

ASM



MATERIAL
MANAGEMENT



PREPARATION



FACTORY
MONITORING



FACTORY
INTEGRATION



PLANNING



VIRTUAL
PRODUCTION



PROCESS
OPTIMIZATION



PRODUCTION

SMART WORKFLOWS



Integrated support for production processes
within a global skills network



Ready for the future with smart workflows	3
Eight critical workflows	4
Planning	6
Virtual Production	12
Process Optimization	18
Production	24
Material Management	30
Preparation	36
Factory Monitoring	42
Factory Integration	48
What now? Your path to more efficient workflows	54



Ready for the future with smart workflows

Powerful machines form the basis of the modern electronics factory.

But only if the central processes receive intelligent and consistent support can you exploit the capabilities of your equipment, lines and factories to the fullest

By working closely with electronics manufacturers all over the world, ASM has demonstrated again and again:

- The right tools make processes more stable and flexible, faster, and more cost-effective.
- The frequency and costs of manual assists sink dramatically.
- Performance indicators for quality, productivity and cycle times set new records.

Find which smart solutions global technology leader ASM offers to support, network and integrate the eight central workflows in electronics manufacturing factories.

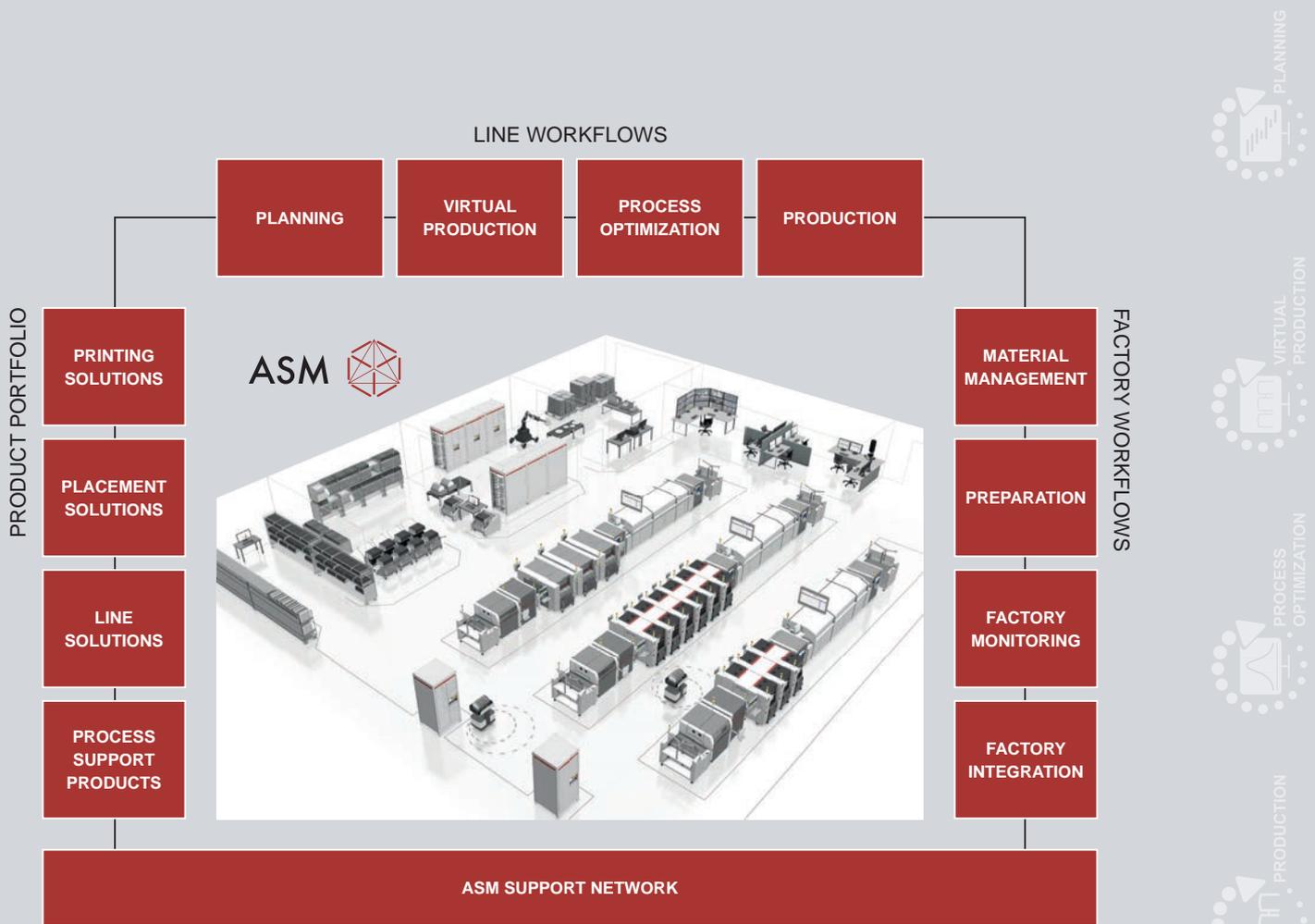
The modular tools and systems interact perfectly to make your production more competitive and ready for the future.

The road to smart processes is as individual as your electronics production. ASM's experts support you with perfectly matched solutions, best practices, checklists, and process know-how. Together we make your workflows smarter and more efficient for the long term.



Eight critical workflows

By working together as part of the SMT Smart Network, innovative electronics manufacturers, industry partners and ASM experts at the SMT Centers of Competence have identified the eight workflows that have a critical impact on efficiency, quality and flexibility, namely the four line workflows **PLANNING**, **VIRTUAL PRODUCTION**, **PROCESS OPTIMIZATION**, and **PRODUCTION**, and the four factory workflows **MATERIAL MANAGEMENT**, **PREPARATION**, **FACTORY MONITORING**, and **FACTORY INTEGRATION**.



Consistent process support

Standalone machines and automation cells are yesterdays' news. Today's manufacturers want connected solutions that support, optimize and automate their processes more effectively, which is what this brochure is all about. For each of the eight workflows you will find descriptions of the innovative tools with which we support the respective processes.

Connected learning

What does process integration look like in practice? Members of the SMT Smart Network describe examples of how the deployment of ASM solutions has affected the KPIs of their manufacturing operations. Links to videos and descriptions provide detailed looks at these best practices and may give you ideas for making improvements on your own factory floor.

Know where your company stands today

Where does your company stand on the road to the smart SMT factory? Completing the Smart Factory Check online or with one of our experts lets you see where in your production the greatest potentials for improving your processes are hidden.



PLANNING

Optimize your capacity utilization and meet deadlines

Maximize your line utilization by scheduling your production with realistic capacities and restrictions.

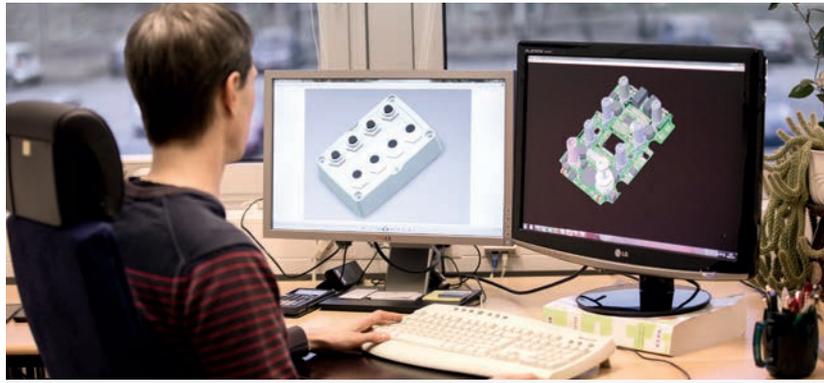


In the planning process you translate your orders with information about products, quantities and deadlines from the ERP system into concrete job sequences and delivery times for your production operations. The goal is to have a production that's "calm", efficient, and on schedule.

This planning process becomes increasingly complex as the number of products and customers increases, lead times become shorter, and lot sizes smaller. In addition, you must be able to deal with rush orders and unforeseen events that must be responded to and taken into account in your planning and processes without delay. Without the right software support for your planners, you will incur more mistakes and suffer higher costs.

Implementing smart tools lets you build a fast, highly automated and therefore highly flexible planning system. Fully networked planning tools reflect capacities, restrictions and even short-term interruptions seamlessly, thus increasing the quality and reliability of your planning.

