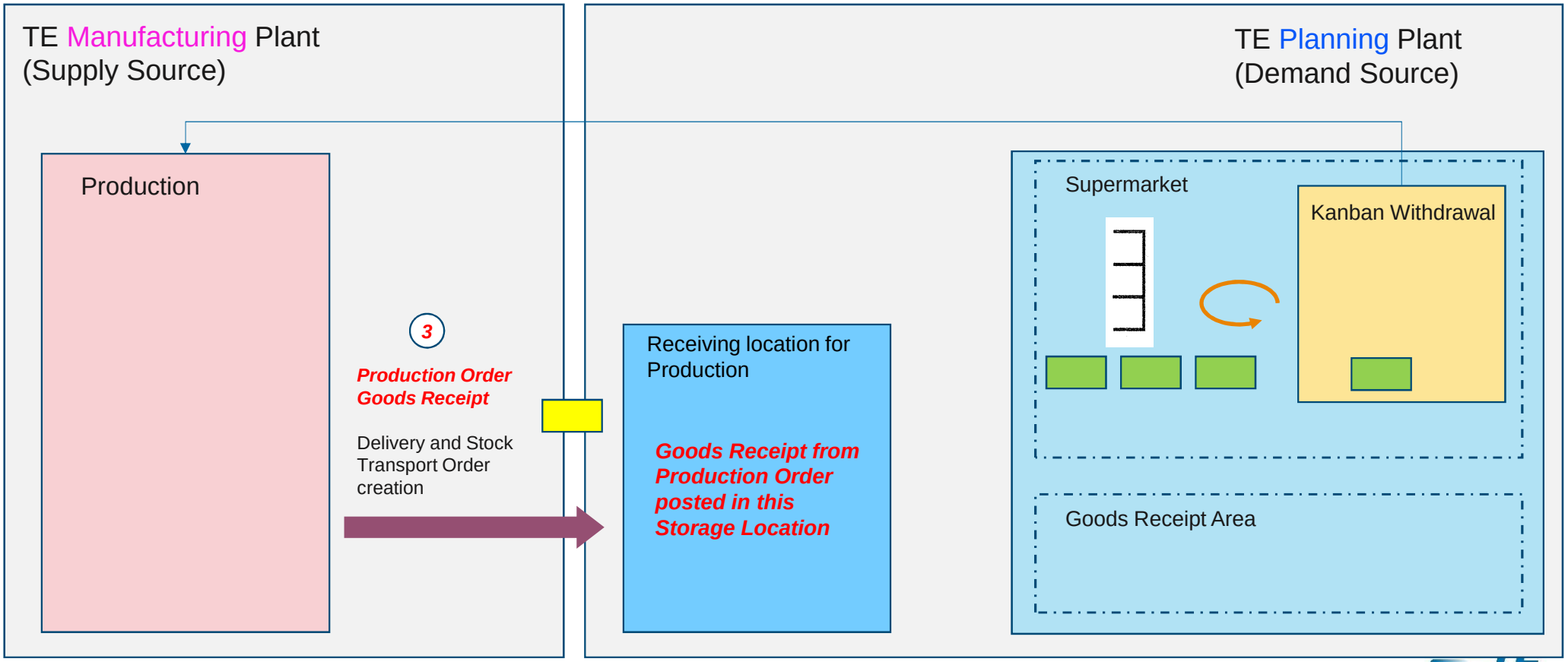


2 Production Process: Kanban Production Order in Alternate Plant (MIAP) (continued)

Production orders generated via Kanban processing have following features:

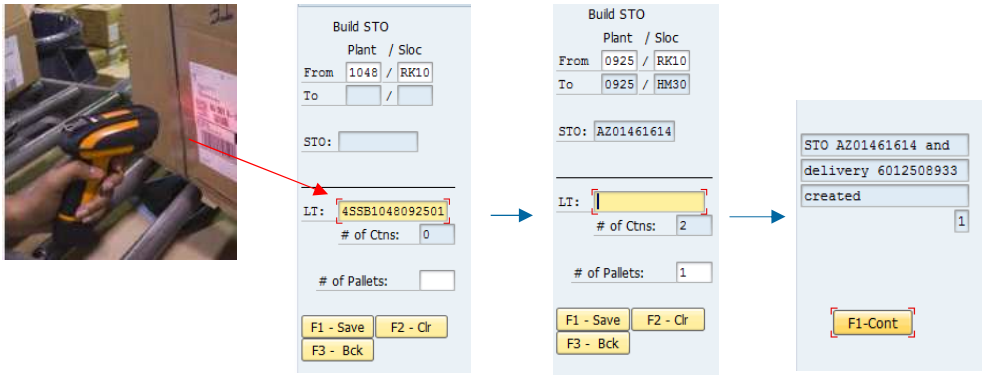
- Kanban production orders are usually released during the create process. However, these production orders can also be generated in “create” status only. In this case, an additional step to release the production order is required (performed by the In-plant Scheduler).
- No component / capacity check is performed during the creation / release of the Kanban production orders since it is assumed either is available.
- Printing of Shop Floor Documents and License Tags (if applicable) will be done as previously (before material move to pull system)
- Kanban Cards / Labels (1 per Container) may be automatically printed at the Manufacturing Plant, when container is set to EMPTY status at the Demand Plant

3 Goods Receipt from Production Order: Stock Posting

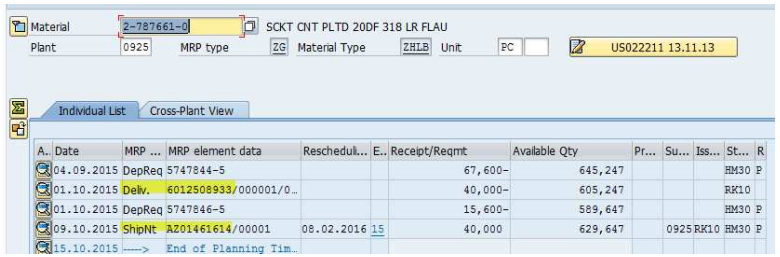


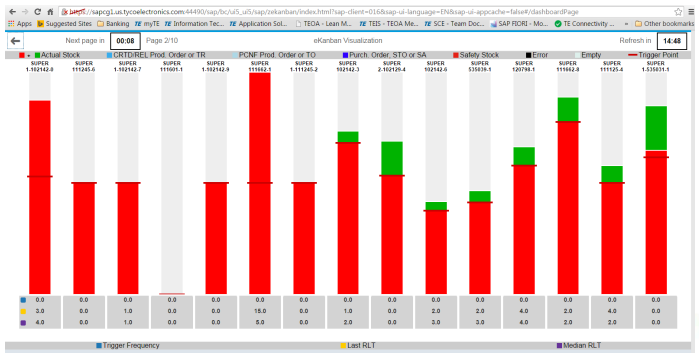
3 Goods Receipt from Production Order

- Goods receipt(*) processing via License Tag scanning.
- Kanban status changes from EMPTY to In-Transit automatically
- Status In-Transit is visible at the Demand Source
- Stock Transport Order and Delivery to move goods from the Manufacturing Plant to the Demand Plant is generated automatically.



Inventory In-Transit

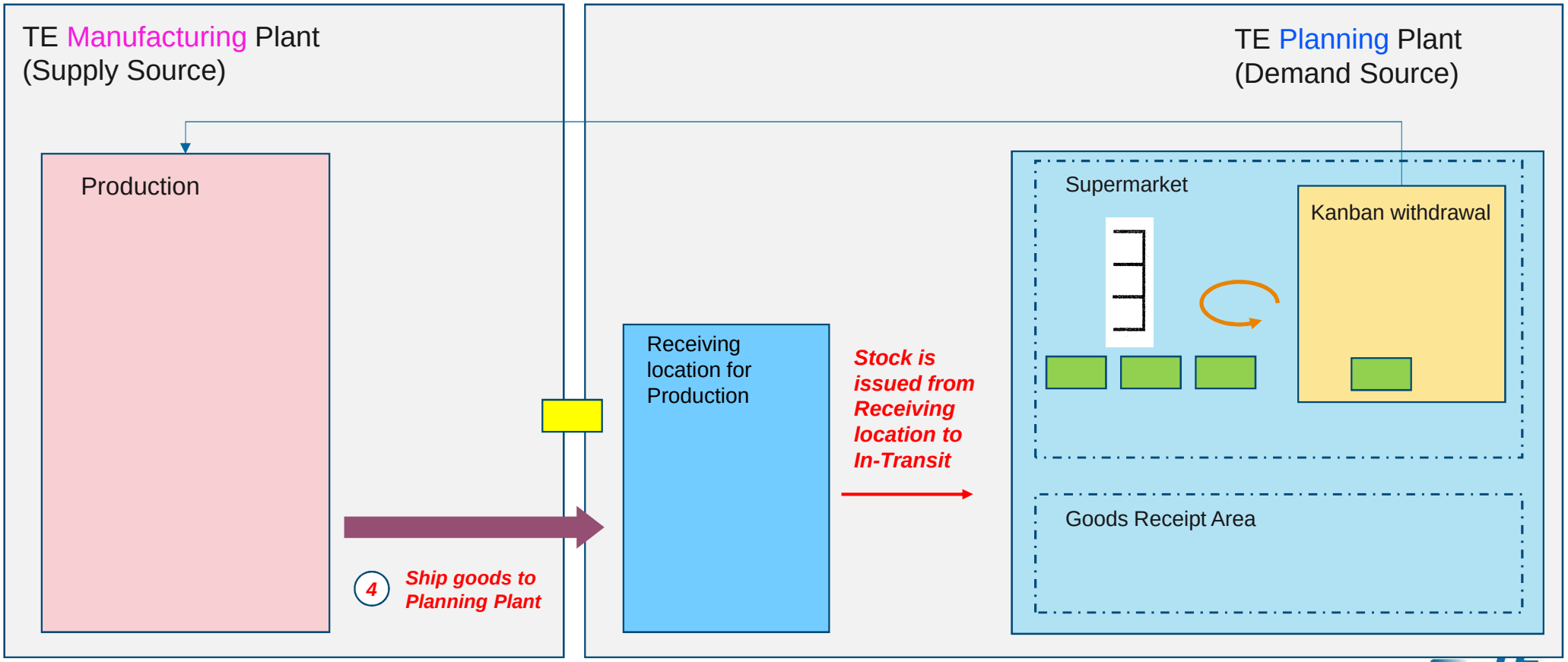




Kanban container status changes may be displayed via the eKanban Visualization Board

(*) Goods receipt is processed into a storage location that belongs to the Demand Plant. Physically, goods are residing at the Manufacturing plant.

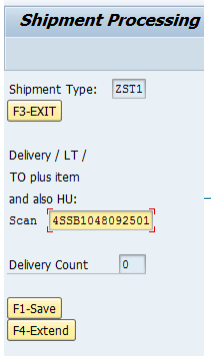
4 Goods Receipt from Production Order: Stock Posting

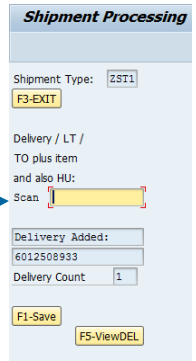


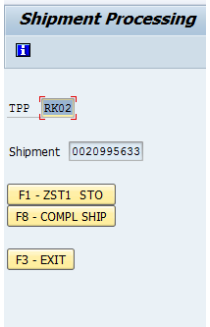
4 Ship Goods to Demand Source

When goods are ready to be shipped from the Supply Source to the Demand Source, a shipment is created at the Supply Source.

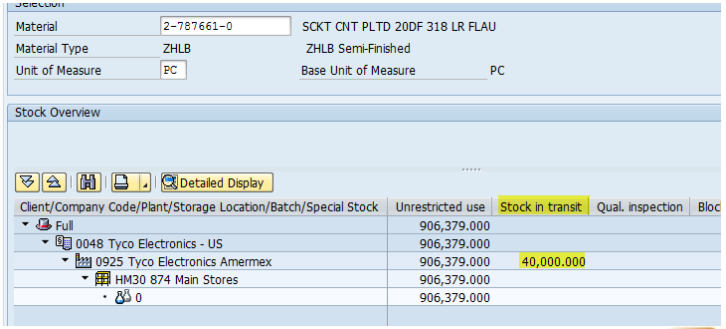
Stock is issued from the receiving storage location and goods are sent to the Demand Source.



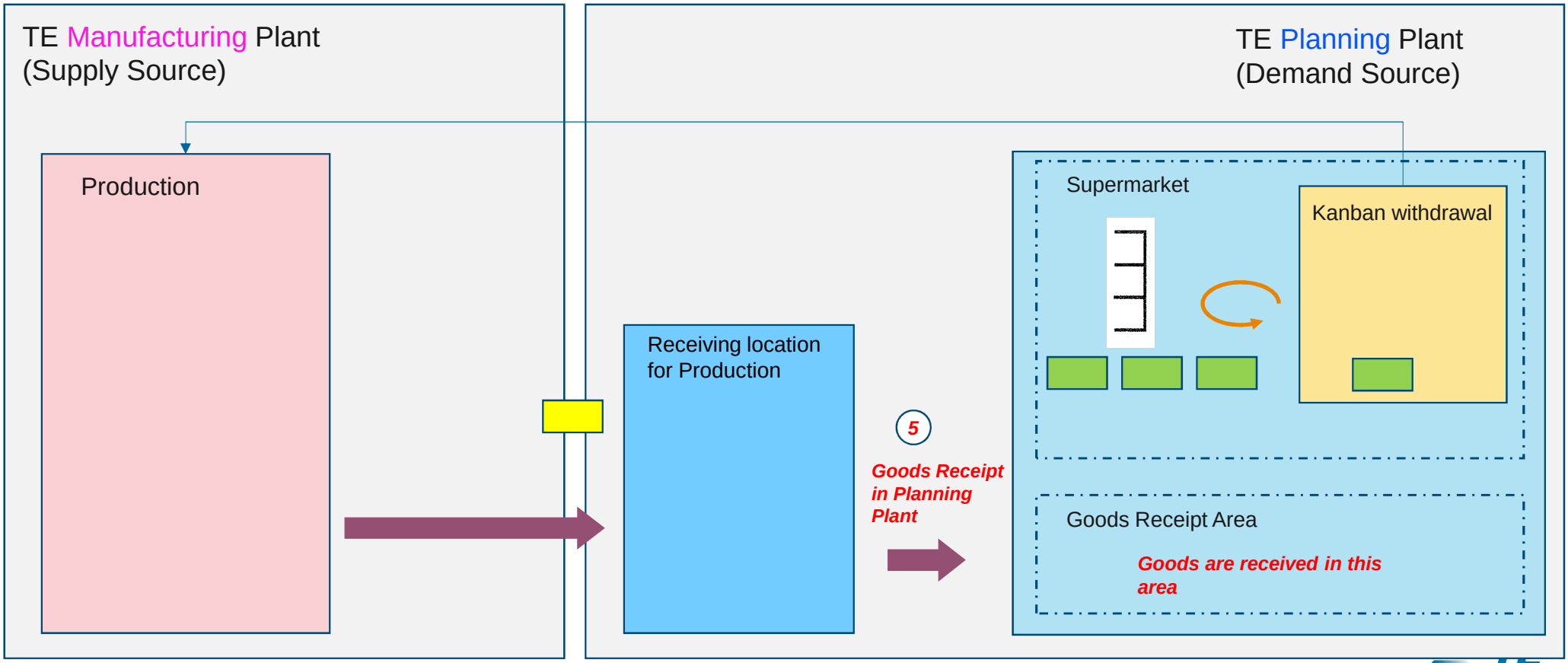




Stock is in In-Transit status.



