ASM

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Maximizing uptime with 100% visibility: The role of material management in flexible electronics production

What this white paper covers

This white paper covers the rising demands on synchronized material management in electronics production environments – a topic that has been neglected in many factories, but is becoming increasingly important. Weaknesses and interruptions in the flow of materials are the most frequent causes of downtime in electronics manufacturing today. And let's not forget: the pressure of customers and markets to become ever more flexible with shrinking lot sizes and more frequent product changeovers and tougher delivery deadlines means that material management is becoming more important every day.

This white paper will to help executives, SMT production managers and material logistics specialists identify weak spots in their material flow and make improvements with the help of modern information technology.

Modern material management is not just about tracking inventory but it must support all material-related processes such as receiving, warehousing, stock issues and returns, production planning, and setup processes. It must also manage the replenishment of material to the production lines.

The best possible results are achieved if users receive all relevant information about the flows of materials at their workstations – quickly, reliably, and in line with their respective duties and tasks.

To put it bluntly, an ERP system will not give you 100% visibility of all material at every location in your factory, but that is what is needed, particularly for the shop floor processes and at the workstations in SMT production and related areas.

Introduction

"If we keep track of our inventory, why would my electronics plant need a special material management solution?"

Yes, most electronics manufacturers already have powerful ERP, inventory management and/or warehouse management systems. They can print out inventory listings, predict requirements based on new orders and bills of materials (BOMs), and report what products were manufactured in recent months. Does that mean that everything is transparent and running smoothly? Not at all. Inventory management and material management have two very different objectives: The former focuses on keeping an eye on inventory and the capital that is tied up in it, while the latter focuses on material flows and the support of all material-related processes on the production level, i.e. the value that is being created and the visibility of where the material is located.

A look at the shop floor level shows that components are often in stock, but don't make it to the production line in time. Users waste time hunting down certain parts, and taking inventory is a nightmare. Orders reach the line, but must be delayed or even canceled because needed reels are still mounted on other lines. In view of the long distances and multiple stock removals and returns, specialists often talk about the problem of "hidden or lost parts" in electronics production.

The material flows are frequently not coordinated with the production processes, which means that supplies become a bottleneck. And the more lot sizes shrink as a result of more product versions and variants, the more troublesome it becomes. The results: larger (emergency) inventories (or saftey stock), very long lead and throughput times, time wasted looking for parts, and shortfalls output – in short: insufficient production agility.

In this document we want to outline a step-by-step solution approach by asking some typical questions.

- Which symptoms in your production indicate weaknesses in your material management?

- What can modern material management accomplish (using the SIPLACE Material Manager as an example)?

- In concrete terms, what potential improvements can a professional, SMT-specific material management system like the SIPLACE Material Manager deliver for processes and people?

- Which factors should you include in your ROI calculation when deciding whether or not to invest in a material management solution?

Of course material management is a complex issue in SMT production, because the manufacturing processes are company- or application-specific. That's why this white paper is no substitute for thoroughly analyzing your current material management and evaluating potential solutions. If this text makes you aware of the problem and provides you with a rough analytical framework and a degree of orientation regarding this important issue, however, we have performed an important task by opening your eyes to potential improvements on your shop floor.

Which symptoms in my production indicate weaknesses in my material management?

Since there are many signs indicating potential weaknesses in your material management system, we have compiled a list of their symptoms. Individual symptoms may also be caused by other weaknesses, but if you can identify several of them and they extend over different areas of your production, you can be certain that your material management is in need of improvement.

Please use this short questionnaire for an initial evaluation and self-assessment.

If you find yourself checking mostly red fields, you have weaknesses in your material management and a material flow that lacks in agility.

WAREHOUSE MANAGEMENT	Yes	No
Do your systems have only one storage location for your electronic components (such as the main component warehouse)?	■	
Are components that have been removed from storage shown merely as "WIP" (work in progress) or "in production"?	■	
Can you locate components on the shop floor (for example, "set up on line 3/machine 4", "in kitting area", etc.)?		■
Do you have to return components to the main warehouse after each order in order to make them appear as available for subsequent orders?	■	
Are MSDs automatically blocked when their exposure times are exceeded?		■
Are components removed in accordance with the FIFO principle (first in, first out)?		■
Does your system compute the consumption of components by multiplying the number of modules produced with the information on the BOM (plus any applicable safety allowances)?	■	
Does your system record the consumption of components based on machine data?		■
May partly used component reels not be returned to the main warehouse for system-related reasons?	■	

COMPONENT/PACKAGE IDENTIFICATION	Yes	No
Do you record and label components only by type or batch?	■	
Does your receiving department label each component package separately with a unique ID?		■
Are the component package labels machine-readable (barcode, data matrix, etc.)?		■