Simulations give you certainty about cycle times and delivery schedules, analyze target vs actual variances, and take these findings into account for future planning processes. At the same time, you can adapt the planning process at any time even for multiple lines to reflect new requirements (rush orders, equipment failures, delayed material deliveries, etc.) and instantly communicate these changes electronically to all employees and process steps.



Aros electronics AB

Smart planning at Swedish electronics manufacturer Aros

Sweden's Aros electronics focuses on process optimization and Industry 4.0 concepts in the development and production of controllers and power electronics for drivetrains in automotive and machinery applications.

The production planning for the high-mix/low-volume production is extremely complex, because the company manufactures not only in small lot sizes ranging from 1 to 200, but must be able to squeeze the production of prototypes for its own development department into its schedule. At the same time, its customers' logistics chains depend on on-time deliveries, which is why they set very strict deadlines. For its planning and monitoring, Aros uses a manufacturing execution system (MES) that was developed in-house. It is supported by smart ASM systems for its planning, setup and material logistics operations.

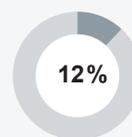
The results:

- Significant reduction of planning and setup costs
- Minimization of material- and setup-related line stops
- Paperless, consistent communication on the factory floor
- Real-time information about planning and production progress
- Production capacity improved by more than 200 percent
- 60% more efficient in material logistics

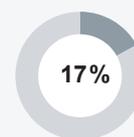
KPI improvements at other ASM customers



Performance improvements



Improvements in line availability



Reduction in material inventories



Video
PLANNING



Process sequence

- 1 Import orders from the ERP system
- 2 Allocate products across lines in accordance with deadlines and capacities
- 3 Cluster and optimize (family) setups
- 4 Generate (paperless) BOMs and setup lists



Indicators of weaknesses in the planning process include:

- Inability to meet delivery deadlines
- Lots of manual operations
- Frantic activity and lots of back-and-forth communication when schedules change
- Schedules must be finalized far in advance, which reduces flexibility
- Difficulty to respond quickly and adequately to rush orders or mal-functions





ASM Production Planner

The ASM Production Planner helps you to plan your production in accordance with shipping deadlines.

In addition to the throughput times for products, it is setup times and non-productive process times for things like maintenance that need to be taken into account. It also includes information about the status of production lines and inventory availability in the planning process.

After orders have been imported from the ERP system, the program generates setup sequences for the various lines – always in consideration of the specified due dates. The whole schedule – and the ongoing production process – are clearly displayed in form of a Gantt chart.

- Transfer of planning-relevant order data from IT systems (ERP, etc.)
- Automated planning of setup sequences for all lines in compliance with the deadlines for each order

- SMT-specific, package-oriented material availability check (if integrated with ASM Material Manager)
- Precise determination of throughput times based on placement programs
- Consideration of configurable non-productive times (material removals, setup, maintenance, shift change, etc.)
- Visualization in form of Gantt charts
- Drill-down capabilities to see more detail
- Recording of actual throughput and non-productive times (target vs actual comparison for each order), based on which planning parameters can be improved further
- Continuous planning based on the status of current production orders on the lines
- Consideration of rush orders and new product introductions

Our product portfolio for your PLANNING workflow

ASM Production Planner	<ul style="list-style-type: none">  Setup effort  Productivity  Costs 	Planning software for schedule-compliant SMT production. (See highlight)	
SIPLACE SiCluster Professional/SIPLACE SiCluster MultiLine	<ul style="list-style-type: none">  Setup effort  Productivity 	Software-supported setup optimization for electronics factories. (See highlight)	
ASM Setup Concepts	<ul style="list-style-type: none">  Line downtime  Productivity 	Our placement machines, conveyors, feeders and planning tools support a wide range of setup concepts, even non-stop setups. Combine fixed setups, family setups, split tables, constant tables, random setups and other setup concepts.	
SIPLACE Pro	<ul style="list-style-type: none">  Line downtime  Productivity 	Uniform graphical programming environment for the creation and validation of placement programs – from importing the CAD data to component description to placement simulation.	
SIPLACE Material Manager	<ul style="list-style-type: none">  Productivity  Quality  Line downtime 	The first process-oriented material flow management system for SMT production. The ASM Material Manager provides paperless transparency of material stocks and locations and integrates and controls all material-related processes – from receiving and storage to setup preparation and the actual setup on the shop floor.	
SIPLACE Material Setup Assistant	<ul style="list-style-type: none">  Setup effort  Material travel  Line downtime 	The intelligent SIPLACE X-feeders indicate whether they should be torn down or “parked” in the setup preparation areas to be available for an upcoming setup. This reduces material travel and speeds up the setup process.	
ASM Quick Changeover Project	<ul style="list-style-type: none">  Product change-over effort  Number of operators  Material travel 	In a three-phase service project, our experts work with your teams to improve and accelerate your setup changeover procedures.	



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PRODUCTION

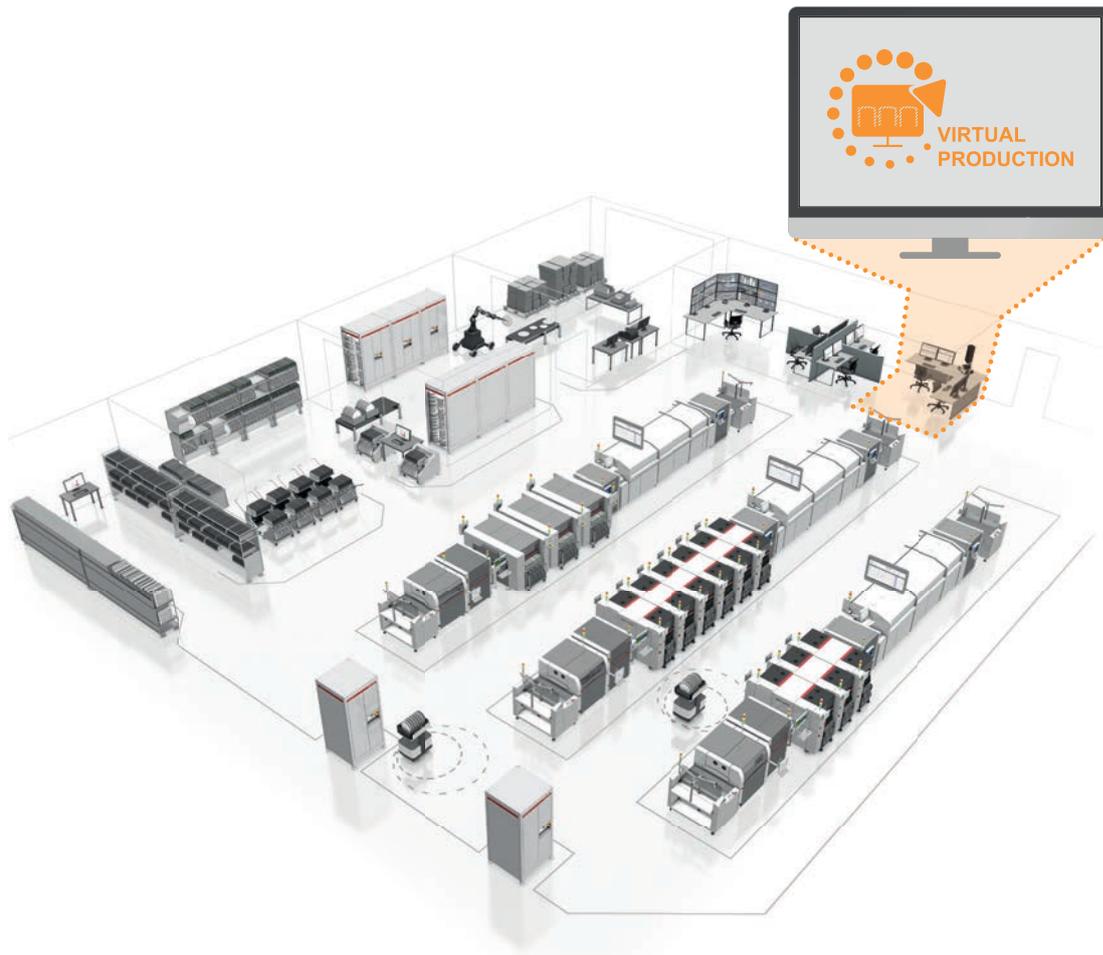


PLANNING

VIRTUAL PRODUCTION

Make the unknown predictable

A 'digital twin' of your production lets you simulate your processes with great reliability.



New product introductions (NPIs) always pose a major challenge for any electronics factory. As the life cycles of modern products become ever shorter, managing NPI processes is becoming a critical competitive factor.