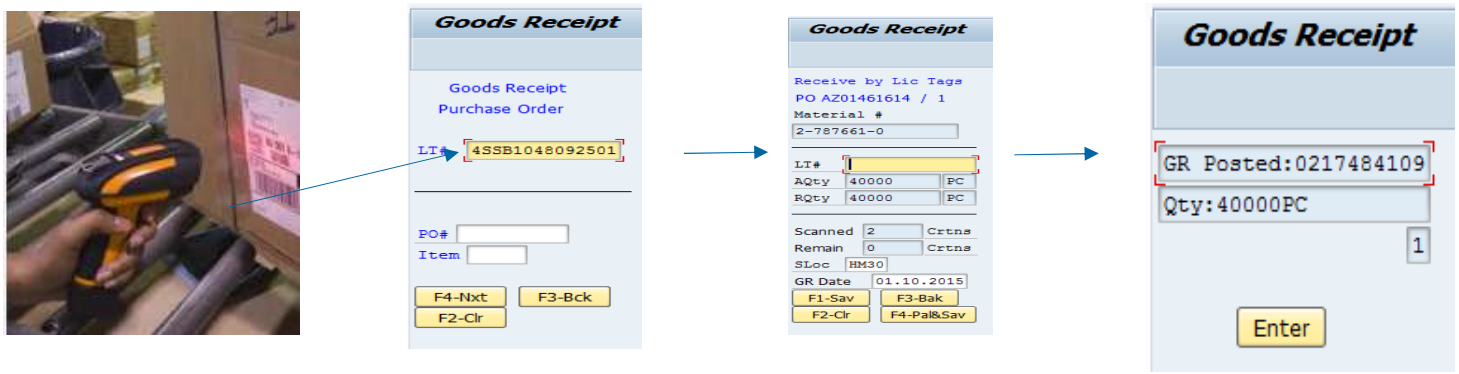
5 Goods Receipt at Demand Source: Stock Posting



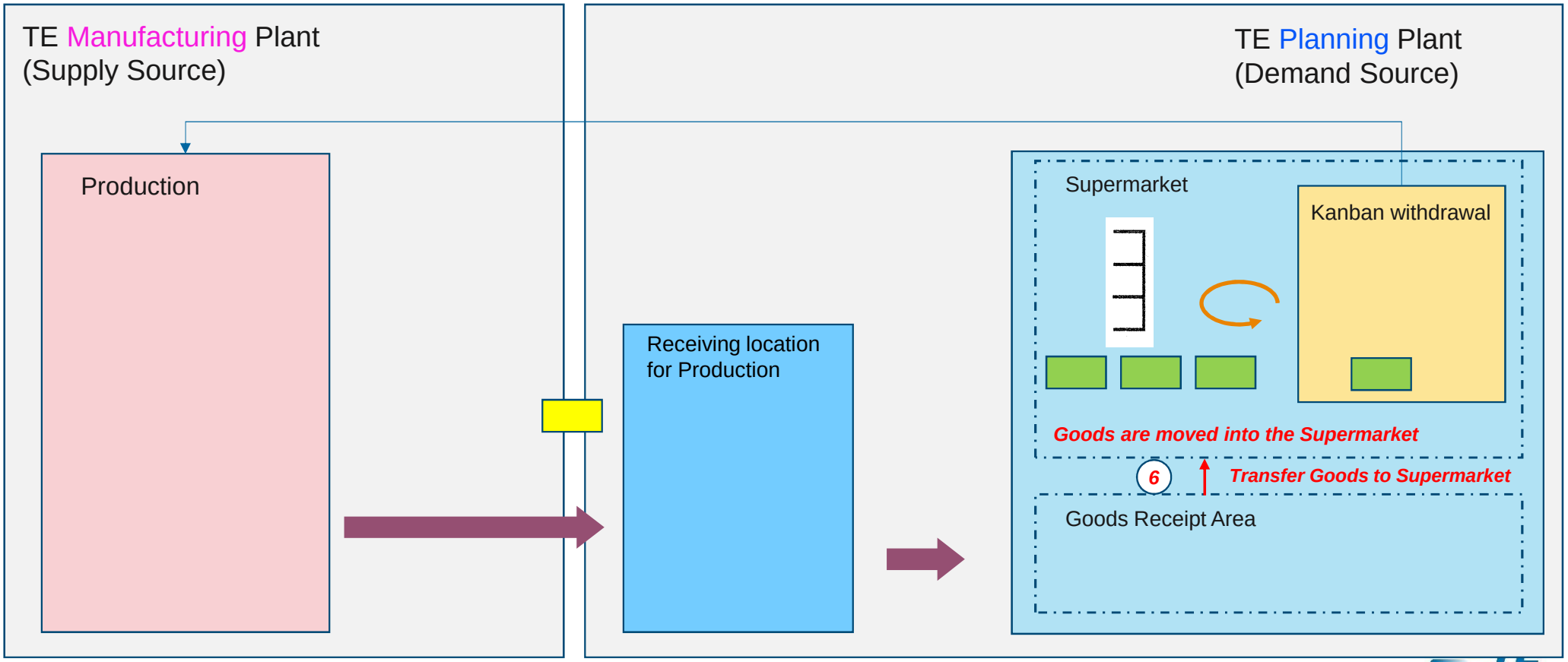
5 Goods Receipt at Demand Source

Goods receipt is processed at the Demand Source via License Tag with reference to the Stock Transport Order.

Goods are posted into the general goods receipt area and subsequently transferred into the Supermarket location.

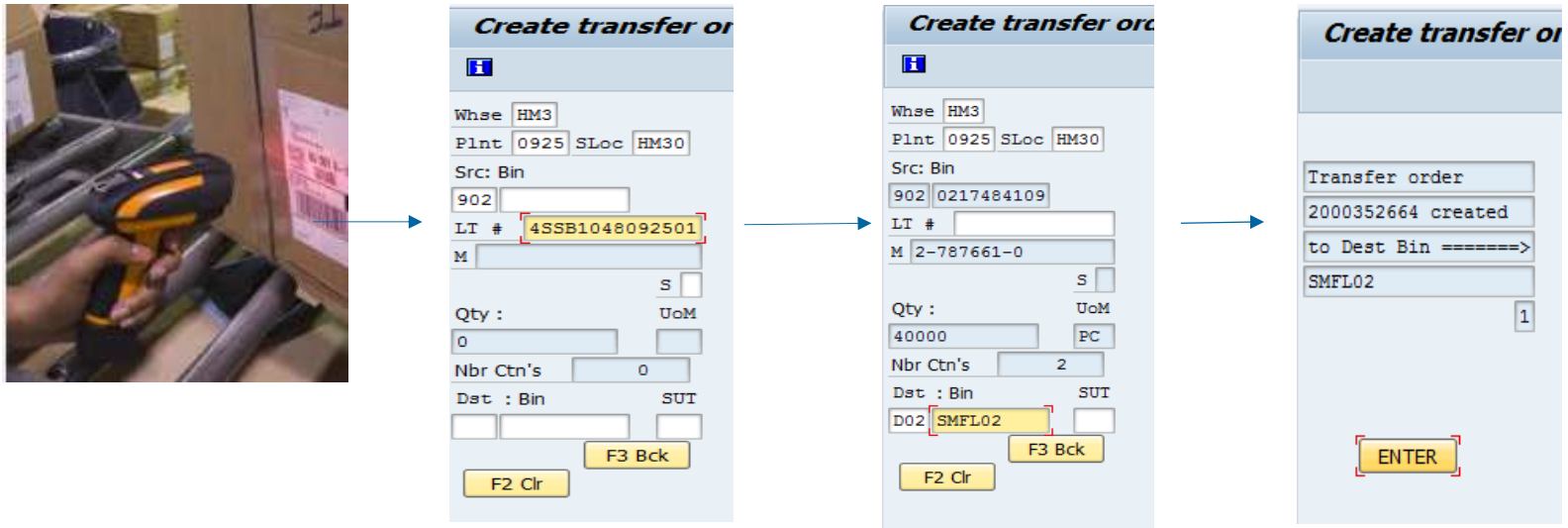


6 Transfer Goods to Supermarket Location: Stock Transfer Posting



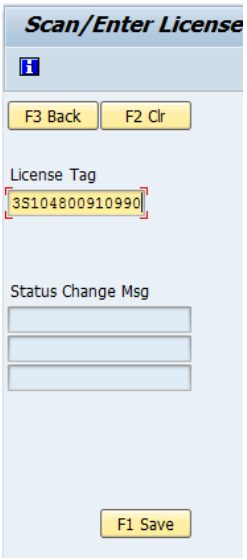
6 Transfer Goods to Supermarket Location: Stock Transfer Posting

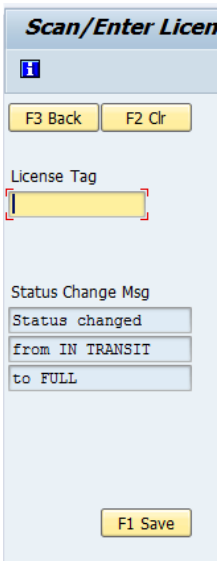
Goods are moved from the Goods Receipt area to the Supermarket location



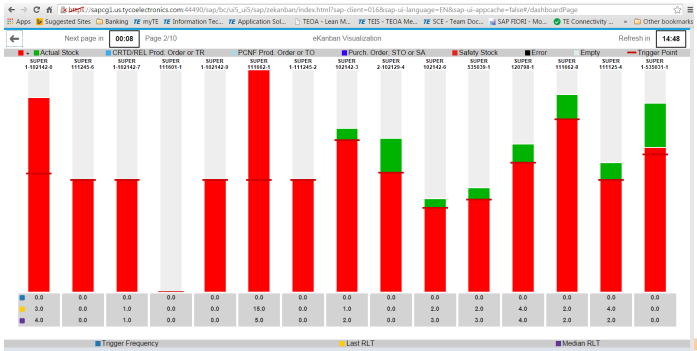
7 Set Kanban to status FULL

Kanban containers which have been transferred to the supermarket location are changed to status FULL by scanning License Tags





Kanban container status changes may be displayed via the eKanban Visualization Board

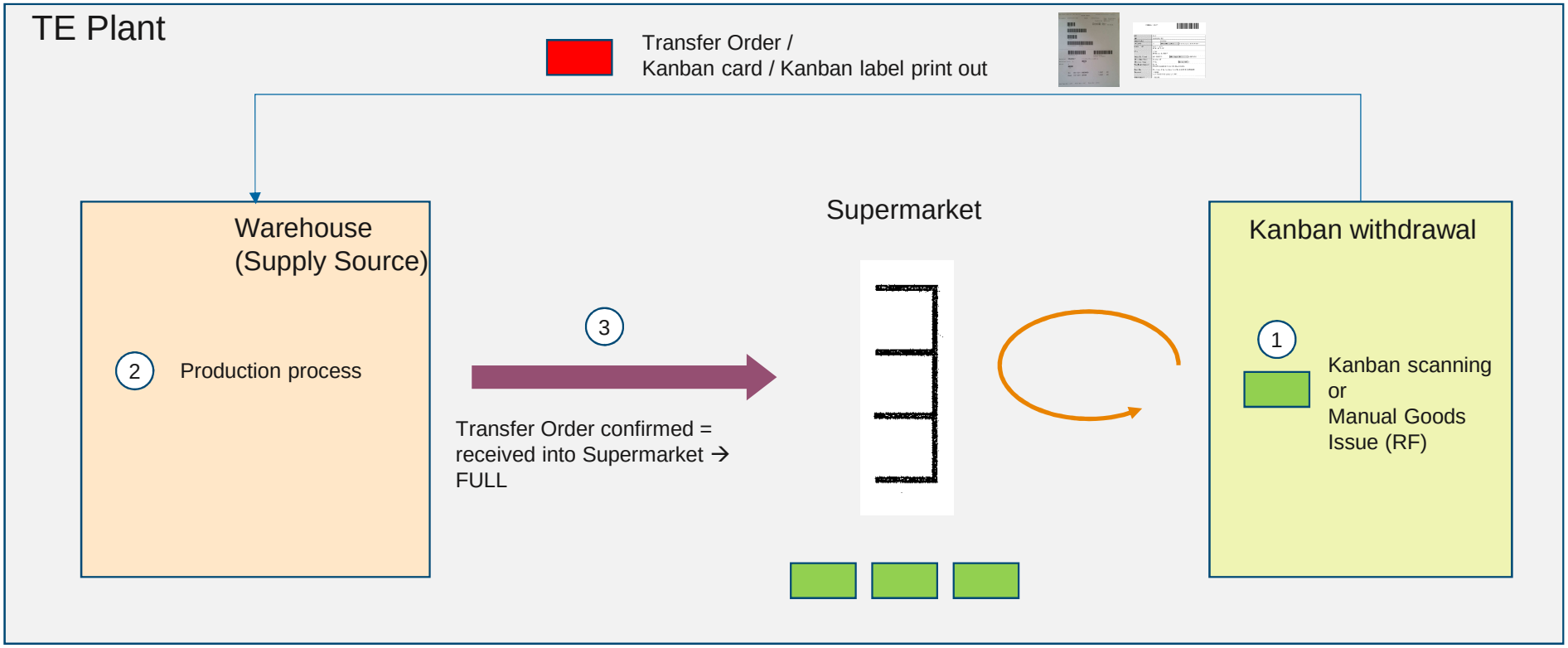


Advanced Level

Replenishment Pull (RPS) and SAP eKanban

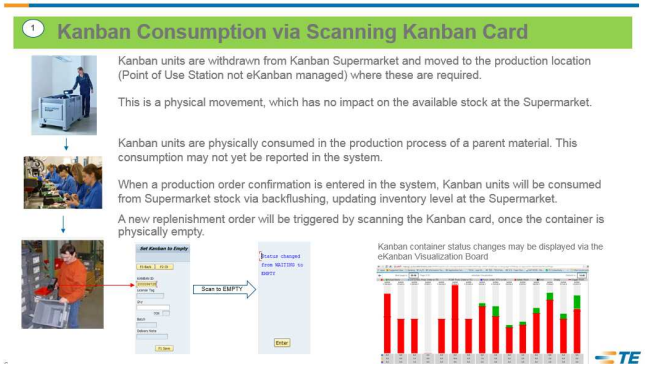
Supermarket Replenishment via TE Warehouse