PROCESS SUPPORT	Yes	No
Warehouse		
Do your warehouse and your shop floor operate with printed pick lists, inventory lists, receiving checklists, etc.?	■	
Are your pick lists path-optimized?		■
Are your automated storage systems (Kardex, etc.) or material towers controlled separately? Do you have to enter material requests manually?	■	
Do you take classic physical inventories to regularly reconcile your actual stock with the theoretical stock numbers in the system?	■	
Does your warehouse staff get notified in advance of required material provisions?		■
Are these notifications issued not schedule-based, but based on the actual production progress?		■
Production planning		
Is your material availability planning based on global, not package-based inventory data? (Example: 10,000 units of A instead of 2 reels with 6,000 and 4,000 units respectively)	■	
Does your system frequently schedule jobs for which not all materials are available?	■	
Operators		
Are your operators notified proactively that certain feeders must be refilled?		■
Do you frequently encounter line stops because materials were not delivered to the line in time?	■	
Can your operators see whether the number of units remaining on a reel is sufficient for the current job or whether the feeder must be refilled before the job is complete?		■
Do your operators have to request refills manually?	■	
Do the machines send refill requests automatically and with appropriate lead time to the material issue department?		■
Do you have to frequently cancel scheduled jobs in mid-stream because of unforeseen material shortages?	■	
Do your machines stop with an error message if the wrong material was set up?		■
Are the exposure times of MSDs recorded automatically? Are MSDs blocked from being set up or does the machine stop if the exposure time is exceeded?		■

Setup preparation area		
Do you operate with flexible setup concepts?		■
Are components that are no longer needed for the current job available for new jobs without having to be returned to the main warehouse?		■
Can you look up the precise location of required components anywhere in the plant via your IT system?		■
Do provisioned materials frequently stack up in your setup preparation area because a job has been delayed due to missing items?	■	
Receiving		
Do you have access to lists of items about to be delivered to your receiving department?		■
Do you label each incoming package with a machine-readable unique ID and keep track of it?		■

What can a modern material management system accomplish?

ERP and inventory control systems provide a stock-oriented view of materials and components. To put it bluntly, the support provided by these systems ends at the warehouse door, i.e. "before" the shop floor.

Several points make this clear:

The shop floor is a storage site

Many ERP systems see the entire shop floor as a single storage location and don't differentiate between shopfloor, warehouse areas, lines, and setup preparation areas. Once components have been removed from the main warehouse, they globally label them as "WIP" or "issued to the shop floor". Pinpointing the exact location of components (for example, "set up on line 4") is either impossible or only possible with severe limitations.

No production-relevant information about the inventory

Most ERP and inventory control systems record components only generally by type (see also the sidebar: "The central role of the UID"). The system shows only a certain quantity of components is in the warehouse, but production-relevant information like the distribution over reels, MSD exposure times, etc. is recorded not at all or only in a very rudimentary manner.

No networking with the shop floor level

There are no data links with systems and processes on the shop floor level. Most of these systems are unable to control automated storage systems or record actual consumption data from the machines. They compute the consumption of materials on the shop floor based on theoretical data (number of units x BOM units + safety allowance) and not based on information supplied by the machines. This lack of communication eventually leads to discrepancies between actual and theoretical stock quantities, which in turn results in expensive scheduling errors and line stops, as well as the need for expensive physical inventories.

No process support on the shop floor

An optimized shop floor is a complex system of individual processes that require synchronization between material flow and production requirements. Examples include availability checks, detailed planning systems, the grouping and distribution of production runs, the on-time provision of materials from the warehouse, product setups and changeovers, setup verifications, and replenishment requests. ERP and inventory control systems provide only very limited support, if any, for all of these.

The central role of the UID: 100% Visibility

Having a system of unique identifiers (UIDs) for each reel of SMT components is critically important for a material management solution. Unlike ERP-based applications, which can only keep track of the total units of a certain part, the SIPLACE Material Manager keeps track of each individual package or reel.

For example, a typical ERP shows 10,000 units of part A in inventory, while the SIPLACE Material Manager breaks these down into one reel with 5,000 units and two reels with 2,500 reels each – thanks to the UID on each reel.

The difference is significant, starting with the material availability check during the production scheduling stage. While the ERP system would indicate that the material supply is sufficient for production on five lines and release the respective jobs to manufacturing, the SIPLACE Material Manager will point out that the production can run only on three lines at the most because the parts are on only three reels in total.

With SIPLACE Material Manager, each reel or "package" is issued a label with a unique ID in clear text and barcode as soon as it is received. The system uses this UID to assign additional properties to the package such as MSD data, manufacturer and batch information for traceability applications, the production or delivery date for FIFO-based removal from stock, brightness classes for LEDs, reel sizes for more effective utilization of the storage system, and a whole lot more.

The system uses the UID to keep track of each reel throughout its entire life cycle and its location at station in the warehouse or on the shop floor with each process having access to the linked properties.

Let's look at three examples:

- The system constantly updates the number of remaining units on each reel by subtracting the number of units actually picked up by the machine, which is much more accurate than the theoretical numbers ERP systems can generate by multiplying the number of modules produced with the units per BOM.