With modern tools and simulations, new products are first produced virtually these days – offline on a 'digital twin' of your SMT lines, without tests, and without having to interrupt valuable production operations. Long before the first board enters the line, you can define program parameters, teach components, generate setup and pick lists, calculate throughput times, and optimize entire production processes. With the ASM DFM HealthCheck you can detect weaknesses in your

stencil design and make corrections before the stencil is made and potentially faulty boards are produced that may have to be scrapped.

When the new products hit the real line after being optimized virtually, your machines and processes operate from the start with the same level of reliability and productivity as with a long-established product. Your production managers know the throughput times in advance and can plan accordingly.

Virtual production creates reliability, drastically reduces non-productive activities, improves yields, and maximizes your line utilization.



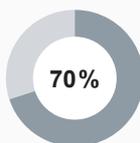
Virtual production at Dutch electronics manufacturer RENA

RENA Electronica B.V. is a specialist for customer-specific LED lighting solutions for architectural, agricultural and oil and gas applications, to name just a few. RENA also develops and manufactures high-quality controllers and industrial electronics. In its high-mix/low-volume production running in three shifts, the company executes on average up to 10 new product introductions in addition to ten setup changeovers. To carry these out seamlessly and with as little line downtime as possible, RENA depends on virtual production. The company optimized its NPI processes and introduced modern simulation tools with help from ASM.

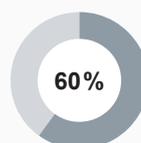
The results:

- Offline creation of printing and placement programs
- Virtual printing and placement produces optimized PCB designs, settings and programs
- PCB layouts are examined via ASM ProcessExpert with ASM DFM HealthCheck functions
- Lower costs thanks to optimized process parameters
- Minimization of standstill times; NPIs without line stops
- Autonomous printing process optimization with ASM ProcessExpert
- Remote support with use of smart glasses
- Throughput improved by more than 90 percent

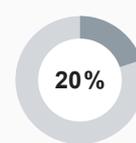
KPI improvements at other ASM customers



Reduction in design and optimization costs



Reduction in setup times



Reduction in material costs



Video
VIRTUAL PRODUCTION



Process sequence

- 1 Import Gerber data to define stencil and printing parameters
- 2 Program printer offline
- 3 Import CAD data to generate and optimize the placement program
- 4 Teach component shapes offline
- 5 Place components virtually (3D)
- 6 Deliver complete and optimized programs to the shop floor



Indicators of weaknesses in virtual production include:

- New product introductions generate hectic activity as well as high costs in terms of time and labor
- Low or merely average first-yield rates
- Significant deviations between target and actual throughput times
- Line standstills of productivity fluctuations
- Classic shakedowns with frequent adjustments of parameters and programs required
- Design and program weaknesses are only detected after the start of production



ASM DFM HealthCheck

Is the stencil design and material suitable for a reliable printing and placement process? The ASM ProcessExpert with its ASM DFM HealthCheck function makes this easy to check – all you need is the stencil's Gerber data.

The ASM ProcessExpert is the world's first self-learning inline expert system for electronics production. With the ASM ProcessLens, a highly accurate 5D SPM (solder paste measurement) system, it monitors and controls the printing process. The results of "fractional" experiments can be taken into account manually or automatically. Since all test results are recorded by the ASM ProcessEngine real-time software, the results of current and historical analyses are instantly available.

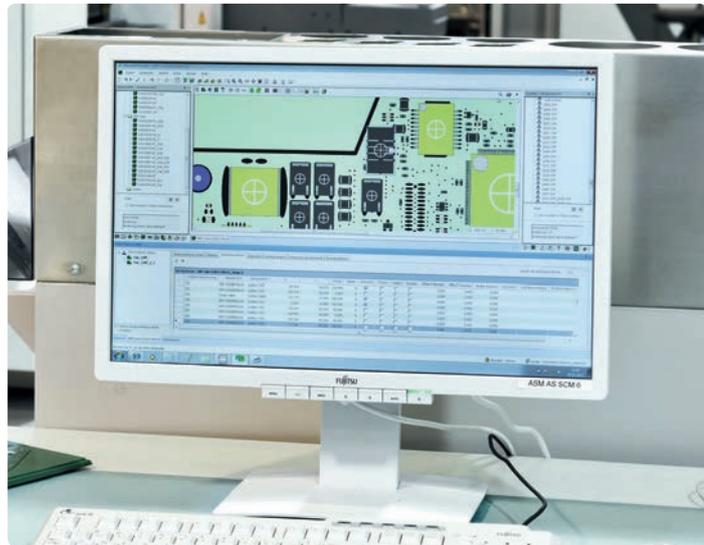
With the ASM DFM (Design for Manufacturability) HealthCheck, the ASM ProcessExpert uses these results and "findings" in virtual production processes. With the virtual process knowledge base, you can print virtually based on nothing but Gerber data long before you hold the first stencil in your hand or the first board enters the line. The ASM ProcessExpert thus determines the best possible process and printing parameters in advance and is able to point out critical areas in the stencil design that may cause problems later on.

- Determine optimal process and printing parameters as well as printing equipment through virtual prints on the basis of Gerber data and the knowledgebase
- Detect weaknesses in the stencil design long before the start of actual production
- Process reliability without trial and error on the actual production line
- NPIs without long-term printing process ramp-ups
- Self-learning system that becomes better with each analysis
- Stable printing processes
- Improved yield and significantly more productivity

SIPLACE Pro

Our SIPLACE Pro programming system guides you safely through new product introductions. Virtual Product Build makes it easy to create reliable placement programs offline. Next you visualize and test the results step by step by simulating the placement process.

Software wizards and an extensive component library help you with the programming, optimize the placement order and point out critical placement sequences. With SIPLACE Pro, your employees can generate executable placement programs without blocking the actual production line.



ASM Printer Programming

Our software for the central creation and storage of printing programs. Programs are generated, tested and optimized offline irrespective of the individual printer.

Centralized offline programming relieves your production lines, eliminates sources of errors, and defines a printing profile and a uniform printing program for each product. When programs are downloaded from the central database, the system checks whether the specific printer on the production line has the right equipment and configuration to execute the program.

The printing and placement programs for your products are administered in a central database and jointly transferred to the line when the production run starts.

- Process-oriented offline programming
- Transparent data management
- Link to SIPLACE Pro Line Control
- Joint data management for printing and placement programs
- Directly download to printers on the line
- Printer configuration check and verification by the operator



Our product portfolio for your VIRTUAL PRODUCTION workflow

ASM ProcessExpert with ASM DFM HealthCheck	<ul style="list-style-type: none">  Costs  Productivity  Number of operators 	<p>Planning software for schedule-compliant SMT production. (See highlight)</p>	
SIPLACE Pro	<ul style="list-style-type: none">  Line downtime  Productivity 	<p>Uniform programming environment for the creation and validation of placement programs – from importing the CAD data to component description to placement simulation. (See highlight)</p>	
ASM Printer Programming	<ul style="list-style-type: none">  Productivity  Operator assists  Costs 	<p>The printing and placement programs for your products are administered in a central database and jointly transferred to the line when the production run starts. (See highlight)</p>	
SIPLACE Vision Teach Station	<ul style="list-style-type: none">  Line downtime  Operator assists 	<p>Equivalent to the vision system in our placement machines, this is where you describe new components offline. With the auto-learn function, it can even detect shapes and dimensions automatically. The descriptions are subsequently made available to all tools and placement systems via the central component library.</p>	
DEK station software & software options	<ul style="list-style-type: none">  Operator assists  Productivity  Line downtime 	<p>Easy-to-use and clearly structured user interface for creating DEK printing programs in a few minutes. Can be operated via touchscreen and/or keyboard. Support is provided by graphical parameter visualizations and how-to videos.</p>	
SIPLACE LED Pairing	<ul style="list-style-type: none">  Quality  Productivity  Costs 	<p>This software administers LED brightness classes and combines them with matching resistors. Your benefit: You enter the permissible brightness class/resistor combinations in form of a table in the placement program. Based on this information, SIPLACE machines automatically pick the appropriate resistor for each brightness class – without new downloads or line interruptions.</p>	
SIPLACE Odd Shaped Component (OSC) Package	<ul style="list-style-type: none">  Quality  Costs 	<p>With the SIPLACE OSC Package, the fully automated placement of odd-shaped components is no longer a problem. Whether you need to accommodate irregular lead shapes or complex snap-in components – with the powerful SIPLACE Very High Force TwinHead and the smart 3D imaging of the new SIPLACE OSC Package you can handle them with ease.</p>	