Supermarket Replenishment from Warehouse via Stock Transfer



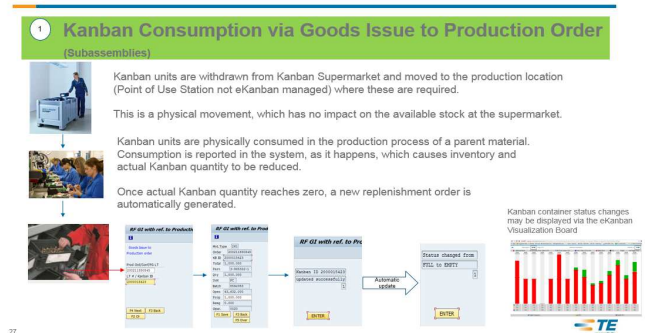
1 Kanban Consumption via Scanning Kanban Card

Same process as for Supermarket via In-House Manufacturing – refer to previous slides



1 Kanban Consumption via Goods Issue to Production Order

Same process as for Supermarket via In-House Manufacturing – refer to previous slides

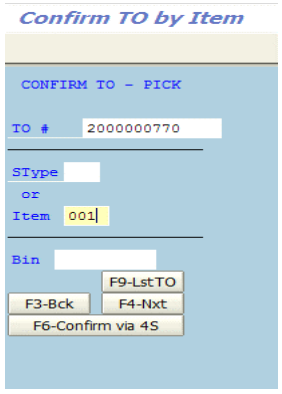


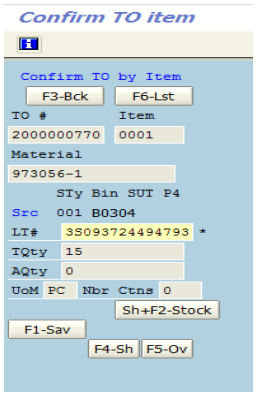
2 Replenishment Process: Transfer Requirement (TR) and Transfer Order (TO)

- A Transfer Requirement is created automatically once Kanban status is EMPTY.
- If there is sufficient inventory at the Warehouse, a Transfer Order (TO) is created immediately.
- The open TO is placed in the so-called “Paperless Queue”; which is visible to the Material Handler (e.g. laptop or other devices) at the supply source (i.e. Warehouse).
- If there is insufficient inventory at the Warehouse, the Transfer Requirement (TR) remains open.
- The system re-checks for inventory (SAP batch job) and will create a Transfer Order (TO) automatically once inventory is available at the supply source.

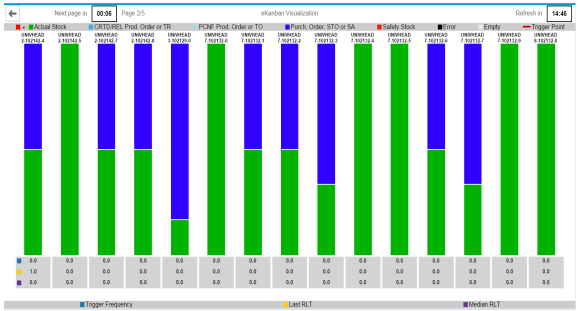
3 Receiving from Warehouse into Supermarket

Upon Picking completion, the Transfer Order (TO) is confirmed and the Kanban status changes to FULL.





Kanban container status changes may be displayed via the eKanban Visualization Board

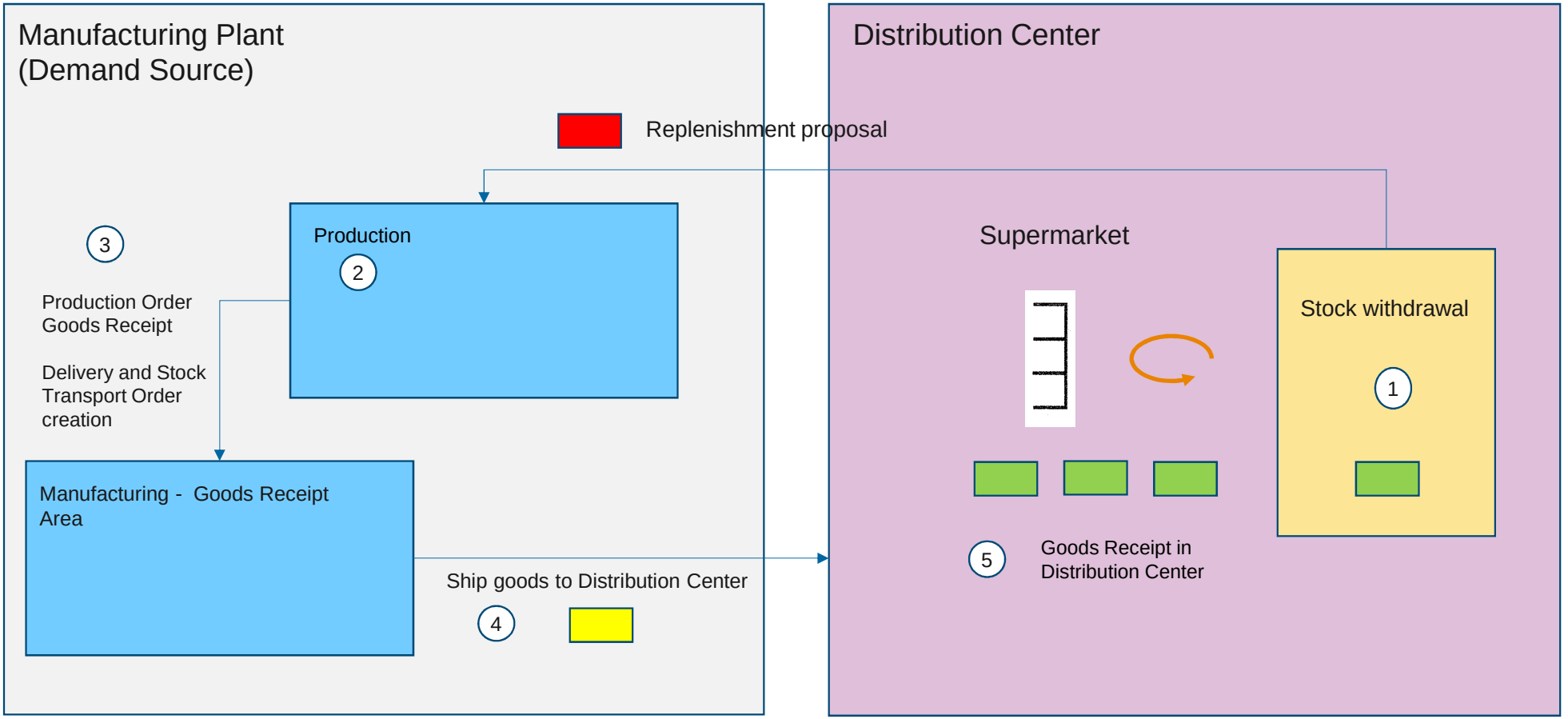


Advanced Level

Replenishment Pull (RPS) and SAP eKanban

Remote Warehouse Replenishment – DC-Kanban

Remote Warehouse Replenishment – DC-Kanban



Introduction

Manufacturing Plat doesn't have enough space for an on-site Supermarket.

The Distribution Center (DC) acts as a Supermarket for a Manufacturing Plant. The Supermarket is replenished via a Kanban process.

For a given material, maximum stock level to be available at the DC has to be defined by business. Replenishment proposals to reach that maximum stock level at the DC are automatically generated using Kanban features.

Inventory at the Distribution Center (DC) will be displayed using Kanban containers as follows:

- Stock available at the DC: Kanban containers in status FULL
- Stock shipped from manufacturing facilities / other DC's: Kanban containers in status IN-TRANSIT (assuming Stock Transport Orders are used)
- Stock to be replenished in order to reach maximum stock available(*): Kanban containers in status EMPTY, which have triggered the replenishment proposals.

(*) Stock to be replenished in order to reach maximum stock = Maximum stock – Stock at the DC - Stock Shipped

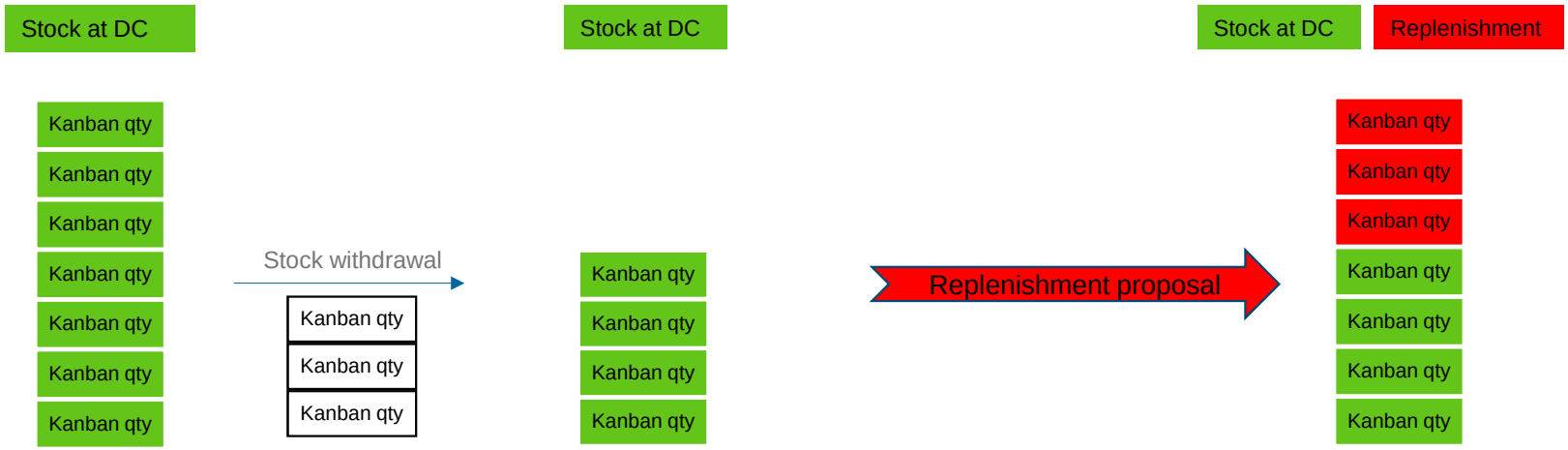
Stock Withdrawal from Distribution Center

Stock withdrawal from DC may happen due to:

- Stock shipped to a Customer Sales Order
- Stock transferred to a manufacturing facility
- Stock transferred to another DC

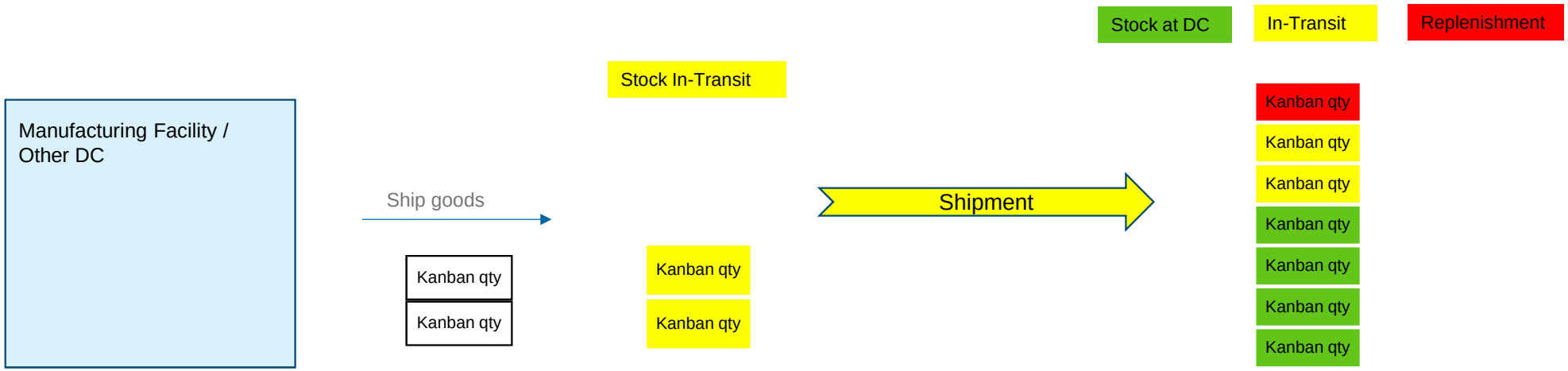
The use of Kanban features to replenish the DC Supermarket has no impact on the current processes to withdraw inventory from the DC; i.e. no change in process for the DC.