- The system places MSDs at the bottom of pick lists to minimize their exposure times. As soon as the reel is scanned during removal from storage, a time stamp is generated and kept track of. When the maximum exposure time of the components is exceeded, they are automatically blocked. Workers in the kitting area can no longer set them up, and the placement machines stop placing them while warning the operator.

- The exact location of each package is known at all times. For example, if the package was just scanned during a refill on line 4, everyone in the plant can see where it is located as well as when it is expected to be available again for other jobs and with how many units remaining.

No SMT-specific functionalities

SMT production has several characteristics that can't be mapped in ERP systems or only at very great expense. A simple example is the recording of exposure times for moisture-sensitive devices and the automatic blocking of their use if these exposure times are exceeded.

Material management provides the link between the ERP system and the shop floor – including process support

This is exactly the point where modern solutions like SIPLACE's Material Manager come into play. They supplement the higher-level ERP systems and link them with the production processes on the shop floor level. They also provide manufacturers wanting to make their production more efficient and flexible with the necessary process support.

If we look at material management solutions from an overall IT perspective, their general benefits are readily apparent:

Link between shop floor and ERP and other upstream IT systems

Material management solutions like the SIPLACE Material Manager complement ERP systems. While the master data, material order data, order entry data, etc. remains in the ERP system, the material management solution takes this data and enriches it with SMT-specific information to provide the foundation for IT-based shop floor support. ERP and material management solutions are therefore not alternative systems, but complement each other, which is why the SIPLACE Material Manager interfaces with ERP and other IT systems.

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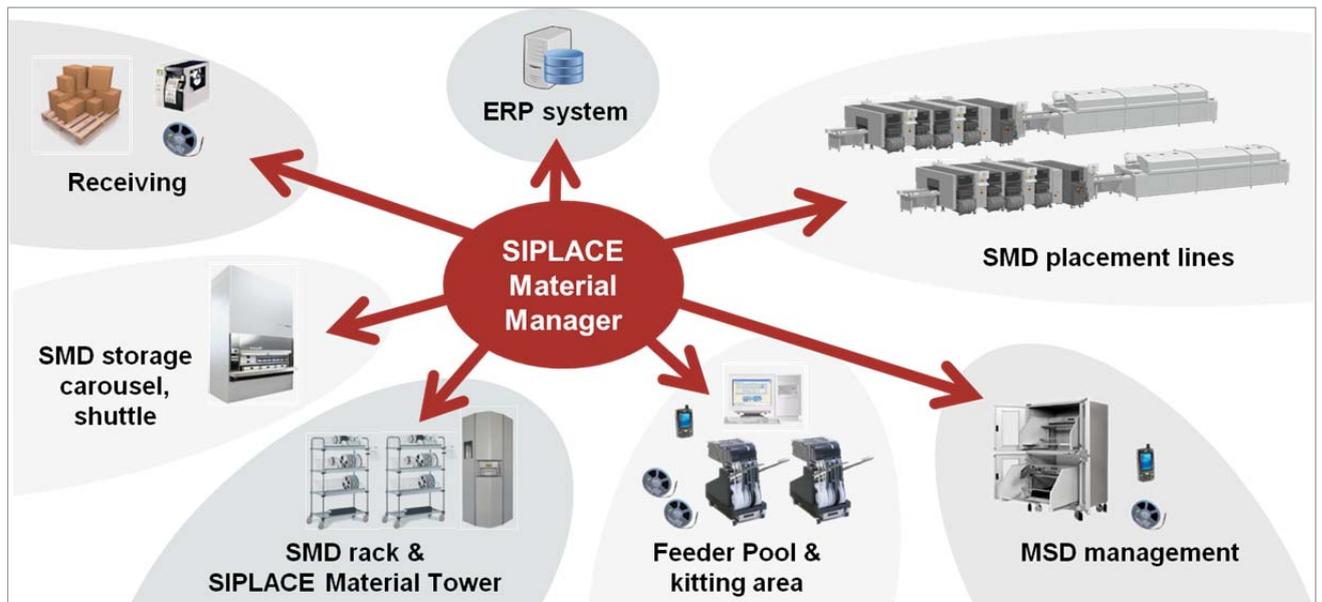
Centralized material management and optimized material flows in SMD production

Networking and automatic data exchange on the shop floor level

To manage the flow of material on the shop floor, material management solutions network with the various production-level systems. The SIPLACE Material Manager takes this networking to the extreme. It links not only the placement machines including their fill level controls and splicing sensors along with all relevant scheduling and setup management modules of the SIPLACE software suite, it also controls automatic storage systems like Kardex, Hänel or the new SIPLACE Material Tower, keeps tracks of MSD exposure times, manages the printing of machine-readable labels in the receiving department, records the data of all mobile and stationary scanners, and controls the data output on user devices such as tablets, handhelds, etc.