Our product portfolio for your VIRTUAL PRODUCTION workflow

SIPLACE Station Software



Operator assists



Line downtime



Productivity

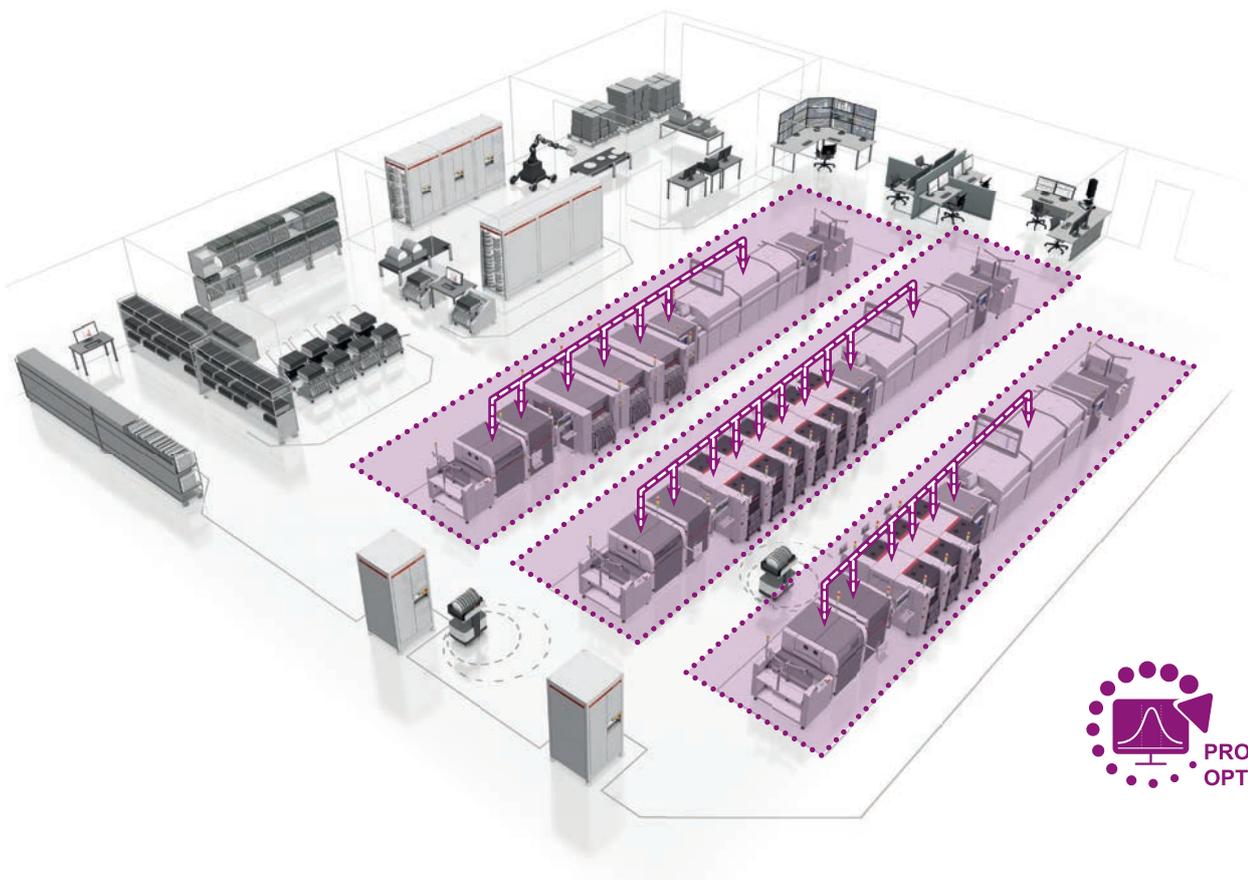
SIPLACE Station Software provides smart features for the component pickup, inspection and placement processes. Even maintenance and calibration tasks can be easily initiated and analyzed with the SIPLACE Station Software.



PROCESS OPTIMIZATION

Processes that improve on their own

The next step in electronics production: Solutions for self-optimizing processes.



Even the smallest changes in product, process or environmental parameters affect an electronics factory's output quality. In classic factories, such changes are not always registered right away and become visible only during product tests. In addition, the necessary adaptations of parameters and configuration frequently require many time-consuming test runs and manual assists, as well as highly qualified employees with lots of experience.

Modern ASM solutions for the smart SMT factory change all this because they are able to monitor and control all relevant process parameters in real time. The systems recognize and communicate even the smallest deviations before they can negatively affect the running production.

The real revolution is that modern expert systems make it optionally possible to stabilize and proactively control the line processes completely autonomously without human interference. This is no longer done on the basis of the rigid threshold or limit values you know from classic inspection systems. Instead, these expert systems analyze huge amounts of data, learn autonomously, and become better and more accurate with each board traveling through the line.

Expert systems recognize on their own which settings ensure stable processes. They allow you to maximize quality and first-yield rates reliably and sustainably, both of which are the most important factors in the productivity of high-mix environments.



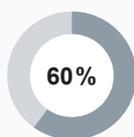
Process optimization at RENA (Netherlands)

“Unstable printing processes and the large share of manual setting repeatedly led to productivity and quality fluctuations in our production of LED lighting solutions. Today we use the ASM ProcessExpert to monitor, stabilize and optimize our printing processes at a very early stage in the product life cycle with virtual prints and the ASM DFM HealthCheck. All ASM systems are linked via the ASM Remote Smart Factory. We use this innovative support system a lot to give the experts and technicians in Munich direct access to our line and to jointly develop and implement process improvements,” says Jochem Winkelmann, General Manager at RENA Electronica B.V.

The results:

- Autonomous printing process optimization with ASM ProcessExpert
- Precise, fast and detailed 5D-control of all solder paste deposits
- Significant stabilization of printing processes
- Rising yields, more productivity
- Efficient remote cooperation with ASM experts
- Smart glasses for user guidance by ASM experts
- Process stability improved by 80 percent

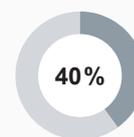
KPI improvements at other ASM customers



Reduction in operator assists



Increases in yield



Increase in throughput



Video
PROCESS OPTIMIZATION



Process sequence

- 1 Gerber data is imported, and a virtual print is executed to determine process and printing parameters.
- 2 The system runs an extremely short, autonomously controlled and multi-variable sequence of experiments on the line with checks via SPI and AOI to determine the best printing and placement parameters.
- 3 Continuous monitoring, optimization and proactive control of the production processes. If necessary, the system initiates a new round of tests/experiments and activates “self-healing” functions.



Indicators of weaknesses in process optimization include:

- Difficulty to produce more complex products with competitive yields
- Process deviations are detected late or only during a product test
- Weaknesses in process monitoring require 100-percent product inspections
- Analyses and corrections via “trial and error” create high costs due to quality problems
- High personnel costs and frequent “emergency calls” to internal or external process experts
- Declining productivity and competitiveness



ASM ProcessExpert with ASM ProcessLens

As a new-generation expert system, the ASM ProcessExpert does more than just monitor the printing process. It records and stores all details of your printing process, combines printer settings with product and process data, forgets nothing, and learns from each printed board.

As a new-generation expert system, the ASM ProcessExpert does not just monitor your printing processes, but records and stores all relevant details, combines printer settings with product and process data, never forgets anything, and learns with each print.

The ASM ProcessLens is the 5D solder paste measurement (SPM) system that is part of our expert system. A special projector chip with eight million individually controllable micro-mirrors illuminates the solder paste deposits to deliver detailed 2D and 3D measurement data with exceptional speed. The ASM ProcessExpert uses this data to monitor and control the printing process.

The ASM ProcessExpert offers much more than classic SPI and closed-loop systems: Linked to the DEK printer, it can adjust parameters to stabilize, optimize and proactively control the printing process autonomously, i.e. without any assistance from the operator. It does not use rigid threshold values, but controls the printer in accordance with its print quality on the basis of its extensive knowledgebase and powerful statistical models, such as the understencil cleaning intervals.