New replenishment proposals are triggered to replenish stock withdrawals from DC, as follows:



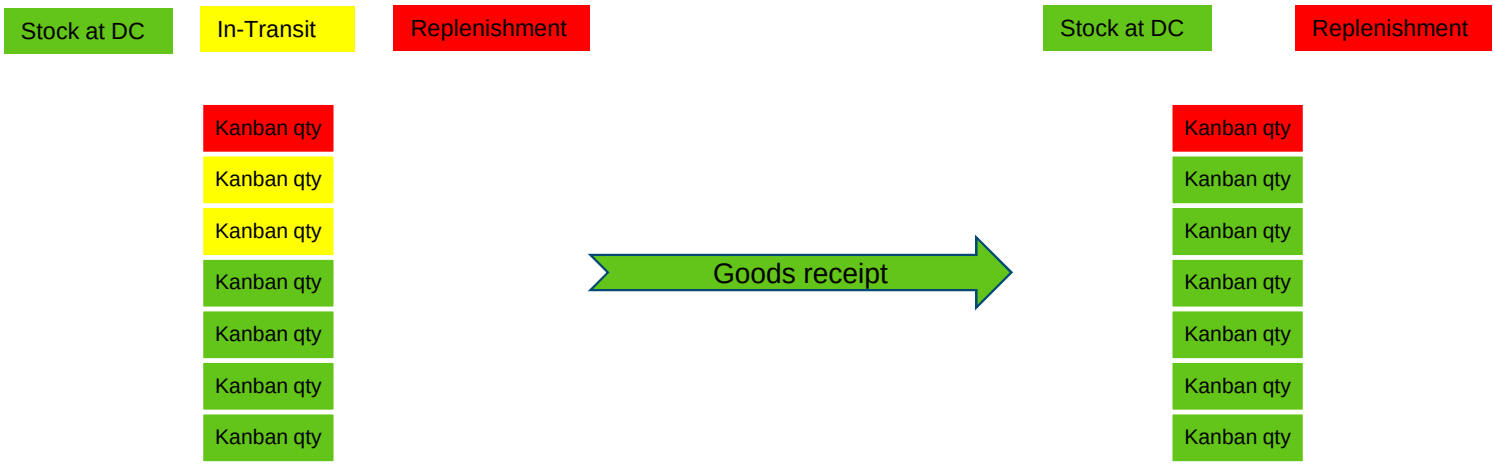
Stock Shipped / In-Transit to Distribution Center

If inventory is transferred from Manufacturing facility or a different DC via a Stock Transport Order, inventory is posted to status In-Transit until it is received at the DC.



Goods Receipt in Distribution Center

If inventory is transferred from the Manufacturing Facility or different DC via Stock Transport Order, inventory is posted to status In-Transit until it is received in the DC.



All Levels

Replenishment Pull (RPS) and SAP eKanban

Point of Use Stations (POU)

RPS via eKanban for Point of Use Stations (POU) – Wet POU versus Dry POU

POU definition:

A defined area on shop floor close to a work center / machine, or group of machines, where components are used in a manufacturing process.

POU's are replenished via Supermarkets.

- Wet POU

  A preset amount is always kept at the work center / machine thus ensuring a constant supply; e.g. line side stocking of components on the shop floor for x hours or days.

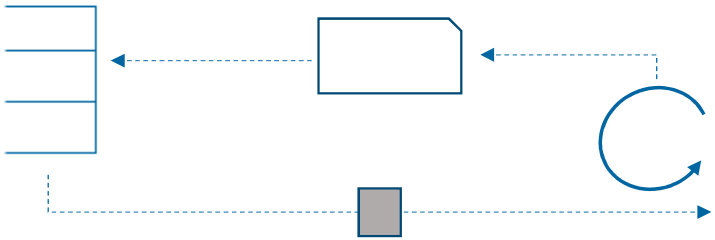
- Dry POU

  There is no line side stocking; operator plans and pulls components as needed to execute a production run. I.e. replenishment is only triggered once there is a demand at the work center / machine.

RPS via eKanban for Wet Point of Use Stations – Replenishment via Supermarket

Supermarket

Production Supply Area linked to a Storage Location



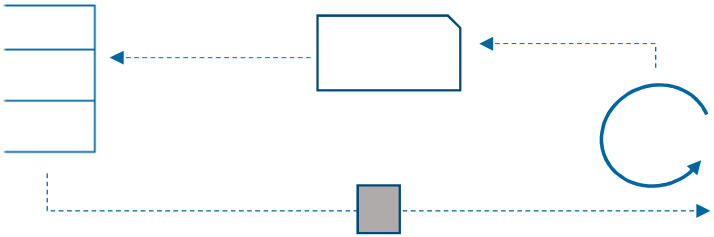
Wet POU

Production Supply Area linked to a Storage Location

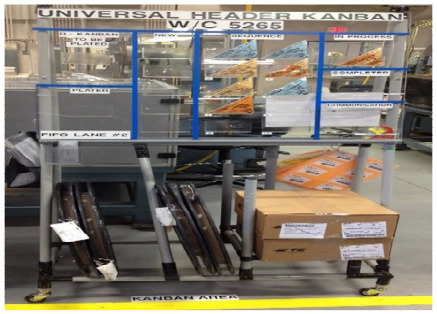
RPS via eKanban for Dry Point of Use Stations – Replenishment via Supermarket

Supermarket

Production Supply Area linked to a Storage Location



Dry POU



Production Supply Area linked to a Storage Location

RPS via eKanban for POU Stations

Key Take-Away's:

- POU's are usually replenished via stock transfers from a Supermarket or Warehouse.
- Recommended eKanban Strategies for Wet POU's:
  - Classic Kanban
  - One Card Kanban / Quantity Signal Kanban
- Recommended eKanban Strategies for Dry POU's :
  - Event Kanban
- Recommended Replenishment Strategies:
  - Warehouse Transfers

Advanced Level

Replenishment Pull (RPS) and SAP eKanban

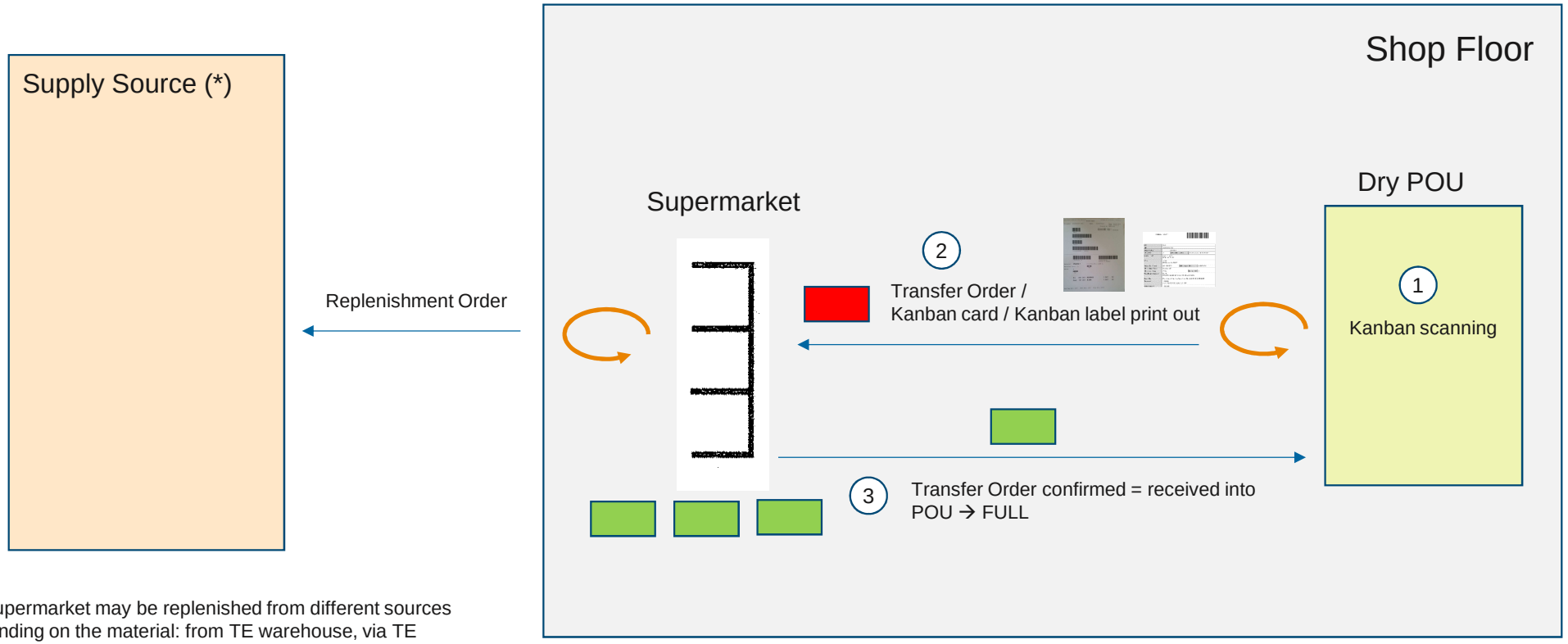
Point of Use Stations (POU)

Course Content

Wet / Dry Point of Use Replenishment:

- Triggering PULL replenishment for Subassemblies / Components
- eKanban Visualization – request in progress / request processed

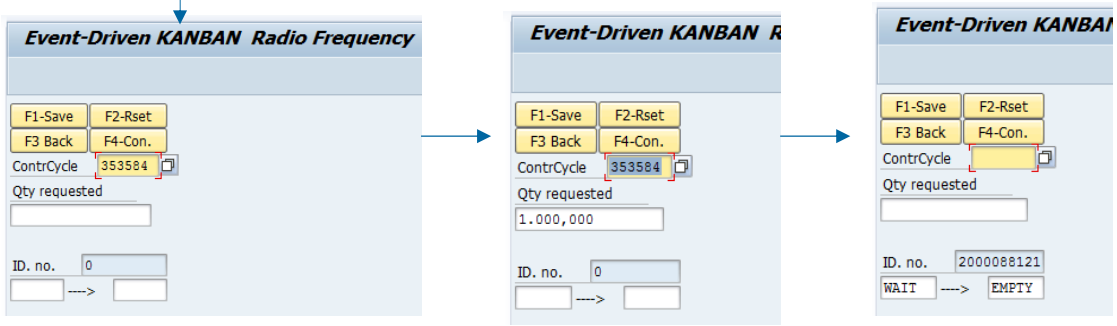
Dry Point of Use Station Replenishment via a Supermarket



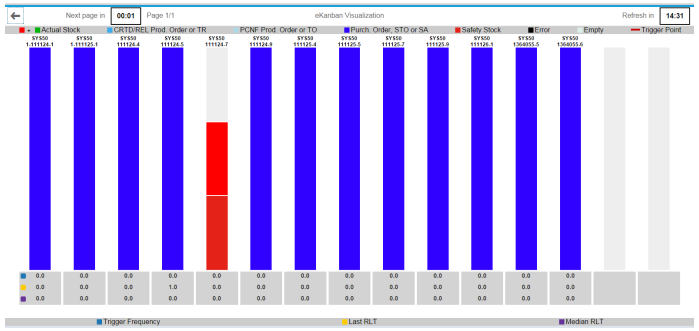
(*) Supermarket may be replenished from different sources depending on the material: from TE warehouse, via TE production order, from an external supplier,…

1 Request Material – Trigger Replenishment for POU

Kanban units are requested via scanning the Kanban Control Cycle id when there is a demand.



Kanban container status changes may be displayed via the eKanban Visualization Board

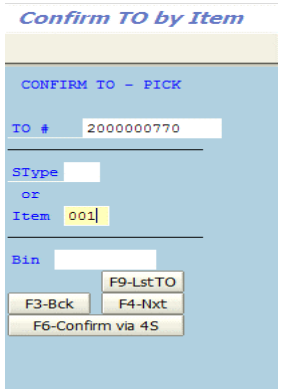


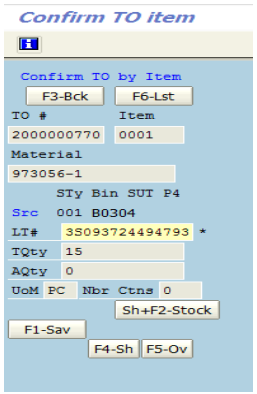
2 Replenishment Process: Transfer Requirement / Transfer Order

- With triggering an Event Kanban, the system creates a Transfer Requirement (TR) – representing one eKanban container in status EMPTY.
- If there is sufficient inventory at the Supermarket (or Warehouse), a Transfer Order (TO) is created immediately.
- The open TO is placed in the so-called “Paperless Queue” ; which is visible to the Material Handler (e.g. laptop or other devices) at the supply source (i.e. Supermarket or Warehouse).
- If there is insufficient inventory at the Supermarket (or Warehouse), the Transfer Requirement (TR) remains open.
- The system re-checks for inventory (SAP batch job) and will create a Transfer Order (TO) automatically once inventory is available at the supply source.

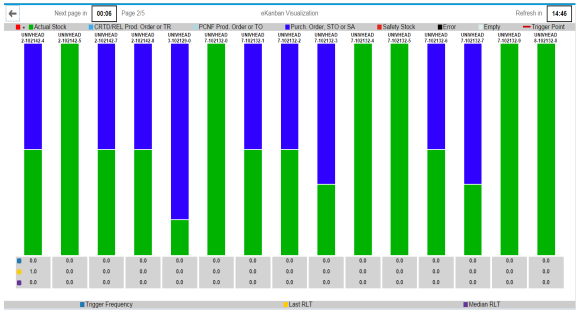
3 Receiving into Dry POU Station

Upon Picking completion, the Transfer Order (TO) is confirmed and the Kanban status changes to FULL.