The bottom line: the SIPLACE Material Manager is the first system that provides comprehensive, paperless visibility of material flow data on the entire production level.

Automation and workplace-oriented views support SMT-specific workflows

Based on the networking described above, material management solutions like the SIPLACE Material Manager provide workflow- and workplace-oriented views in addition to process automation options. As an initial benefit, this allows you to eliminate all paper from your production processes by replacing printed checklists with scanners. This prevents errors, simplifies the synchronization of processes, and improves the ways in which you can respond to schedule changes.

Examples include: scanning of material receipts against shipping lists; displaying path-optimized pick lists on PDAs; transmitting data from the scheduling department to workstations in the warehouse, setup preparation areas and lines; automatically blocking placement processes when MSD exposure times are exceeded; and special search screens for quickly locating components on the shop floor.

Package chains – frequently underestimated

Splicing reels together is a frequent occurrence in SMT production. In terms of data management, however, this simple procedure harbors a great deal of complexity that classic ERP and inventory management system are unable to reflect.

By interacting with placement machines and intelligent SIPLACE X feeders, the SIPLACE Material Manager combines the spliced reels into so-called package chains that track every splice – even when many small snippets are taped together. Via splice detectors, the system is able to determine when the transition between components from different packages takes place.

This kind of tracking is important for applications that require traceability, precise inventory management, expiration date tracking, or the tracking of MSD exposure times. At this time, the SIPLACE Material Manager is the only material management system that can track this SMT-specific activity (including error handling and corrections) so accurately.

Many other software solutions, on the other hand, "prohibit" splicing, and require the user to let the feeder run empty before installing and scanning a new reel. In short, weaknesses in these software applications increase the risk of unproductive downtimes or make accurate material management impossible. Other systems, for instance ERP systems, lead to "downstream" errors such as the faulty tracking of MSD exposure times or inventory discrepancies.

What improvements can a professional, SMT-specific material management system like the SIPLACE Material Manager make possible for processes and people?

The previous sections laid out the benefits of an IT-based material management system on a more general level. To put them in even more concrete terms, the following sections show process improvements on the shop floor that the SIPLACE Material Manager makes possible.

Using some before and after scenarios, we will explain how processes can be optimized with the SIPLACE Material Manager and what impact this will have on important factors like productivity, flexibility, reliability, quality, time, and costs.

Needless to say, this list of examples is neither complete nor does it apply to each production environment. Depending on the individual plant, the processes and potential improvements may differ.

In addition, the SIPLACE Material Manager features a modular structure that lets the user build the system step-by-step or install it only in certain areas for systems that already exist.

What's important to remember, however, is the fact that improvements made with the SIPLACE Material Manager accumulate across the entire production chain: 1 plus 1 becomes much more than 2!
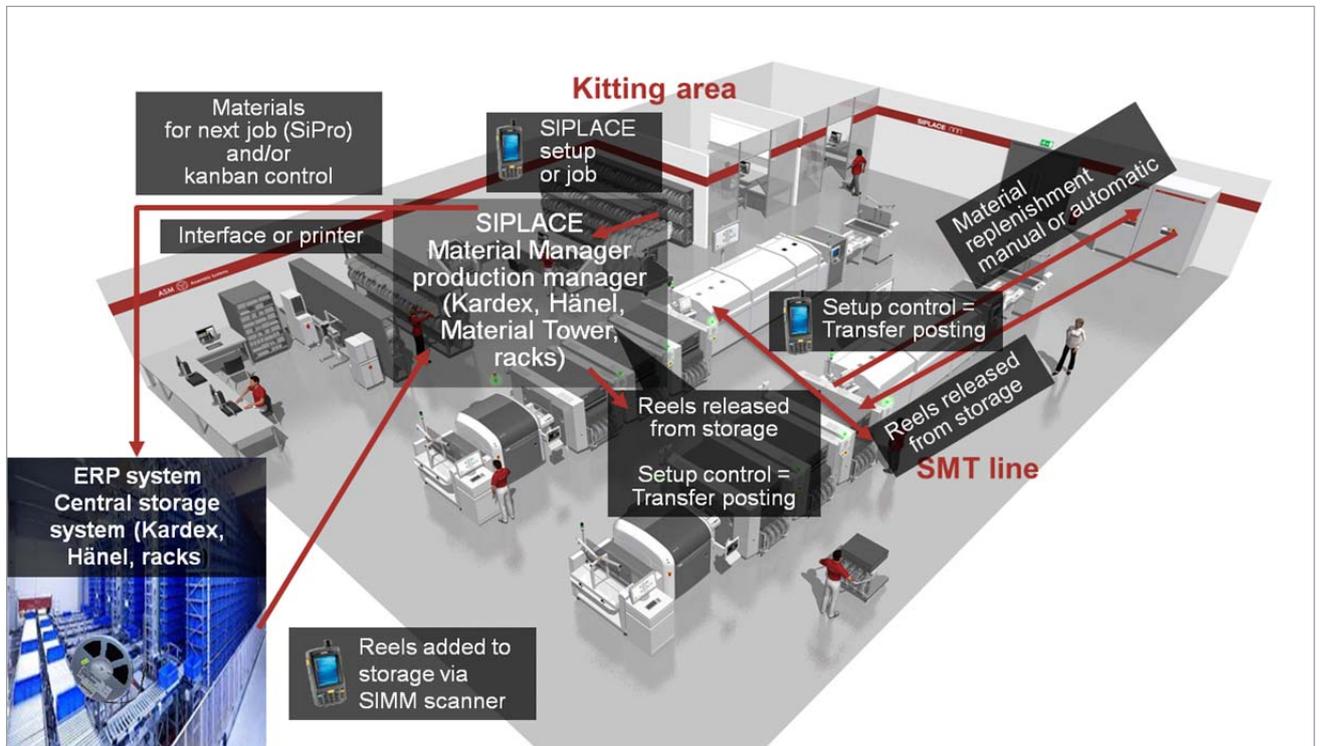
Central ERP warehouse (e.g., SAP) linked to SIPLACE Material Manager