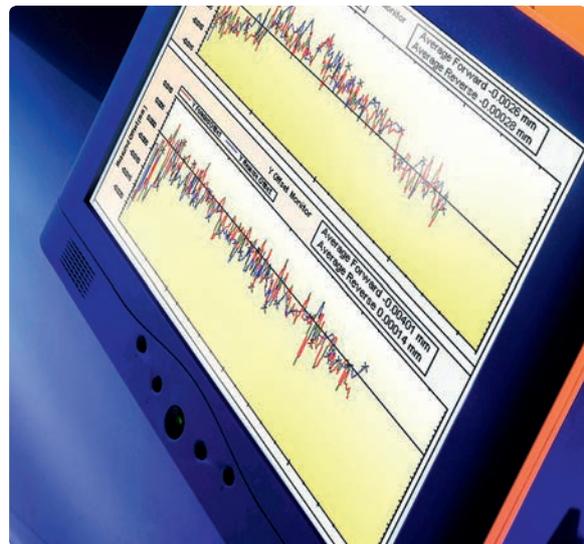
When new products must be introduced, it finds the best possible settings for a stable printing process and maximized yields with just a few experiments. During production runs, it corrects offsets with exceptional precision.

- Transparency through permanent control of the printing process via the high-precision ASM ProcessLens 5D SPM system
- Real-time access to current and historical printing process data, including links between process parameters, printer settings and printing results
- Stable printing processes
- Autonomous process optimization
- Proactive control long before faulty prints are produced
- Higher yields and significantly improved productivity
- Self-healing function corrects the process or operator setting

DEK ProDEK

The DEK ProDEK Closed Loop software tool provides access to the results of external SPI systems and use this statistical data for the automated control of the printing process. For example, DEK ProDEK corrects print offsets and adjusts cleaning cycles.

- Interfaces with SPIs from Koh Young, Parmi, Cyberoptics, and many others
- Closed-loop printing process control
- Automatic offset correction
- Cleaning cycle adjustment
- Improved productivity and yield



ASM Process Support Products (PSP)

Stable, perfectly optimized printing processes require the use of performance-enhancing printer options and high-quality consumables. Only the consistent quality of stencils, frames, toolings, paste supply systems and cleaning materials ensures the desired results. Our portfolio of Process Support Products lets you create application-specific solutions and optimize your processes for a consistent level of printing quality and productivity.

- Stencil technology (incl. multi-level stencils)
 - DEK Electroform stencils
 - DEK Fine Grain technology
 - DEK Nano Ultra coating
- DEK VectorGuard High Tension – the latest generation of our flexible frame technology
- High-efficiency understencil cleaning with ultra-fine pitch ECO Cleaning Rolls



Our product portfolio for your PROCESS OPTIMIZATION workflow

<p>ASM ProcessExpert with ASM ProcessLens</p>	<ul style="list-style-type: none">  Operator assists  Quality  Yield 	<p>The expert system that monitors, stabilizes, optimizes and proactively controls your printing processes – even fully autonomously. Its self-healing function corrects processes or assists. (See highlight)</p>	
<p>DEK ProDEK</p>	<ul style="list-style-type: none">  Quality  Yield  Costs 	<p>Our closed closed-loop interface for external SPI systems. (See highlight)</p>	
<p>ASM Process Support Products (PSP)</p>	<ul style="list-style-type: none">  Quality  Productivity  Costs 	<p>High-quality stencils, frames, toolings, paste supply systems and cleaning materials for highly efficient printing processes. (See highlight)</p>	
<p>DEK Cyclone Duo</p>	<ul style="list-style-type: none">  Productivity  Quality  Costs 	<p>DEK Cyclone Duo is an optional add-on for the DEK Cyclone understencil cleaning system. The newly developed DEK Cyclone Duo cartridge lets you perform wet and vacuum cleaning in a single cycle. This cuts down on cleaning times and reduces the cost of consumables by up to 50 percent.</p>	
<p>ASM Remote Smart Factory</p>	<ul style="list-style-type: none">  MTTR (mean time to repair)  Costs 	<p>ASM Remote Smart Factory integrates all ASM line components into a network with the help of special connector hardware. Via our global and highly secure IT infrastructure we establish direct links between our support teams, your technicians and your ASM machines.</p> <p>Direct access by our experts relieves your employees, ensures the fastest response times, enables quick and targeted diagnostics, solutions to problems, including the use of smart glasses for operator guidance. Worldwide support of online training seminars by ASM experts.</p>	
<p>ASM Zero Defect Project</p>	<ul style="list-style-type: none">  Quality  Costs 	<p>Process optimization as a service. With the ASM Zero Defect Project, our experts work with your people to cut down on defects in three stages: analysis, workshop, review.</p>	
<p>ASM Tooling</p>	<ul style="list-style-type: none">  Repeat accuracy  Productivity  Quality 	<p>ASM toolings like DEK Dedicated Tooling or DEK Grid-Lok provide support for a high-quality printing and placement process.</p>	

Our product portfolio for your PROCESS OPTIMIZATION workflow

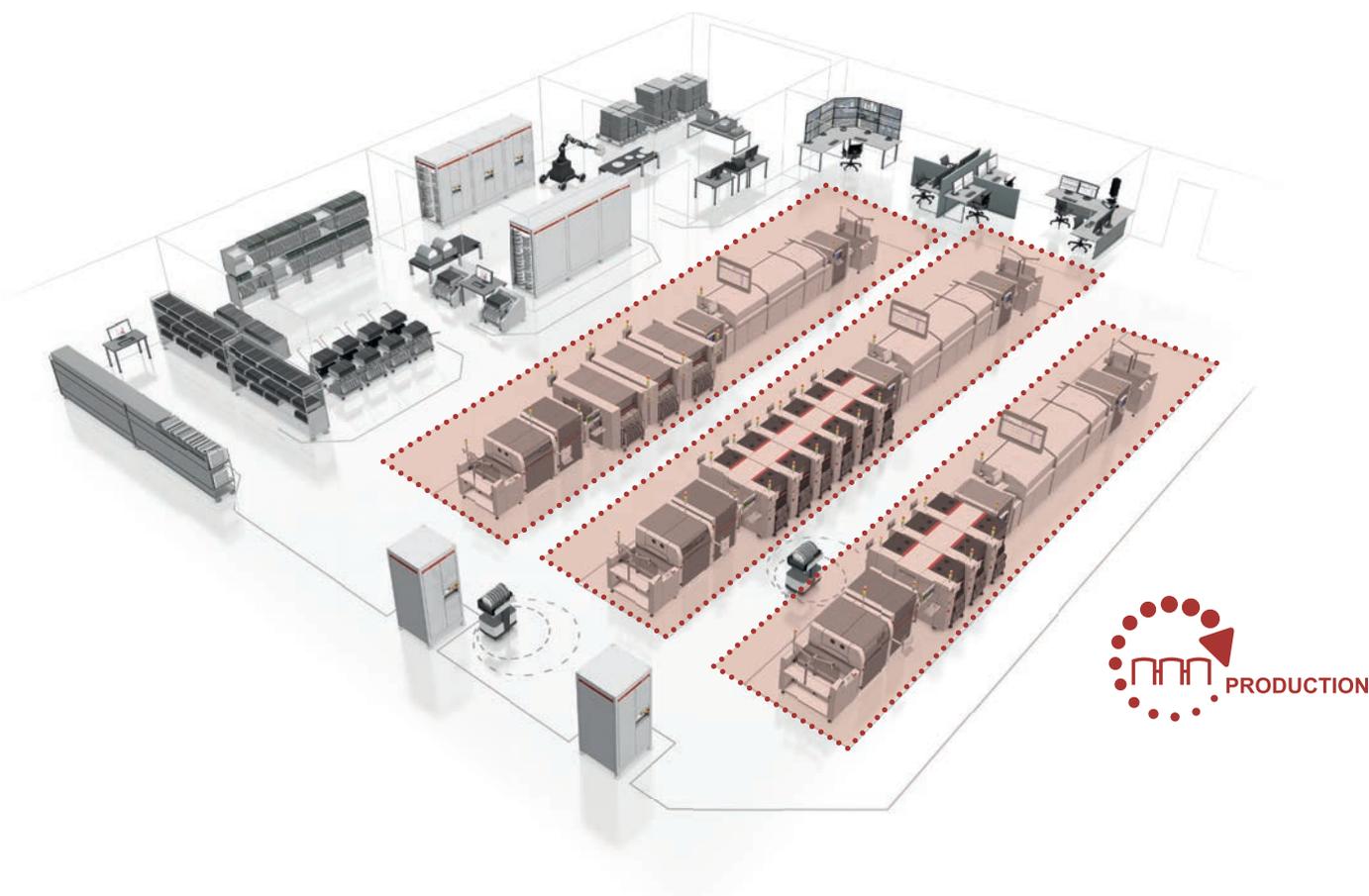
ASM Stencils	<ul style="list-style-type: none">  Line downtime  Costs  Quality 	<p>The large and high-quality portfolio of stencil technologies from ASM lets you select the material, design and coating that delivers a high-quality printing and placement process with maximum throughput.</p>	
ASM Consumables	<ul style="list-style-type: none">  Costs  Line downtime  Quality 	<p>High-quality ASM consumables reduce operator assists, improve your throughput, and ensure a high-quality printing process.</p>	



PRODUCTION

Maximum placement performance, maximum quality

Let your lines run non-stop and gain a competitive advantage
with maximum productivity and quality.