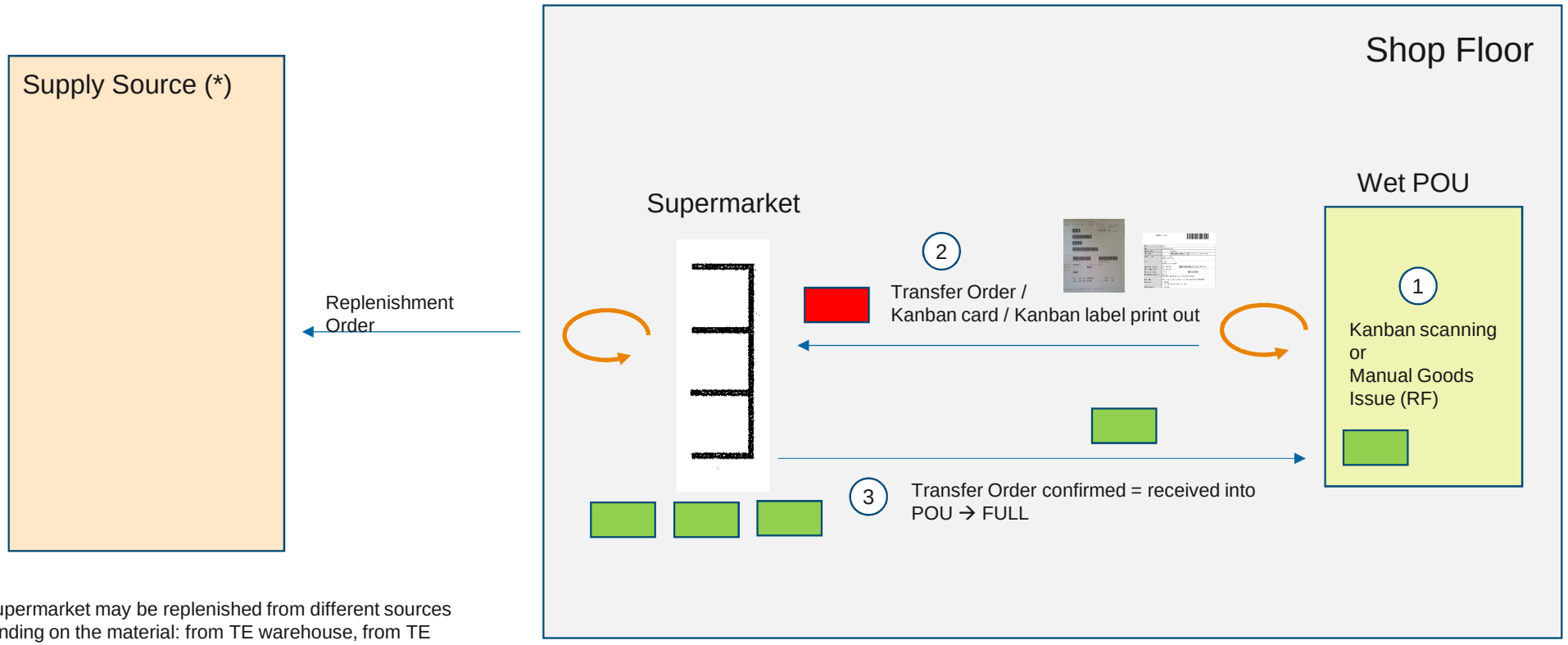




Kanban container status changes may be displayed via the eKanban Visualization Board



Wet Point of Use Station Replenishment via a Supermarket

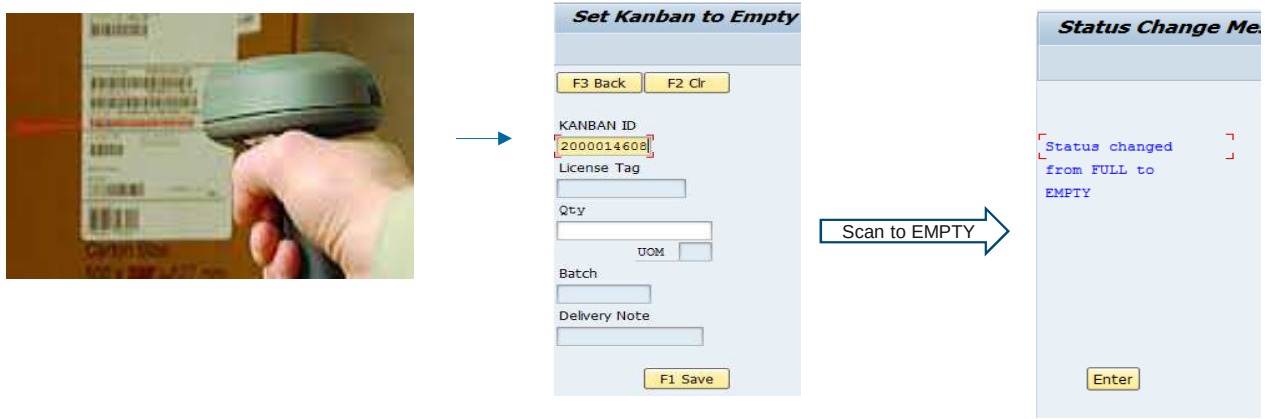


(*) Supermarket may be replenished from different sources depending on the material: from TE warehouse, from TE production, from external supplier,…

1 Kanban Status Change via Kanban Card Scan Backflushed Components

Components are physically consumed in the production process of a parent material or subassembly.

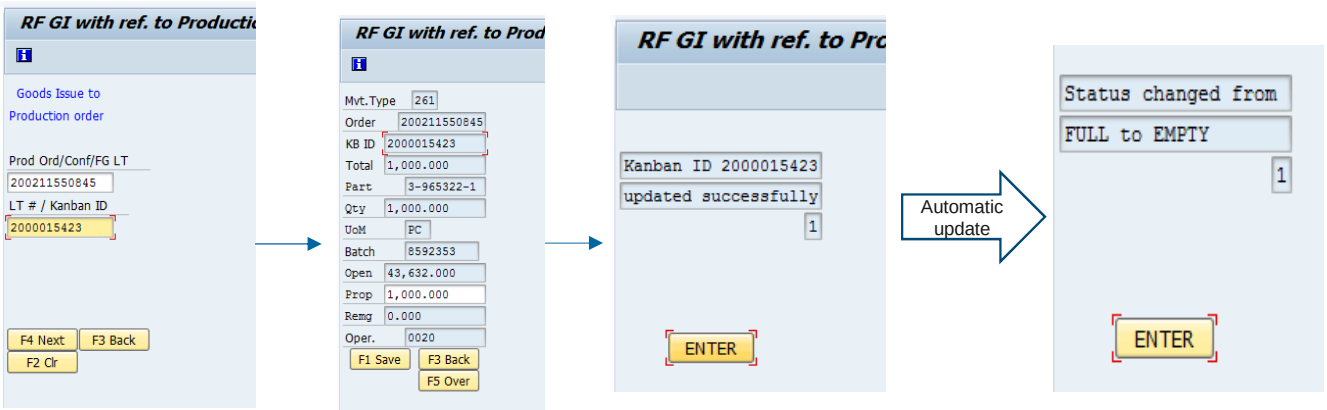
- Kanban container replenishment is triggered manually by scanning the Kanban card once a container is empty.
- Production order confirmation is updating inventory quantity at the Point of Use Station.



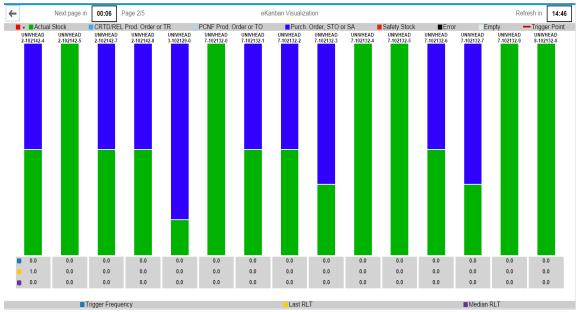
1 Kanban Status Change via Goods Issue to Production Order

Components are physically consumed in the production process of a parent material or subassembly.

- Component usage is reported in the system, as it happens, via scanning Kanban ID
- Inventory is reduced
- Actual Kanban quantity is reduced
- A new replenishment order is generated once Kanban quantity is zero and trigger point has been reached (maximum of Empty Kanban containers).



Kanban container status changes may be displayed via the eKanban Visualization Board

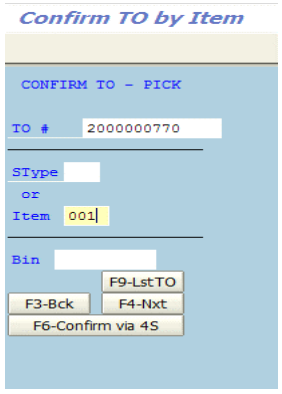


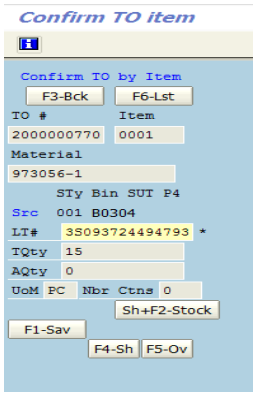
2 Replenishment process: Transfer Requirement and Transfer Order

- A Transfer Requirement is created automatically once Kanban status is EMPTY and trigger point has been reached (maximum of EMPTY Kanban containers.
- If there is sufficient inventory at the Supermarket (or Warehouse), a Transfer Order (TO) is created immediately.
- The open TO is placed in the so-called “Paperless Queue”; which is visible to the Material Handler (e.g. laptop or other devices) at the supply source (i.e. Supermarket or Warehouse).
- If there is insufficient inventory at the Supermarket (or Warehouse), the Transfer Requirement (TR) remains open.
- The system re-checks for inventory (SAP batch job) and will create a Transfer Order (TO) automatically once inventory is available at the supply source.

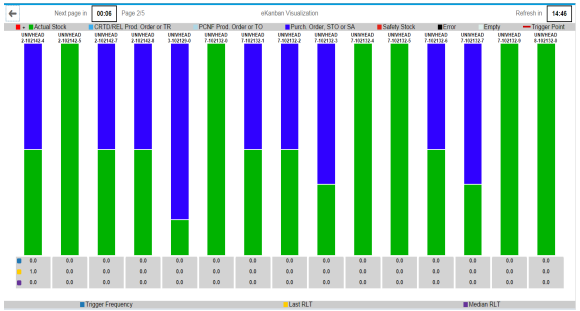
3 Receiving into Wet POU Station

Upon Picking completion, the Transfer Order (TO) is confirmed and the Kanban status changes to FULL.





Kanban container status changes may be displayed via the eKanban Visualization Board

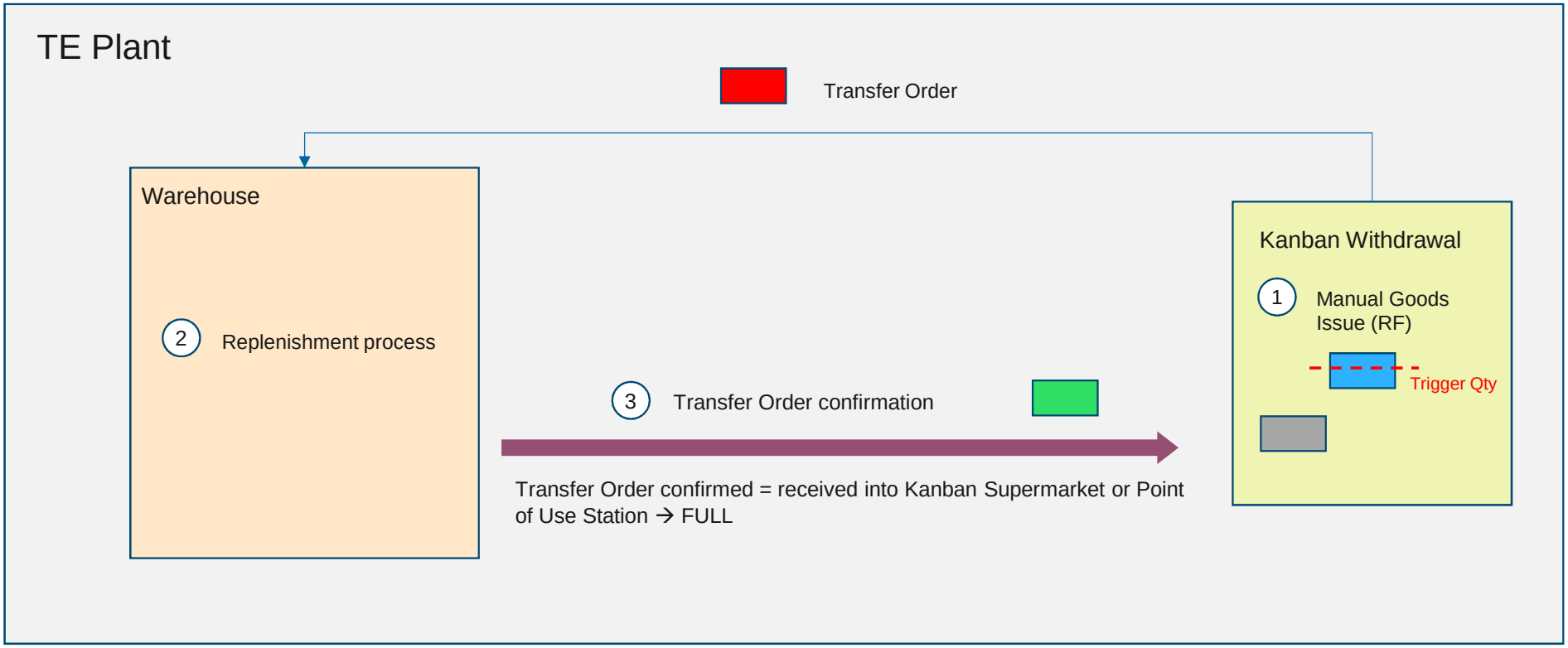


Advanced Level

Replenishment Pull (RPS) and SAP eKanban

One Card Kanban / Quantity Trigger

One Card Kanban



Introduction

One Card KANBAN system is based on a two container logic to replenish a Wet Point of Use Station or a Supermarket (aka Supply Area).