Receiving

Checking incoming deliveries

Before:
Material deliveries are checked against the supplier's shipping note for completeness. The data is entered manually.

With SIPLACE Material Manager:
The ERP provides the receiving department employee with an electronic shipping advice listing all components about to arrive. When the components actually arrive, the worker labels each reel with a machine-readable UID and additional data in plain text. Data about the manufacturer, batch number, receiving data and special information like expiration dates is recorded as well and linked to the UID. If the delivery has items missing, the system automatically notifies the purchasing department.

Results:

- UIDs make it possible to link data and track packages through each production stage.

- Machine-readable labels provide the basis for paperless manufacturing.

- Delivery lists accelerate the receiving process and make it more reliable.

Planning

Material availability checks in the scheduling process

Before:
The systems have access to total inventory data, but no information on the items' breakdown into individual packages, or reels. In addition, leftover quantities can only be computed on the basis of units produced multiplied by the quantities per BOM. As a result, orders are frequently scheduled for production despite the fact that not all parts are available. For example, you may have sufficient units in inventory, but they are distributed over too many reels, or the residual amounts posted in the system are incorrect.

With SIPLACE Material Manager:
You get 100% visibility of all SMT reels in your factors. Thanks to the UID, the SIPLACE Material Manager checks material availability based on total quantity and the location and distribution of that quantity across a set of reels. Residual amounts are not computed, but recorded accurately and directly from each machine (including discards). The system also uses the UID to determine when components becomes available again from other setups and arranges the job sequence accordingly.

Results:

- More planning transparency and reliability.

- No more unscheduled production stops and wasted setups as a result of missing parts.

- Improved productivity and line utilization.

- Improved delivery reliability.

Scheduling rush jobs

Before:
Squeezing in rush jobs is expensive and risky. Changing the production schedule involves lots of coordination across the entire plant. Lists must be reprinted, and the individual jobs must be re-sequenced at the various workstations. Despite all this effort, communication gaps often lead to line stops because some warehouse, setup or line process cannot adjust quickly enough. The required materials may be available, but cannot be

located in time. Because of all these problems, most plants operate with long lead times and "lock in" the planning periods as mandatory.

With SIPLACE Material Manager:
Schedule changes such as those caused by rush jobs are transmitted instantly to all affected entities and inserted into the new job sequence. They are also updated on all tablets, handhelds and stationary systems. Users can already see for example, in the planning stage how much lead time is needed, for provisioning of materials. The system also rearranges setup sequences automatically. The positive experience with successful rush jobs enables producers to schedule jobs in a more customer-oriented manner.

Results:

- Significantly improved flexibility with regard to short term

- Automated notifications; significantly less communication effort with improved planning reliability

- Easier to find location of materials, also on the shop floor (kitting areas, lines, etc.)

Warehouse

**Placing goods into automatic storage systems**

Before:
Incoming components are sorted by type and stored in automatic storage systems (Kardex, Hänel, etc.). The storage locations are assigned by the system's proprietary controls. In most cases, all components of the same type are placed in a dedicated bin. All movements must be executed manually by the operator via a storage system terminal. There is no true inventory transparency, because the component quantities on the individual reels are unknown.