Modern SMT lines are extremely powerful. But this level of performance can only be fully exploited if operators receive proper support and guidance.

Smart production processes involve a bare minimum of manual assists and support the operations staff with timely information. Offered precisely when and where it is needed, real-time information provides transparency about the job status, pending refills, and countermeasures when something goes wrong. It enables your employees to make the right decisions and keep the lines running. The number of line stops drops significantly while overall line productivity increases – even in environments with small lot sizes.

A system that makes decisions entirely on its own is even smarter. Machine-internal self-healing functions such as automatic paste management in the printer and nozzle changes, pitch corrections and feeder location checks in the placement machine are a first step. A connected electronics factory is also able to exchange information across systems: barcodes on circuit boards can trigger automatic program changeovers as well as adjustments of conveyor rails and support pin positions.

With high-speed placement solutions, getting materials on time is particularly critical for maximum productivity, which is why ASM machines can request materials from the component warehouse automatically and with sufficient lead time – a huge relief for your operations and warehouse staff.

Process sequence

- 1 Unique product ID
- 2 Automatic downloading of printing, placement and reflow programs, including the verification of materials and toolings
- 3 Powerful printing and placement solutions for best-in-class production
- 4 Permanent process and quality control (closed-loop)
- 5 All machines control their consumption of components and request fresh supplies automatically
- 6 Real-time monitoring, operator guidance, and online support



Indicators of weaknesses in the production process include:

- Lack of real-time information on line status and job progress
- Hectic activity at the line; frequently faulty prioritization/sequencing of assists
- Low degree of automation
- No or patchy networking of machines and systems; no automatic transfer of information between systems
- Information is available only on request and requires lots of effort by the operations staff
- Frequent line stops
- Over-long run times for jobs; productivity is merely average
- Personnel/shift-based productivity fluctuations



Aros electronics AB

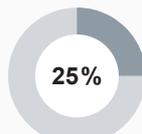
Intelligent no-touch production at Aros in Sweden

"We produce in very small lots for demanding automotive OEMs and frequently squeeze in prototypes with a lot size of 1. The boards must make it through the SMT line without any manual assists. We use barcodes for automated routing, track width adjustments, and program downloads. Intelligent setup concepts and powerful ASM software tools allow us to change setups very efficiently without having to empty the line. Our output has multiplied considerably," says Per-Johan Edgren, Manufacturing Process Manager at Aros.

The results:

- Significantly more efficient setup and production concepts
 - Board IDs control routing and program downloading
 - Expert systems control and optimize printing processes autonomously
 - Flexible routing via dual-track conveyors
 - One side of the line operates with fixed setups and splicing, while the other operates with interchangeable feeder tables and family setups
 - Minimization of setup- and material-related line stops
- Transparent production progress
 - Real-time collection of machine and process data
 - Software visualizes the SMT line with drill-down capability
 - Tracking and tracing of process and machine data for each board ID
- Line output increased by 200 percent (with fewer operators)

KPI improvements at other ASM customers



Increase in productivity



Increase in line utilization



Increase in quality



Video PRODUCTION





ASM Line Operations Package

The ASM Line Operations Package pools a series of progressive functions for reliable and mostly non-stop product changeovers and efficient line operation.

The ASM Line Operations Package makes it easy to integrate innovative ASM setup concepts like random setup (placement of feeders anywhere on the changeover table) or split-table mode (splitting a single changeover table into several setup areas) into the ASM planning and control systems.

It also includes operator support functions like changeover guidance, with which delta setups – i.e. the difference between the current and the next setup – can be displayed and which significantly increase the whole line's speed and reliability during product changeovers in cooperation with functions like Whispering-Down-the-Line up to non-stop product changeovers.



ASM Line Monitor

Everything that matters on a single screen at, or above the line. The ASM Line Monitor bundles all relevant material status information for an SMT line. Traffic light functions warn of critical situations and allow your employees to take corrective action before a line stop occurs.

- No more line stops due to material shortages
- Less running around – intelligent prioritization ensures that operators can start manual assists early enough
- Information about fill levels, components and consumables running low, MSD exposure times, order status, remaining run times, etc. for the entire line
- Improved material flow; minimized line stops



DEK Paste Management

The DEK Automatic Paste Dispenser applies solder paste automatically, reliably and evenly from a cartridge. The DEK Jar Dispenser can use standard paste containers for this purpose. Both systems feature clear advantages over the manual application of solder paste.

You close the control loop in combination with the laser-based DEK Paste Roll Height Monitor. A solution that delivers significantly improved process control and reduces the amount of manual operations in the printing process.



Our product portfolio for your PRODUCTION workflow

ASM Line Operations Package	<ul style="list-style-type: none">  Productivity  Line downtime 	<p>Our software bundle for reliable and preferably non-stop setup changeovers and efficient line operation. (See highlight)</p>	
ASM Line Monitor	<ul style="list-style-type: none">  Capacity utilization  Line downtime  Productivity 	<p>All of a line's relevant status and progress information on a single screen. (See highlight)</p>	
DEK Paste Management	<ul style="list-style-type: none">  Productivity  Quality  Line downtime 	<p>Paste dispenser solutions with closed-loop process control. (See highlight)</p>	
DEK ProFlow ATx	<ul style="list-style-type: none">  Productivity  Quality  Line downtime 	<p>The enclosed print head system that sets standards in the industry. The automated, software-driven paste application ensures stable and consistent printing while reducing the material consumption. DEK ProFlow ATx is extremely flexible with regard to applications and paste types.</p>	
SIPLACE Pro	<ul style="list-style-type: none">  Line downtime  Productivity 	<p>Programs created in the powerful SIPLACE Pro environment run on all modern SIPLACE placement platforms. The central data management simplifies downloads and makes for reliable program administration.</p>	
ASM OIS (Operator Information System)	<ul style="list-style-type: none">  Productivity  Costs  Quality 	<p>The ASM Operator Information System visualizes all major performance data of your placement machines: production data, availability, capacity utilization, reject rates, etc. – also as trends and as an early-warning system while the line is running. If certain thresholds are crossed, the software issues special warnings. All the information is also available offline for technicians, production managers or schedulers.</p>	
SIPLACE Smart Pin Support	<ul style="list-style-type: none">  Line downtime  Quality  Operator assists 	<p>Our solution for automated pin support for circuit boards that eliminates all the costs and risks of manual pin placements. After the support pin positions have been defined in the placement program, the SIPLACE Pin Picker, which is mounted to a placement head, places them automatically for each product.</p>	