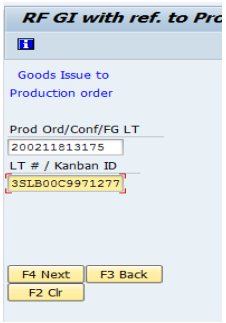
One Card Kanban features:

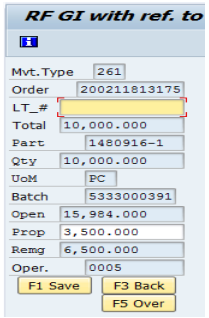
- The Supply Area holds one container
- Replenishment is triggered once a pre-defined quantity has been reached (aka Trigger Quantity).
- The second container arrives at the Supply Area as the fist container is used up.
- One Card Kanban has an additional status “USED” to indicate that inventory is being taken (consumed) from the Supply Area.

1 Kanban Consumption via Goods Issue to Production Order

Kanban units are physically consumed in the production process of a parent material.
Consumption is reported in the system, as it happens, which causes inventory and actual Kanban quantity to be reduced.
Kanban status changes from FULL to In Use automatically.

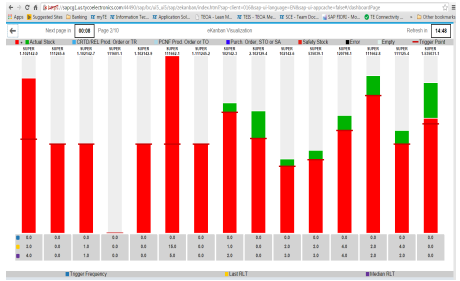
Kanban units are physically consumed in the production process of a parent material.





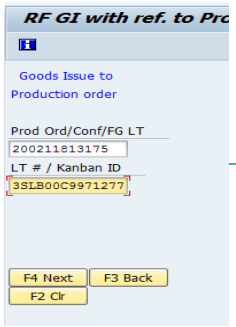
Kanban container status changes from FULL to USED

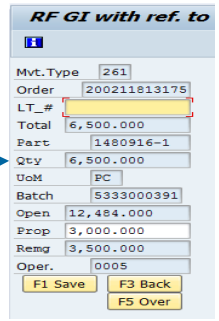
Kanban container status changes may be displayed via the eKanban Visualization Board



1 Kanban Consumption via Goods Issue to Production Order (continued)

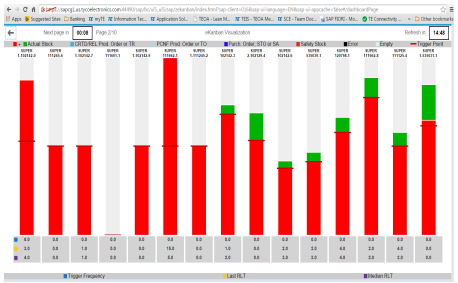
Once Trigger Point has been reached, a replenishment order is generated for the second container.





New replenishment is triggered for second container, Kanban status changes from WAIT to EMPTY

Kanban container status changes may be displayed via the eKanban Visualization Board

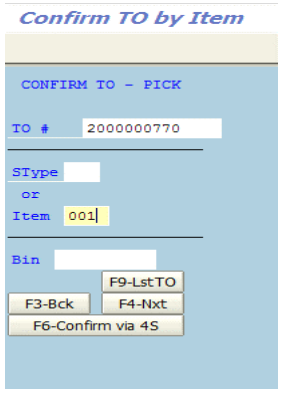


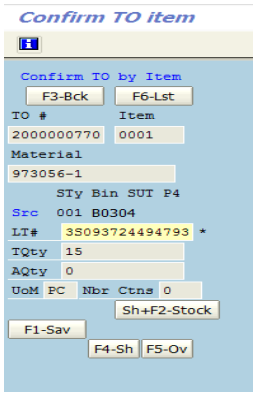
2 Replenishment Process: Transfer Requirement and Transfer Order

- A Transfer Requirement (TR) is created automatically once Trigger Quantity has been reached.
- If there is sufficient inventory at the Supermarket (or Warehouse), a Transfer Order (TO) is created immediately.
- The open TO is placed in the so-called “Paperless Queue”; which is visible to the Material Handler (e.g. laptop or other devices) at the supply source (i.e. Supermarket or Warehouse).
- If there is insufficient inventory at the Supermarket (or Warehouse), the Transfer Requirement (TR) remains open.
- The system re-checks for inventory (SAP batch job) and will create a Transfer Order (TO) automatically once inventory is available at the supply source.

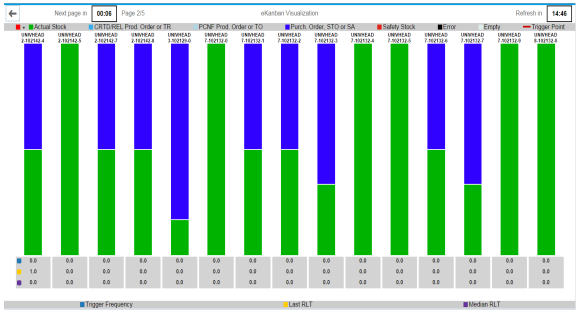
3 Receiving into Supply Area (Wet POU or Supermarket)

Upon Picking completion, the Transfer Order (TO) is confirmed and the Kanban status changes to FULL.





Kanban container status changes may be displayed via the eKanban Visualization Board



All Levels

Replenishment Pull (RPS) and SAP eKanban

Subcontracting – Component Provisioning

RPS via eKanban for Subcontractors – Component Provisioning

Component Provisioning:

In a classical* subcontracting scenario, TE supplies components, such as stamped parts, to a Subcontractor for further processing, e.g. plating.

(*TE maintains ownership of components)

- Component Provisioning via In-house Production

  Once the Subcontractor pulls components from its Supermarket, it will create a production order at TE based on a preset trigger point.

- Component Provisioning via Delivery

  Once the Subcontractor pulls components from its Supermarket, it will create a delivery at TE based on a preset trigger point.

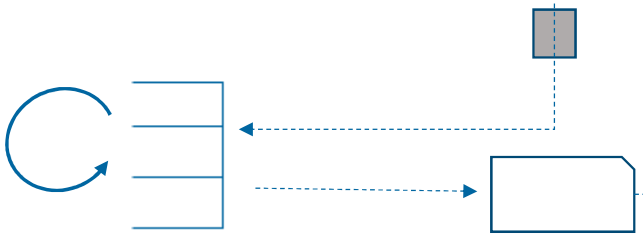
  TE holds inventory for the component (Supermarket or MRP / Reorder Point or Safety Stock)

RPS via eKanban for Subcontractors – Component Provisioning via In-house Production

Subcontractor

Supermarket

Stamping at TE

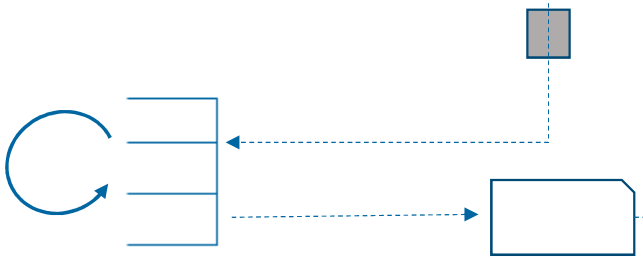


RPS via eKanban for Subcontractors – Component Provisioning via Warehouse / Supermarket Supply

Subcontractor

Supermarket

Warehouse / Supermarket



RPS via eKanban for Subcontractors – Component Provisioning

Key Take-Away's:

- Component provisioning can take place via in-house manufacturing or deliveries.

- Recommended eKanban Strategies:
  - Classic Kanban
  - Quantity Signal Kanban

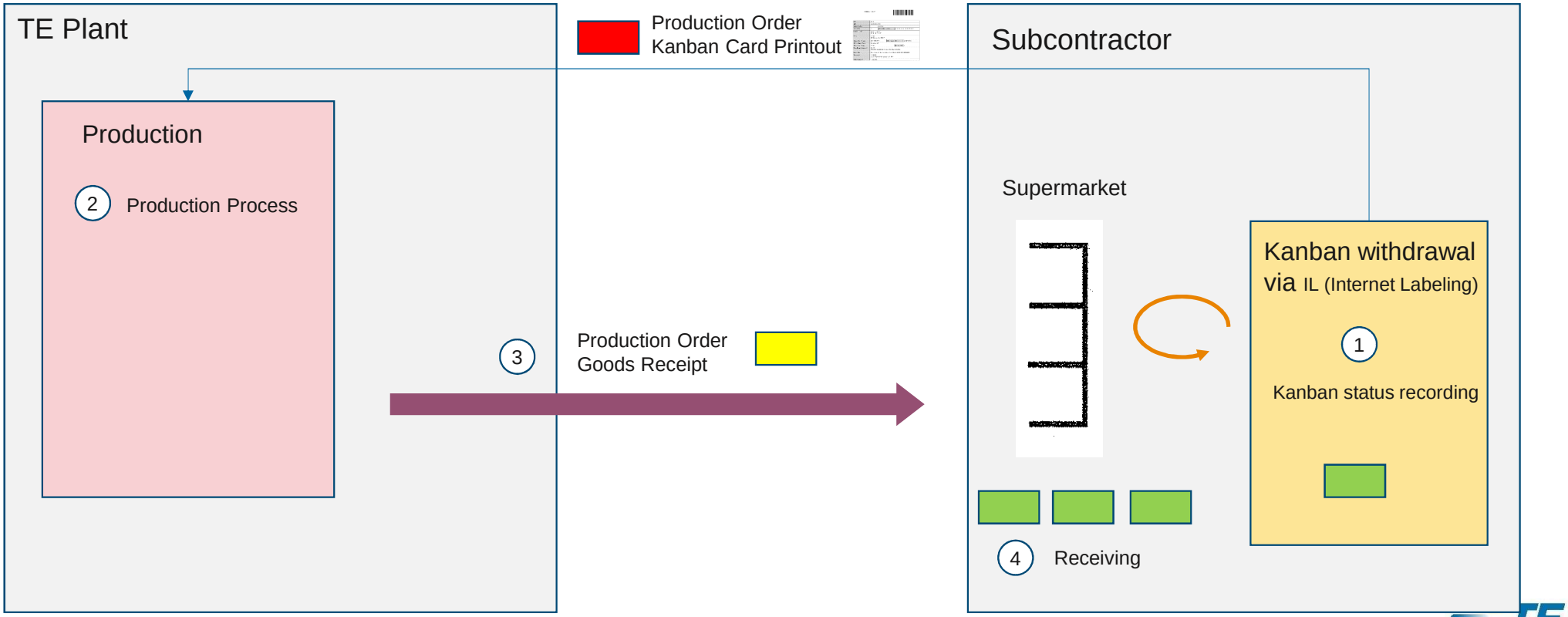
- Recommended Replenishment Strategies:
  - In-house Manufacturing & Warehouse Transfers
  - Deliveries (from TE inventory)

Advanced Level

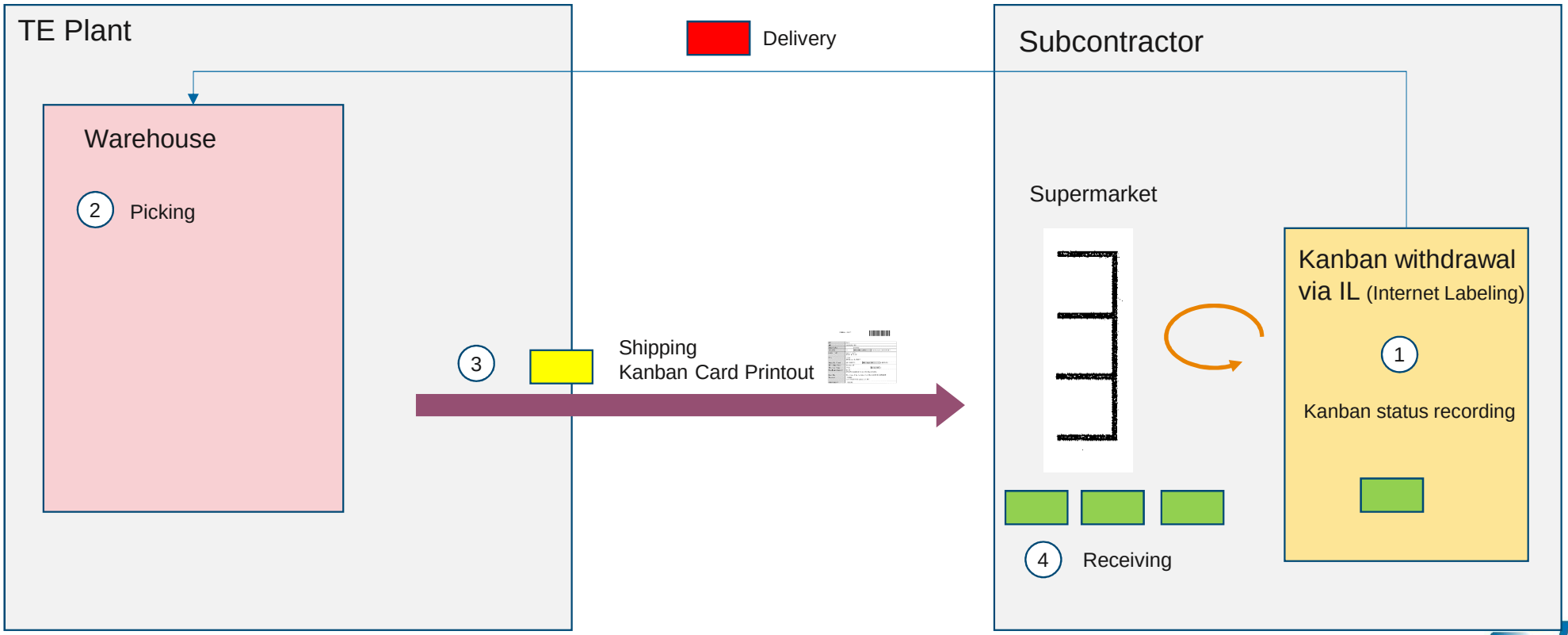
Replenishment Pull (RPS) and SAP eKanban

Subcontracting – Component Provisioning

Subcontractor (SC) Supermarket Replenishment
via TE In-House Manufacturing



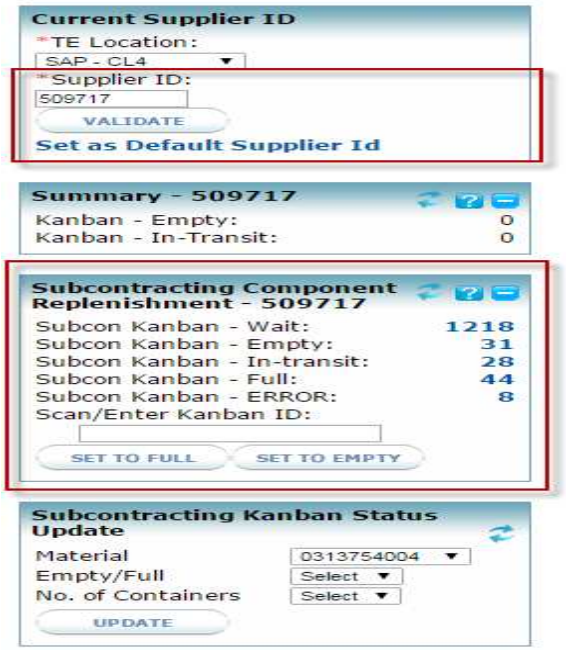
Subcontractor (SC) Supermarket Replenishment
via TE Warehouse



Introduction

The Subcontractor communicates with TE using the Supplier Portal for information exchange, i.e. receiving inventory into eKanban Supermarket and consuming eKanban from the Supermarket .