With SIPLACE Material Manager
Thanks to the UID and the storage system control via the SIPLACE Material Manager, a "chaotic" storage approach is possible. Users can place the components into any bin in the order they arrive. The system links the scanned package's UID with the respective bin's ID to keep track of where everything is located. This applies

not only to newly received components, but also to components being returned from the shop floor.
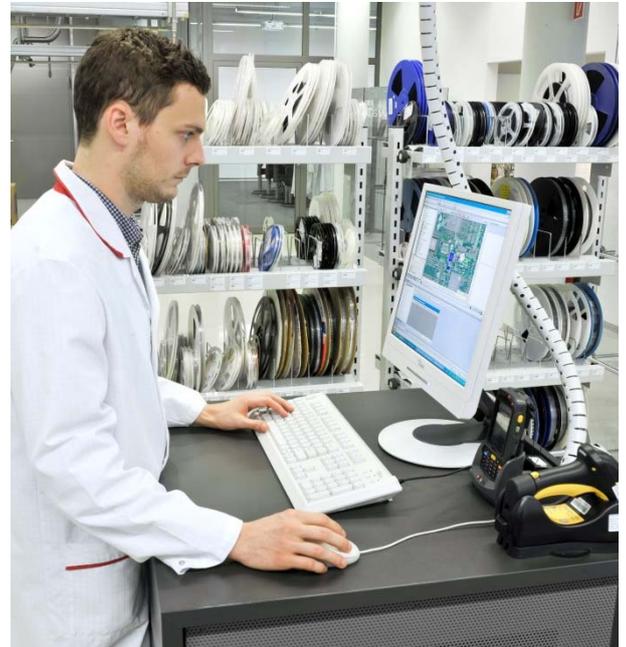
Results:

- Much easier and faster storage and withdrawals

- Significantly improved space utilization in the rack systems, less investment in rack systems.

- Accurate stock data, because the system knows the component quantities on each reel

Withdrawing materials for placement jobs

Before:
Materials are withdrawn based on production jobs. Warehouse staff use printed lists, pick items in the order listed, and check them off one by one. They manually enter the component numbers into the automatic storage system so that the storage system can travel to the respective location. The user is then instructed to retrieve the appropriate reel from the bin (based on quantity, date because of FIFO, etc.).

With SIPLACE Material Manager:
The SIPLACE software notifies the warehouse staff of the required materials in a timely manner and in the correct order. Workers receive path-optimized pick lists on their handheld devices. They check off the items by scanning them. The system makes sure that only reels

with sufficient quantities are picked according to the FIFO principle. SIPLACE Material Manager can also control automated storage systems and instruct them to travel to the appropriate position without any human input.

Results:

- Setup-based material withdrawal

- Automated and synchronized information on material provisions

- Scanning improves the process reliability

- Shorter distances and faster material provisioning

- Paperless communication with handhelds, tablets, etc.

- Much faster issuing stock by automated storage systems

- Elimination of time-consuming and error-prone manual procedures

Taking inventory

Before:
To keep the discrepancies between calculated and actual inventory quantities in the main warehouse from getting too large and to minimize the resulting planning errors, physical inventories must be scheduled, which is expensive and takes a lot of time.

With SIPLACE Material Manager:
By interfacing directly with the placement machines (e.g. splicing sensors), the SIPLACE Material Manager collects very accurate component consumption data. This allow manufacturers to switch to a perpetual inventory system. Any physical inventory counts can be performed during non-production periods and in the main warehouse only, for example by sampling individual packages based on the UIDs.

Results:

- Perpetual inventory saves time

- Production-oriented planning of random sample counts

Kitting areas/placement lines

From simple to flexible setup concepts

Before:
Because of bad experiences as a result of material supply problems, many electronics manufacturers hesitate to employ more flexible setup concepts. Most plants use changeover table-based concepts where the tables are set up between runs with components supplied from the warehouse. When the tables are removed from the lines, they are completely torn down, and all components are returned to the warehouse. Printed lists and long material provisioning lead times make more flexible concepts or even the side-by-side use of different setup concepts impossible.

With SIPLACE Material Manager:
The fully transparent material management system radically reduces the "hidden and lost parts in the production" and opens the door to much more flexible setup concepts. SIPLACE software tools and SIPLACE Material Setup Assistant (see sidebar) indicate which feeders and components will still be needed for one of the upcoming production jobs by blinking the LEDs on the SIPLACE X feeders. Similar functions are also available on the placement machines when setups must be changed.

As a result, many components don't need to be returned to the main component warehouse. SIPLACE Material Manager also considers the setup preparation area to be "storage location" and it keeps track of all components located there. This further reduces the travel distances for frequently needed components. The SIPLACE Material Tower can also function as a fully automated storage system in the setup preparation area. Since the SIPLACE Material Manager controls the issue of reels sorted by table numbers and tracks, this on-demand supply system simplifies and accelerates setups and eliminates mistakes. Even MSDs can be stored in the SIPLACE Material Tower close to the line to reduce their exposure time considerably.

Results:

- Ability to employ more flexible, powerful and productivity-enhancing setup concepts

- Visual control of setup processes via LEDs on SIPLACE X feeders

- Path- and time-optimized storage of components in the setup preparation area or adjacent to the line (SIPLACE Material Tower)

- Significant reduction of material movements and postings

- When feeders and changeover tables are removed from the line, the materials become instantly available and can be used on other lines without having to be returned to the main warehouse

- No more printed setup lists needed

Automated material requests for replenishment processes

Before:
When a feeder runs empty, the machine indicates this to the operator. In many cases, however, refills take too long because the operator is busy somewhere else, or the required reel must still be supplied from the warehouse, or several feeders run out of components at the same time. As a result, the line stops. Operators are instructed to avoid such stops, which is why they sometimes replace reels that still have enough components for the current job with fresh ones.