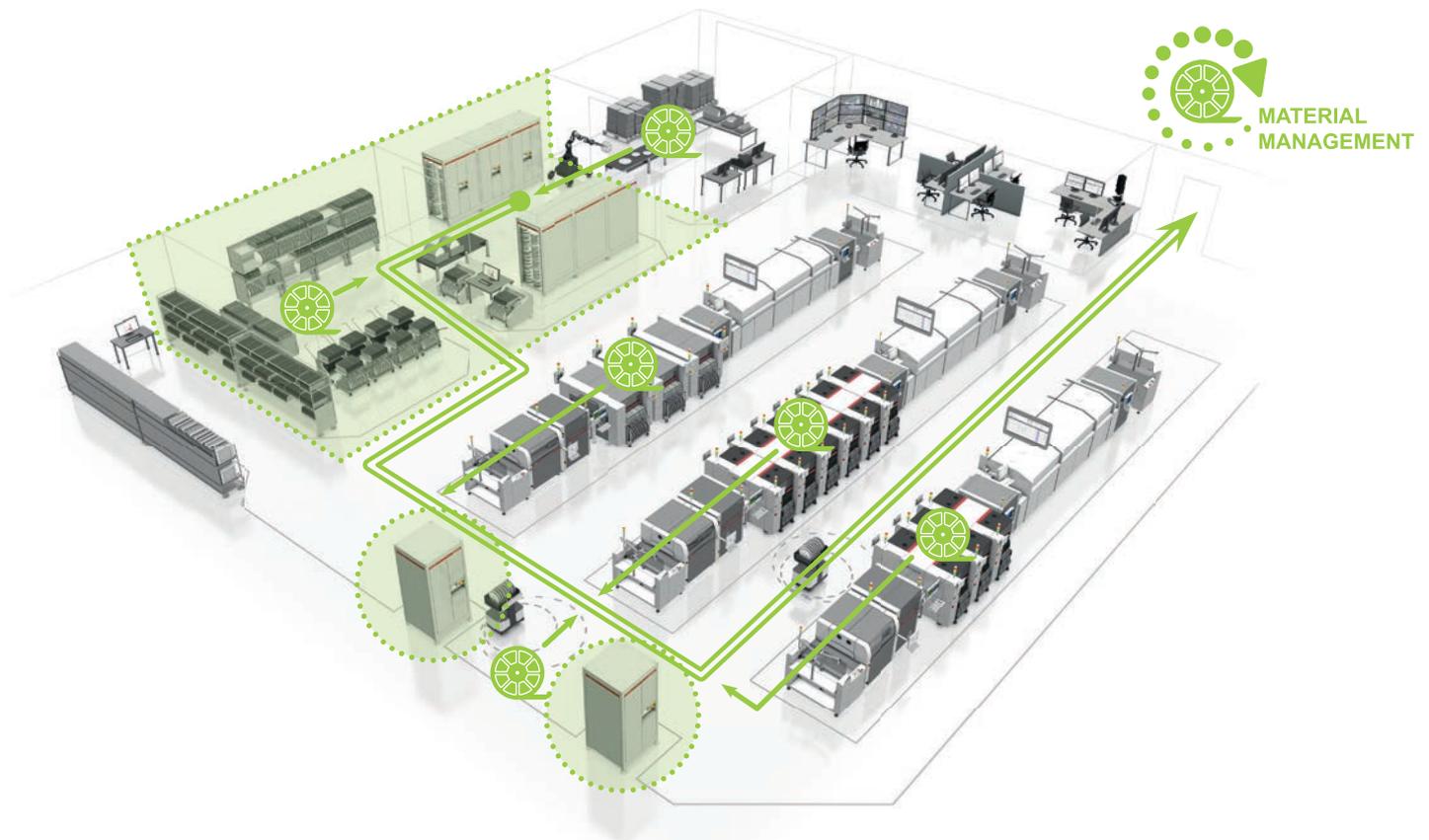
Our product portfolio for your PRODUCTION workflow

<p>ASM Command Center</p>	<ul style="list-style-type: none"> Capacity utilization Number of operators Productivity 	<p>The innovative software solution for the flexible control of staff assignments. ASM Command Center permanently monitors the production lines. If a manual assist is needed, the system alerts the operators via smart devices (for example, smart watches) and automatically provides them with the necessary information and guidance. With ASM Command Center you can form teams that support your lines in a flexible, competent and task-oriented manner. Assists such as setting adjustments that don't require an operator's physical presence on the line can be performed on a central console.</p>	
<p>ASM Consumables</p>	<ul style="list-style-type: none"> Costs Line downtime Quality 	<p>Everything you need for a stable printing process: squeegees and squeegee mounts, cartridge nozzles for paste dispensers, precision cleaning cloths, and stencil storage systems.</p>	
<p>ASM Tooling</p>	<ul style="list-style-type: none"> Repeat accuracy Productivity Quality 	<p>DEK Grid-Lok is the highly flexible system for automated board support along the entire SMT line. Ideal fast setup changeovers. Product-specific toolings are available on demand.</p>	
<p>ASM Stencils</p>	<ul style="list-style-type: none"> Line downtime Costs Quality 	<p>DEK offers the right stencils for top-quality applications. Stencils are available with DEK Fine Grain technology for fine-pitch applications or as DEK Electroform for ultra-fine-pitch applications – also as multi-level stencils and with DEK Nano Ultra coatings for optimized release properties.</p>	
<p>ASM Setup Center</p>	<ul style="list-style-type: none"> Productivity Quality Costs 	<p>With the ASM Setup Center component verification system, feeders are kitted by scanning them. ASM Setup Center verifies the combination, and the smart X-feeders download the pitch information automatically.</p>	
<p>DEK Verification & Traceability</p>	<ul style="list-style-type: none"> Quality Line downtime Costs 	<p>DEK Verification & Traceability is our solution for the seamless documentation of all relevant printing parameters and process data. It also forces the printer operator to use only the consumables and materials that have been approved for a particular job.</p>	
<p>ASM OIB (Operations Information Broker)</p>	<ul style="list-style-type: none"> Quality Costs 	<p>With the modular ASM OIB (Operations Information Broker) you transmit all production-related to wherever it is needed (for example, to the MES). Its "board gatekeeper" ensures reliable processes, because the production run will start only when all materials have been verified and the process parameters set correctly.</p>	

MATERIAL MANAGEMENT

Process-oriented material flow transparency

Integrated solutions for highly flexible material supplies in high-mix electronics factories.



In a high-mix electronics factory, material management becomes a process that is critical for your success. Instead of having few setups with large quantities of the same components, many different components must be procured, removed from storage and transported to wherever they are needed much more frequently and in smaller quantities. This is not an easy task. Safety stocks, extended searching, material tourism and material-related line stops are symptoms of weaknesses and missing tools in SMT-specific material management.

The solution lies in integrated material flow solutions that don't just administer inventories, but actively support all material-related processes on the factory floor. Such smart tools deliver complete transparency from receiving to placement and let you see where materials are located at all times.

This gain in transparency reduces operator trips and material travel. Components that are needed for an upcoming job stay on the machine or in the setup preparation area. Any changes in order sequences and processes are communicated instantly to all process steps such as warehousing, rack systems, MSD cabinets, setup preparation, and the lines themselves. In addition, the placement machines order refills on their own with sufficient lead time.

The result is a faster and trouble-free material flow – your production becomes more agile, but with less hectic activity and fewer material movements. In short, an intelligent and integrated material management system generates tangible competitive advantages.



At ASM Technology, material movements are handled by robots and automated guided vehicles (AGVs)



Process sequence

- 1 Material receiving, UID assignment, UID label printing
- 2 Management of a wide range of storage locations:
 - Main component warehouse
 - Rack systems
 - Lift systems (Kardex, Haenel, etc.)
 - SMD towers
 - Line-adjacent storage systems
 - MSD drying cabinets
 - Setup preparation area/active feeder pool
- 3 For withdrawals: automatically generated, path-optimized pick lists
- 4 Setup preparation area with intermediate material storage
- 5 Automatic recording of material consumption in the placement machines
- 6 Automatic material replenishment
- 7 Setup-optimized material issue
- 8 Check for future material use



Indicators of weaknesses in material management include:

- Lack of transparency regarding materials in storage and on the factory floor
- Mistakes during material issue/provisioning
- Quantity-based inventory management without package data
- Inability to locate materials/partial quantities in setup preparation areas, on changeover tables, lines, etc.
- Material-related line stops
- Manual processing of printed order lists/bills of material
- Violations of MSD exposure times
- Placement machines not integrated; major discrepancies between theoretical and actual stocks
- Long searches for materials
- Line staff must request fresh supplies manually
- Rush jobs require excessive coordination effort





ASM Material Manager

The comprehensive integrated software solution for SMT-specific material management. It links all storage and usage locations, material-related processes, as well as storage systems and placement solutions.

The ASM Material Manager gives you a process-oriented view of your material flows and provides support for all material-related planning and operations processes in your factory – in receiving, the warehouse, production scheduling, the setup preparation areas, and on the line.

Since the ASM Material Manager software is modular, each employee, process and workstation can get precisely the support they need. This begins with the assignment of UIDs for each material package and the communication with ERP systems, continues with the control of automatic storage systems and the issuance of path-optimized pick lists, and extends to setup verification, replenishment requests and the collection of consumption data directly from the SIPLACE placement solutions.

The ASM Material Manager raises your material logistics to a new level.

- Transparency and connectivity across all material-related processes – from receiving to kitting and setup, from planning to placement

- Interfaces with ERP systems and digital data reconciliation eliminate the need for classic inventory-taking
- Data that's always up-to-date – paperless, at every workstation, for every process
- Package-based UIDs and stock management across all storage locations, kitting areas and lines
- Control of storage systems (ASM Material Tower, Kardex, Haenel, etc.)
- Path-optimized pick lists, strong search functions, MSD management, permanent registration of inventories, etc.

The positive effects of the ASM Material Manager become apparent right away. No more emergency stocks and work-in-progress storage sites, and no more time-consuming searches for materials. Rush jobs no longer require lots of hectic phone calls and printing of lists, but are synchronized instantly and communicated to all employees and workstations. Your electronics production becomes more flexible and more agile while gaining in stability and efficiency.