SC Supermarket
(Supplier Portal / IL – Internet Labeling)



Subcontractor Supermarket
TE Plant - SAP

1 SC Kanban Withdrawal

Upon withdrawal or consumption of of a Kanban unit, the Subcontractor records a status change in the Supplier Portal.

Kanban card scanning:

Supermarket replenishment is automatically generated as a result of container status change to EMPTY, upon reaching pre-set trigger point (maximum EMPTY Kanban).

- If material is replenished from a TE Warehouse → a delivery is created.
- If material is replenished from via TE In-House Manufacturing → a production order is created and Kanban cards may be also automatically printed.

2 TE Plant: Picking for Delivery vs. Production Order

Subcontractor Supermarket replenishment via TE Warehouse:

- Delivery creation ties into existing Warehouse process for pick, pack and shipping.

Subcontractor Supermarket replenishment via TE Manufacturing:

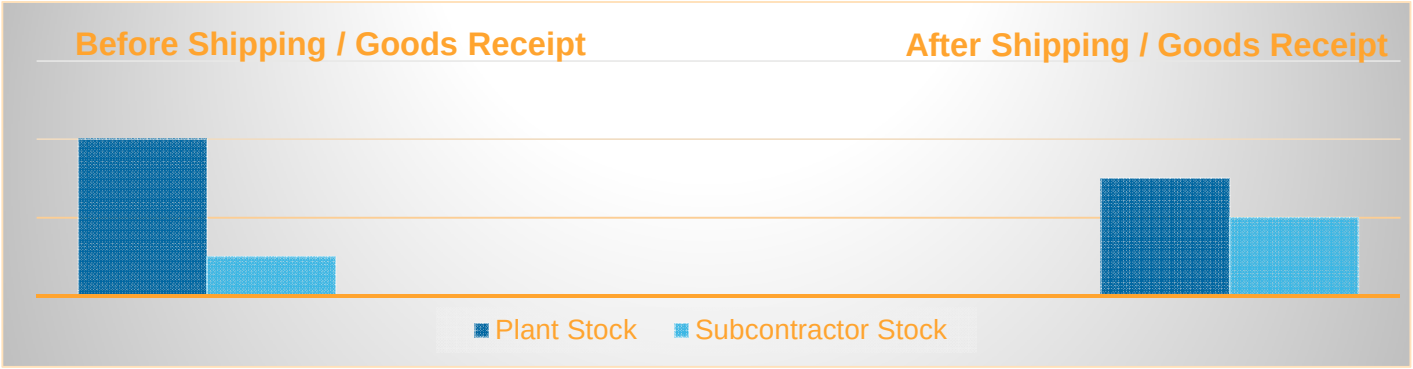
- Manufacturing proceeds with the production of the components based on the automatically generated Kanban refill production order.
- Kanban refill production orders for Subcontracting Supermarket replenishment are handled the same way as refill production orders for an in-house Supermarket.

3 TE Plant: Shipping

Subcontractor Supermarket replenishment via TE Warehouse:

- Kanban container changes automatically to status IN-TRANSIT upon delivery creation, Kanban cards may be automatically printed.
- Inventory increased at Supermarket location (*)
- Material is physically shipped to the Subcontractor

(*) Note: Components may have not been physically received yet by the Subcontractor vendor.

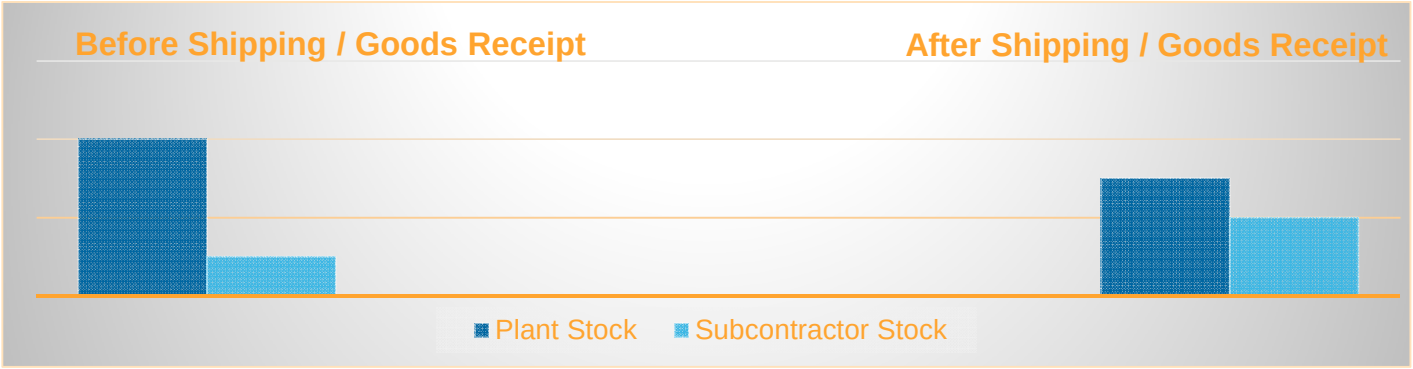


3 TE Plant: Goods Receipt from Production Order

Subcontractor Supermarket replenishment via TE In-House Manufacturing:

- Upon production order completion, goods are received into the TE Plant.
- Kanban container changes automatically to status IN-TRANSIT.
- Stock transfer from shipping location at TE Plant to Subcontractor Supermarket is executed.
- Inventory increases at the Supermarket location (*)
- Material is physically shipped to SC

(*) Note: Components may have not been physically received yet by the Subcontractor vendor.

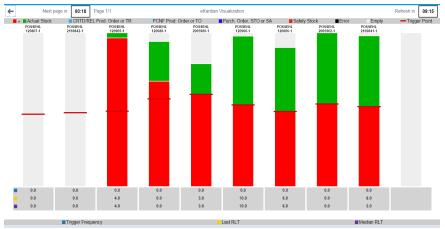


4 Receiving at the Subcontractor Location

Components are physically received at the Subcontractor location:

- Subcontractor scans via Supplier Portal / Internet Labeling Kanban cards
- Kanban containers status changes to FULL.

Kanban container status changes may be displayed via the eKanban Visualization Board



All Levels

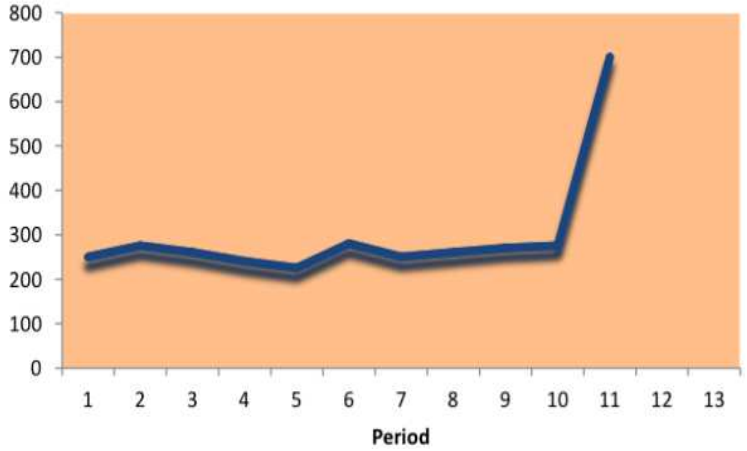
Replenishment PULL (RPS)

Demand Spike

Demand Spike

What is a Demand Spike?

- An abnormal request from customer(s) that exceeds normal demand and would cause missing customer request date.
- The demand spike exceeds the Standard Lot-size of replenishment.



How and when does it occur?

- Inventory is depleted rapidly; e.g. customer orders are being pulled to meet month-end or quarter-end sales targets.
- Unexpected customer order is placed and takes all inventory.

Demand Spike (continued)

How does SAP handle demand spikes?

- In an RPS environment, Kanbans can be temporarily increased to accommodate additional requests.
- In a PUSH environment, MRP determines the lot-size and lead-times and generates a new replenishment order (Planned Order).

All Levels

Replenishment PULL (RPS)

Overflow Area

Overflow Area (continued)

How does SAP handle Overflow Area?

- Specific overflow bins are created in SAP (Warehouse Mgmt).
- Excess inventory will be transferred into those overflow bins.
- New Transfer Requests (TR) will first check for available inventory in those overflow areas. The “Paperless Queue” indicates likewise.

Overflow Area

What is a Overflow Area?

Overflow Area is a physical location which holds exceeded maximum number of Kanban containers designated for the Supermarket.

How and when does it occur?

- Maximum number of Kanban containers are full, but a Demand Spike has been detected and the number of Kanban containers is increased temporarily to accommodate an abnormal demand situation.
- Components are returned from a Dry Point of Use (POU) Station without a Kanban Label (container qty is usually below standard qty).
- Production overrun has occurred and material is sent to the Supermarket. Production overruns should be an exception in a PULL environment.

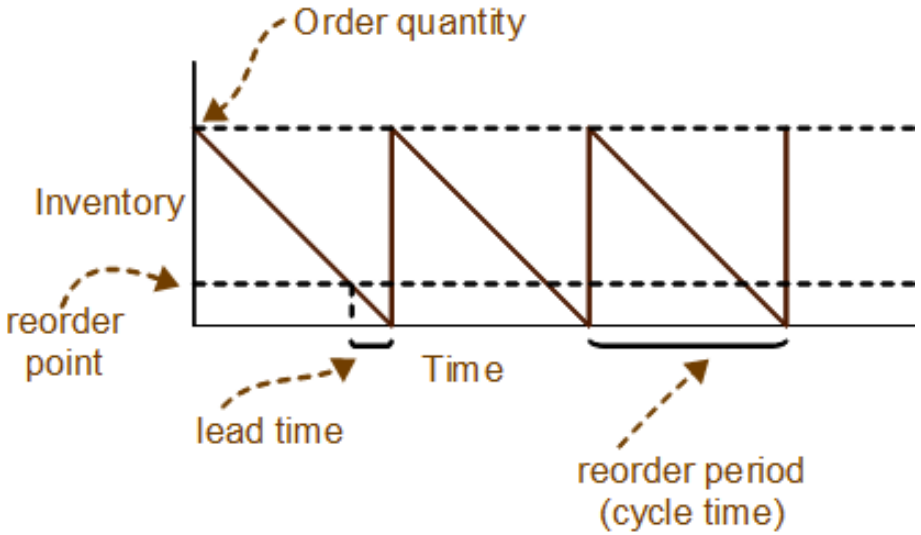
All Levels

Replenishment Pull (RPS)

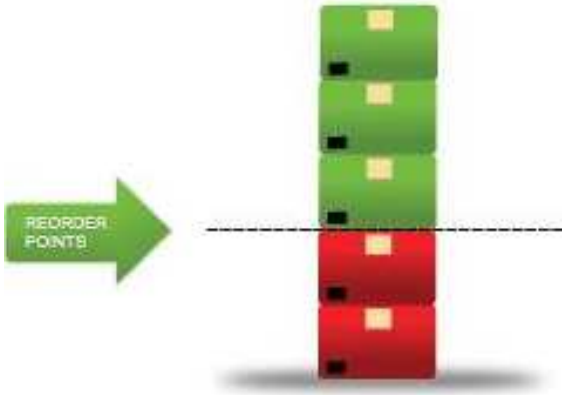
PULL and MRP Trigger Points

Reorder Point Planning (ROP)

Concept



Simplified



Average Daily Demand *x* Lead-time* (+ Safety Stock) = Reorder Point

*in days

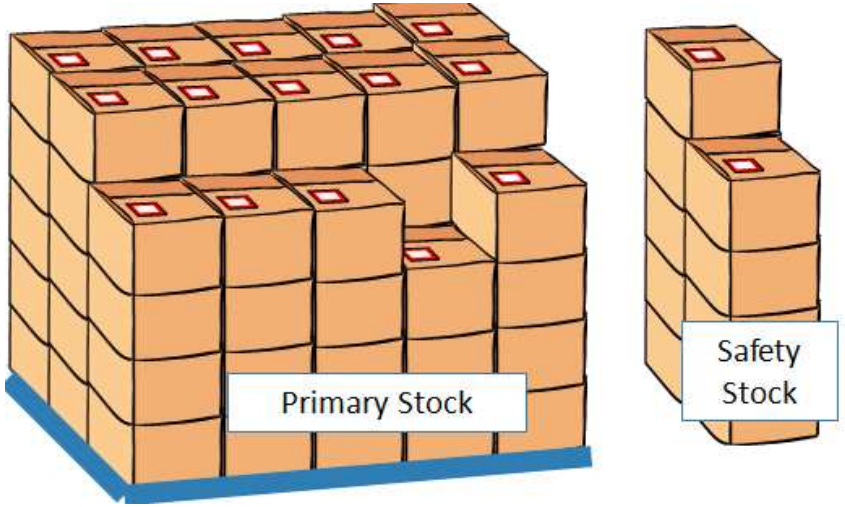
MRP Trigger Points – Reorder Point Planning

Reorder Point Planning – ROP

- Trigger Point (aka Reorder Point) is maintained in SAP
- A replenishment request is generated via MRP once inventory has fallen below the Reorder Point
- Assumes lead-time is sufficient to cover demand that falls within lead-time.
- Reorder Point determination:
  - Manually calculated – outside of SAP (most commonly used)
  - Calculated based on past consumption
  - Calculated based on ex-post forecast
- Most Reorder Point strategies do not consider future demand (customer orders, dependent demand).
- Reorder Point is, with some exceptions, on plant level.