With SIPLACE Material Manager:
When the operator sets up the feeder, he or she scans the reel's UID. The machine thus knows how many components are still on the reel and reduces this number as it picks up components. When the number reaches a

SIPLACE Material Setup Assistant

The SIPLACE Material Setup Assistant is a system that makes your kitting operations much more efficient, because it is fully integrated into the SIPLACE software suite and the SIPLACE Material Manager.

Operators use the SIPLACE Material Setup Assistant to "park" feeders in the kitting area. When a setup change comes up, the required feeders blink. The Active Feeder Rack also requests any missing materials automatically from the storage site (main warehouse or SIPLACE Material Tower). With this advanced guidance, setup processes can be executed much more quickly and reliably.

certain threshold, the machine automatically requests a fresh reel via the SIPLACE Material Manager – either from the main component warehouse (with a configured lead time) or from the SIPLACE Material Tower next to the line. That way, the operator does not have to guess when a refill will be needed, but receives a timely notification from the machine. This keeps feeders from running empty and prevents operators from splicing on fresh reels too early due to excessive caution.

Results:

- Sufficient lead times for operators reduce the risk of line stops.

- Fill level control prevents the splicing on of refills to reels that still have enough components.

- The placement machines request refills automatically. Since each reel and its residual quantities are tracked via the reel's UID, partial reels can be used for refills (FiFo).

- Refills are requested one-by-one as needed, which eliminates the need for maintaining excess emergency supplies next to the line.

These examples show that modern material management is much more than inventory management, because it supports all material-related operations.

The production environment becomes faster, more reliable and more efficient. It may even attain a new level of efficiency with entirely new processes and processes. How can you translate this into a cost-benefit or ROI analysis?

SIPLACE Material Tower

The SIPLACE Material Tower is a compact and completely automated storage system that is fully integrated into the SIPLACE Material Manager. It is also MSD capable. The SIPLACE Material Tower makes it possible to keep materials near or next to the line, which reduces the supply lead time considerably.

Requests are issued to the tower by SIPLACE Material Manager, and issuing a reel takes only 10 seconds. The system can even issue the supplies in the proper track order for each changeover table. Refilling the SIPLACE Material Tower is also automatic via UID scanning. It even sends a replenishment request to the main material warehouse after it has issued a reel.

TECHNICAL SPECIFICATIONS		
SIPLACE Material Tower	**"Small" model**	**"Large" model**
Dimensions	1,110 × 1,070 × 2,500 mm (W × D × H)	1,560 × 1,070 × 2,500 mm (W × D × H)
Weight	500 kg (without coasters) Maximum coaster weight: 3.5 kg	700 kg (without coasters) Maximum coaster weight: 3.5 kg
Power requirements	100-240 VAC, 50-60 Hz	100-240 VAC, 50-60 Hz
Storage capacity	4"-7" reels: 8 mm - 72 mm tape width 11"-15" reels: 8 mm - 72 mm tape width	4"-7" reels: 8 mm - 72 mm tape width 11"-15" reels: 8 mm - 72 mm tape width
Maximum capacity	612 4"–7" reels Combination of 4"-15" reels: up to 320 4"-7" reels plus 146 11"-15" reels (8 mm tapes)	932 4"–7" reels Combination of 4"-15" reels: up to 480 4"-7" reels plus 146 11"-15" reels (8 mm tapes)
Material issue speed	9-11 seconds per reel	9-11 seconds per reel
OPTIONS		
MSD option		

Which factors should you include in your ROI calculation when deciding whether to invest in a material management solution?

In the previous section we covered how the SIPLACE Material Manager increases transparency and stock availability in your factory and how efficiently it can support your operators. More transparency also means more speed and reliability in your electronics production.

The extent to which these improvements affect factors like productivity, reliability, on time delivery, customer loyalty and costs will vary depending on your organizational structure and other circumstances.

However, in many cases measurable improvements have been identified in the following areas:

- Inventories

  - Reduction of safety stock and the amount of capital tied up in inventory

  - Improved transparency regarding residual quantities

  - Consistent FIFO compliance reduces losses caused by spoiled MSD stock

- Physical (year end) inventory

  - Cost savings through the elimination of costly physical inventories and the introduction of a perpetual inventory system

- Warehouse

  - Faster receiving process of incoming material via shipping notification lists

  - Fewer errors caused by faulty labeling on the part of suppliers

  - Time savings through path-optimized pick lists

  - Time savings through material storage adjacent to the line (SIPLACE Material Tower)