ROP is a technique to determine *when* to order; it does not address how much to order or make.

Safety Stock



(Maximum Daily Usage − Average Daily Usage) × Lead Time = Safety Stock

MRP Trigger Points – Safety Stock

Safety Stock

- Trigger Point (aka Safety Stock) is maintained in SAP
- A replenishment request is generated via MRP once inventory has fallen below Safety Stock
- Assumes lead-time is sufficient to cover demand once Safety Stock has been reached
- Safety Stock determination:
  - Manually calculated – outside of SAP
  - Calculated via Coverage Profiles / Periods (& average daily inventory), considering future demand
- Safety Stock is always on plant level.

Safety Stock is an additional quantity of a material held in inventory in order to reduce the risk that the material will be out of stock. Safety Stock act as a “buffer” in case demand is greater than planned and or the supplier is unable to deliver at the expected time.

Minimum / Maximum Replenishment (Warehouse Management)

Min / Max Inventory at Demand Source

Trigger Replenishment

Supply

Supply Source

Minimum / Maximum Replenishment (Warehouse Management)

Minimum / Maximum Replenishment (Warehouse Management / WM)

- Minimum / Maximum levels are determined outside of SAP.
- Minimum / Maximum levels are maintained in SAP per material on storage bin level
- A replenishment request (Transfer Requirement / TR) is generated automatically once the minimum level has been reached.

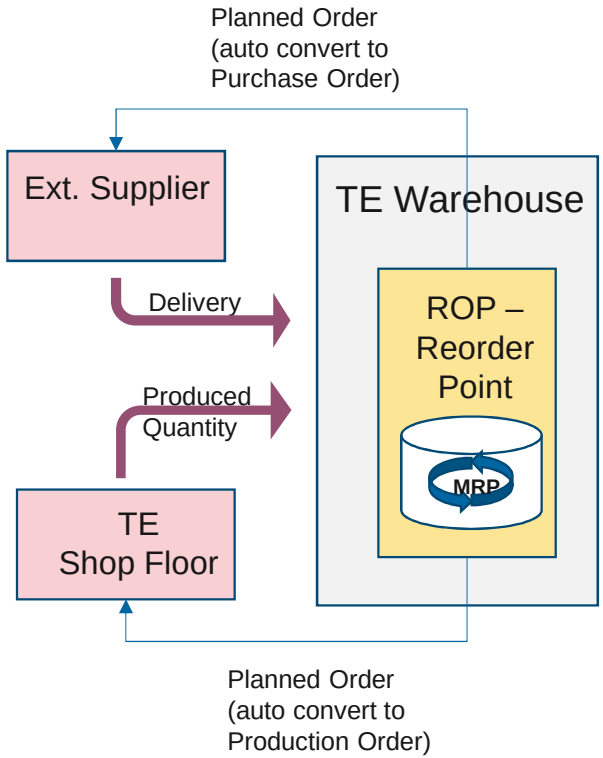
WM Minimum / Maximum Replenishment deals with internal supply only; e.g. Warehouse to Supply Area.

Advanced Level

Replenishment Pull (RPS)

Reorder Point Planning (ROP)

Reorder Point Planning - ROP



Reorder Point Planning - ROP

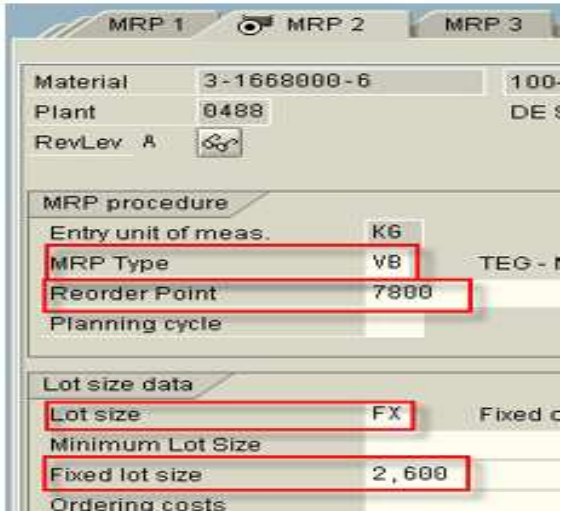
ROP Features:

- ROP is an MRP driven strategy
- It can be used for in-house production, for external procurement and also for replenishment of a Warehouse / Distribution Center from a TE Manufacturing Plant and or external vendor.
- ROP does not require a Supermarket concept.
- ROP level can be calculated outside of SAP (e.g. Excel) or via SAP transaction ZPP7TB002, Reorder Point Calculation.

Reorder Point Planning - ROP

Recommended System Settings for ROP Materials:

- MRP Type VB (manual ROP)
- Fixed lot size is recommended to be used for materials with manual ROP (MRP Type ‘VB’)
- Automatic conversion of planned orders into Production or Purchase Orders can be activated (assumes no Planner interaction is desired).
- ROP does not consider forecast or other type of demand (e.g. Planned Independent Requirements, dependent demand etc).
  - For strategic analysis, Long-term Planning (LTP) can be activated (e.g. inclusion of the plant in LTP scenario 907)

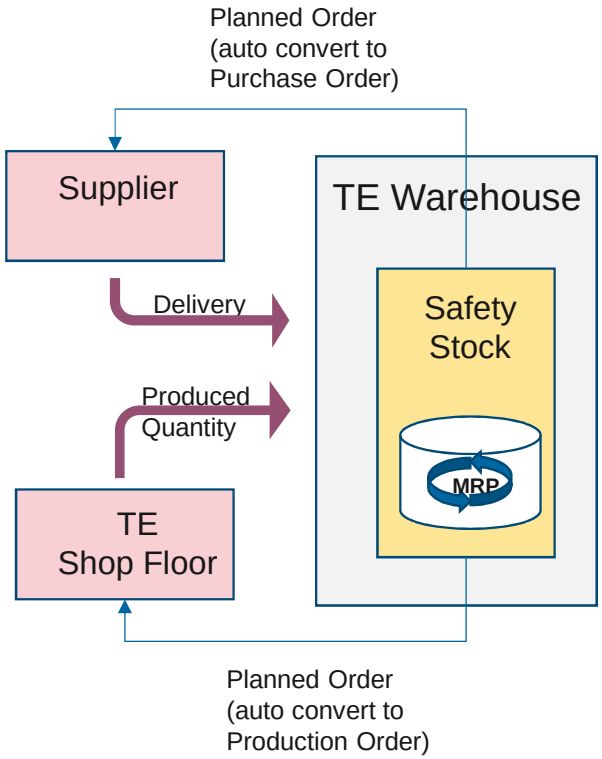


Advanced Level

Replenishment Pull (RPS)

Safety Stock

Safety Stock



Safety Stock

Safety Stock Features:

- Safety Stock and Dynamic Safety Stock calculation can be based on MRP determined demand.
- It can be used for in-house production, for external procurement and also for replenishment of a Warehouse / Distribution Center from a TE Manufacturing Plant and or external vendor.
- Safety Stock Level can be calculated outside of SAP (e.g. Excel), or via SAP transaction ZPP3TI019, Safety Stock Calculation based on Future Demand.
- Safety Stock does not require a Supermarket Concept

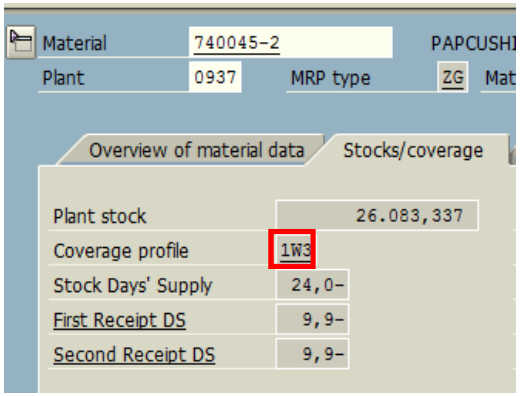
Safety Stock

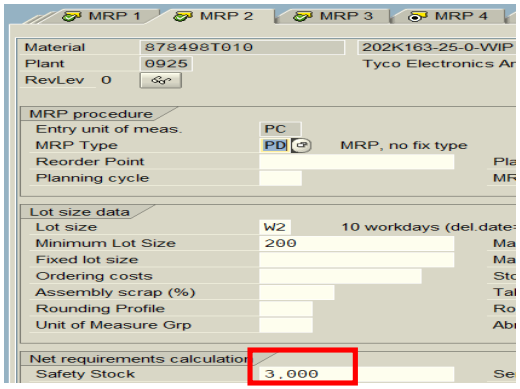
Recommended System Settings for Safety Stock Materials:

- Coverage Profile is maintained
  or
- Safety Stock is maintained

- MRP creates Planed Orders automatically once inventory has fallen below safety stock.

- Automatic conversion of Planned Orders into Production or Purchase Orders can be activated (assumes no Planner interaction is desired).
  - If no Automatic PO function is activated, Planner needs to work with exception message 96 - Stock fallen below safety stock, and convert Planned Orders.



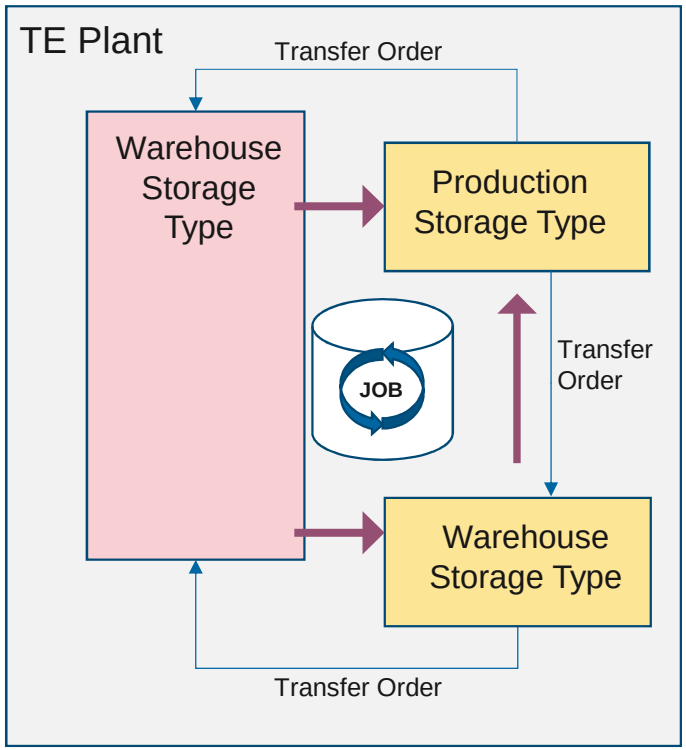


Advanced Level

Replenishment Pull (RPS)

Minimum / Maximum Replenishment

WM - Minimum / Maximum Replenishment



Minimum / Maximum Replenishment

Min / Max Features:

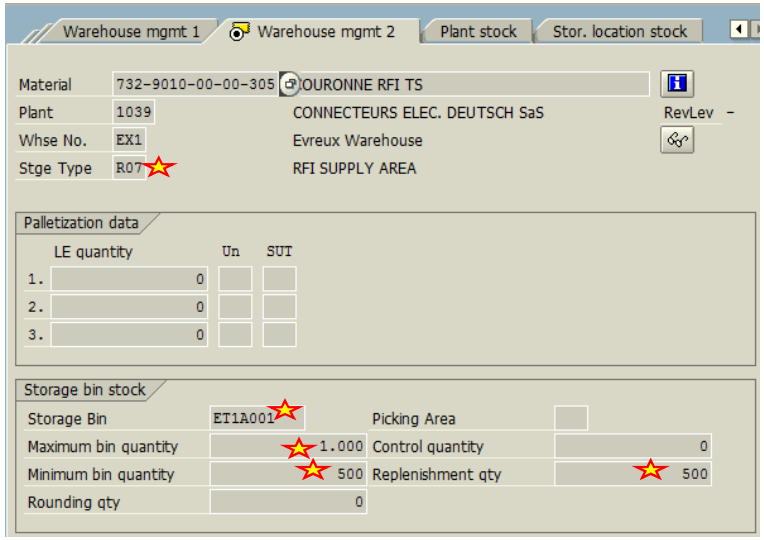
- This strategy allows auto replenishment for “fixed bins” only.
- It accommodates inventory moves between a demand source and the supply source
    - Supermarket concept is not required
- It is an independent process and has no link to production supply (required qty based on demand) or delivery processing

Minimum / Maximum Replenishment

Min / Max Replenishment Settings:

- Definition is made on the Material Master, Warehouse Mgmt 2 view
- Automatic Transfer Order creation can be activated (SAP background job processing compares lower bin level and triggers a TO if reached).

Stor. type
Stor. bin
Minimum qty
Maximum qty
Replenishment qty



Thank you for your attention!

End of SAP Lean Manufacturing Training Program.