  - More efficient workflows using shorter replenishment lead times

  - Faster response times and improved process reliability for rush jobs

  - Error-proofing using scanner verification

  - Time saving by eliminating manual data entries on automated storage systems

  - Improved space utilization with automated storage systems

- Production

  - Reduction of material-related line stops

  - Less material travel and transportation costs (more transparency, faster localization, storage adjacent to the line, SIPLACE Material Setup Assistant)

  - Implementation of more flexible and efficient setup concepts

  - Improved traceability (order-oriented); less costly recalls

  - Improved control of placement order deadlines

- General

  - Paperless production using mobile devices and electronic lists

  - Improved process verification (scanning)

  - Significantly less stress on the entire shop floor, which reduces the need for ad-hoc communication

  - Fewer manual entries into the ERP system due to direct interface with SIPLACE Material Manager

  - Improved transparency of inventories and work in progress

  - Significantly fewer manual postings

Sample ROI calculations from customer projects

Although amounts vary because of different organizational and salary structures, the following ROI examples prepared by current customers provide some indications of the scope of potential savings.

Reduction of safety stock

A customer with €10 million tied up in inventory calculated a five-percent reduction in his safety stock. Assuming an interest rate of 5%, the company came up with annual cost savings of €25,000 (plus one-time benefits of the reduction).

Kanban control of consignment inventory

A customer computed his reduction in downtime at 10 minutes per day per line as a result of the improvement in scheduling. With seven lines running, his production team came up with a productivity improvement of €98,000 annually.

More storage capacity in Kardex systems

After the conversion, a customer was able to reduce his Kardex systems from five to two. According to the company, each Kardex system represents an €80,000 investment.

Recalls because of faulty labeling by suppliers

SIPLACE Material Manager allows you to keep track of manufacturers' component IDs in addition to IDs issued by distributors and/or suppliers. To prevent production errors caused by faulty labeling on the part of the distributor, the SIPLACE Material Manager compares the distributor's ID (or customer-specific labeling) with the manufacturer's original labeling. If they differ, the SIPLACE Material Manager rejects the part and requests clarification. This effectively prevents the storage of component reels with faulty IDs and any resulting product errors.

Based on three to four recalls caused by such errors on average, one customer computed the resulting savings at roughly €100,000 per year.

Elimination of physical inventories

One customer calculated that a classic physical inventory takes 20 man days and costs approximately €5,000, not including any opportunity costs caused by the reduction of productive time.

Less line downtime through improved operator notifications

One electronics manufacturer determined that the automated fill level display on the line monitors and the corresponding refill notifications reduced his material movements by 30% (line-adjacent storage, reduction of preventive splicing) The reduction in downtime alone resulted in annual cost savings/productivity gains of €49,000.

SIPLACE Material Setup Assistant reduces setup costs

Roughly 50 percent – that's how much an electronics manufacturer recently estimated he saved in material supply, setup and material return costs as a result of using the SIPLACE Material Setup Assistant and the SIPLACE Material Manager.

In summary

A modern material management system provides transparency and opens the door to new opportunities.

A modern material management system does not just keep track of inventory, but supports your production processes. Over the short term, the greatest potential savings come from more efficient warehousing processes and the minimization of material-related downtimes. Over the medium and long term, the gains in flexibility and process reliability on the shop floor will be even greater. Without improving the flow of materials, more flexible production concepts (made necessary by smaller lot sizes, Industry 4.0, etc.) are doomed to fail. Flexible and on-demand production is possible only if the components are supplied to the line in a flexible and timely manner as well. The production levels must be networked and the flows of materials and information must be synchronized with your processes, which is precisely what SMT-specific material management solutions like the SIPLACE Material Manager can accomplish. 100% visibility of all the SMT reels in your factory

Appendix:

SIPLACE MATERIAL MANAGER VS. ERP SYSTEM		
Requirement	**Material Manager**	**ERP system**
Interface to placement machine	Yes	?
Package-based storage management	Yes	?
Interface to Setup Center	Yes	?
Update capability to handle new products, features, or machine generations	Yes	?
Accurate stock management that integrates the machine's fill level control	Yes	?
Package chains are tracked in the warehouse and on the line	Yes	?
Stock releases based on SIPLACE Pro setups and production schedules	Yes	?
Consistent and automated MSD handling from warehouse to placement machine, including package chain handling	Yes	?
Online blocking of reels in the warehouse and on the placement machine	Yes	?
Material availability check based on SIPLACE Pro data across multiple lines (requires Multi-line Clustering)	Yes	?
Material reuse check in the kitting area (requires Material Setup Assistant)	Yes	?
Automatic transfer posting of packages on the shop floor for accurate reel localization	Yes	?
Support for automated material replenishment via SIPLACE Line Monitor	Yes	?
Support for brightness class handling also in the warehouse	Yes	?
Support for alternative components also in the warehouse	Yes	?
Interfaces to all common storage systems (Kardex, Hänel, SIPLACE Material Tower)	Yes	?
Complete handling of SMT and THT materials from a single source	Yes	?
Project duration	Quick installation thanks to automated data transfer	?

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