ASM Material Tower

The automatic ASM Material Tower is compact, fast, and fully integrated into the ASM Material Manager software. The innovative storage system opens up new prospects as a scalable and MSD-capable system in the main component warehouse or for the decentralized supply of materials in setup preparation areas or next to lines.

- “Small” model: 612 reels in a cabinet only 1.1 meters wide
- “Large” model: 932 reels in a cabinet only 1.5 meters wide
- The time from request to issue is 10 seconds or less
- MSD-capable
- Fully integrated and controlled via ASM Material Manager
- For state-of-the-art storage concepts involving local, line-adjacent and set-up-area-adjacent component supplies



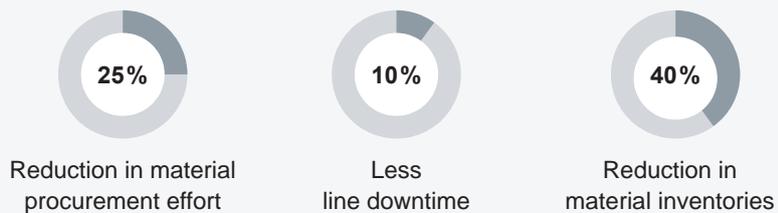
Integrated material management at Velankani Electronics Private Limited in Bengaluru (India)

Rapidly growing Velankani Electronics Private Limited manufactures set-top boxes and smart meters in three shifts with state-of-the-art, robot-supported production technologies and a high degree of automation. Integrated material flow solutions from ASM are central components of the factory. In addition to the ASM Material Manager software, the company employs automatic storage systems (ASM Material Towers) for line-adjacent supplies, software solutions for setup verification, and line monitors for operator guidance.

The results:

- Transparent, paperless material management
- Optimized material flow and significantly shorter travel distances
- ASM Material Towers integrated for automated material supply
- Operator guidance via ASM Line Monitor and LED indicators on the SIPLACE X-Feeders
- Minimization of fixed setups and material-related line downtime
- Output increased by 70 percent while the line staff was reduced from 5 to 3 people

KPI improvements at other ASM customers



Video MATERIAL MANAGEMENT



Our product portfolio for your MATERIAL MANAGEMENT workflow

SIPLACE Material Manager	<ul style="list-style-type: none">  Productivity  Quality  Line downtime 	<p>The comprehensive integrated software solution for SMT-specific material management. (See highlight)</p>	
ASM Material Tower	<ul style="list-style-type: none">  Productivity  Quality  Setup effort 	<p>Compact automatic storage system that's fully integrated into ASM Material Manager. (See highlight)</p>	
SIPLACE Material Setup Assistant	<ul style="list-style-type: none">  Productivity  Quality  Effort preparation area 	<p>The SIPLACE Material Setup Assistant supports setup preparation operations and cuts down on “parts tourism”. The software controls the feeders’ LEDs and guides operators through the setup and tear-down of changeover tables.</p> <p>Operators see at a glance whether an item should be returned to the main warehouse or will be needed for one of the upcoming production jobs and should therefore remain in the setup preparation area.</p>	
ASM Setup Center	<ul style="list-style-type: none">  Productivity  Quality  Costs 	<p>With the ASM Setup Center component verification system, feeders are kitted by scanning them. ASM Setup Center verifies the combination, and the smart X-feeders download the pitch information automatically.</p>	
ASM Line Monitor	<ul style="list-style-type: none">  Capacity utilization  Line downtime  Productivity 	<p>Everything that matters on a single screen at, or above the line. The ASM Line Monitor bundles all relevant material status information for an SMT line. Traffic light functions warn of critical situations and allow your employees to take corrective action before a line stop occurs.</p>	



FACTORY
INTEGRATION



FACTORY
MONITORING



PREPARATION



MATERIAL
MANAGEMENT



PRODUCTION



PROCESS
OPTIMIZATION



VIRTUAL
PRODUCTION

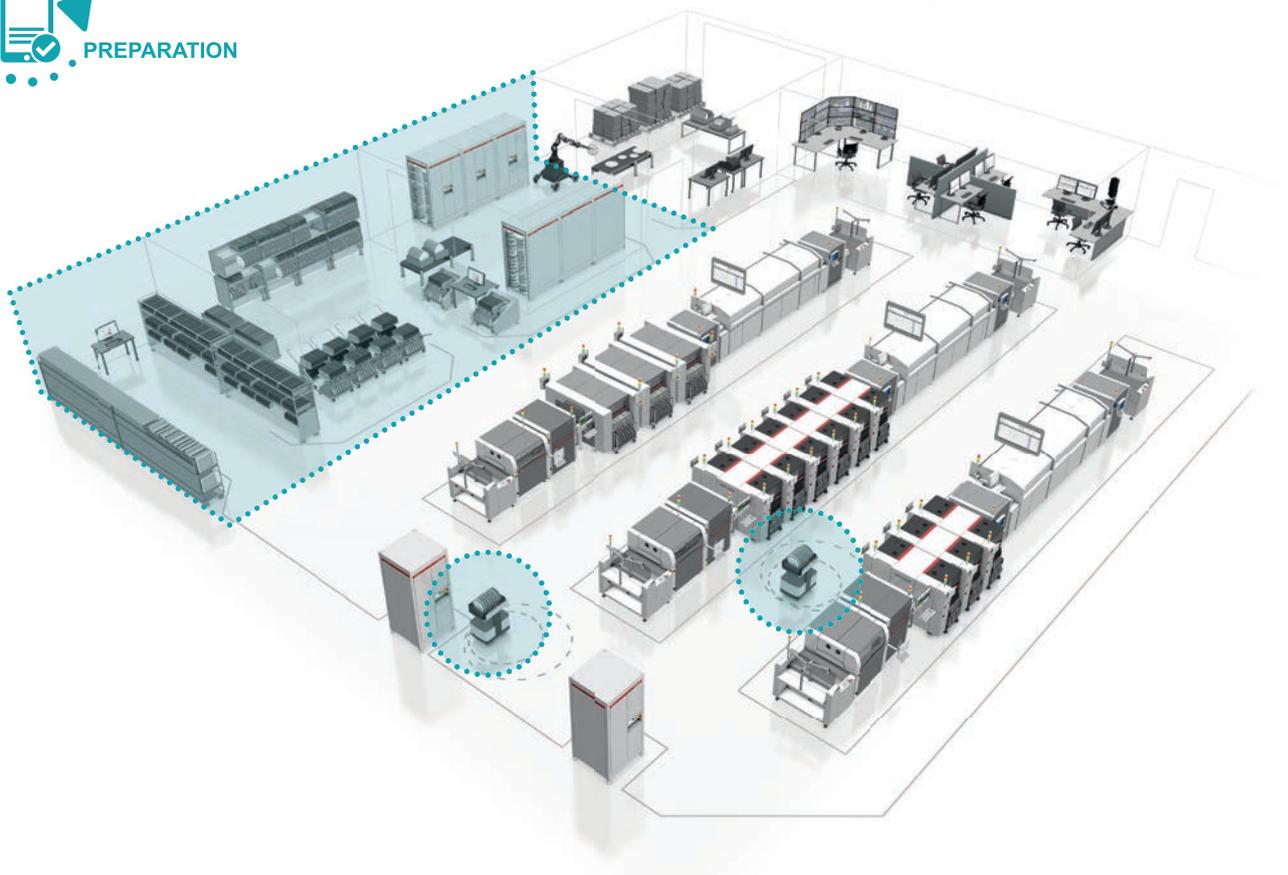


PLANNING

PREPARATION

Everything ready for an on-time start

Optimize your setup preparation for maximum efficiency and line utilization.



Frequent setup changeovers are a characteristic of modern and efficient production environments. Insiders know that any delay or error in the setup process leads to line stops and kills your efficiency.

Smart workflows support your employees in every phase of the setup preparation process. Monitors indicate upcoming setup changeovers in the proper order. Intelligent software guides operators through the setup process via monitors or feeder LEDs.

The system clearly indicates the location for each feeder and automatically verifies each setup. Short distances are an additional efficiency booster. Items that will still be needed in upcoming setups stay in the preparation area, and intelligent feeders let operators know whether they should be torn down or placed in intermediate storage.



Space-saving and efficient: Component reels with UIDs in the automatic storage system at Aros electronics AB in Sweden.



Process sequence

Paperless setups

- 1 The setup monitoring system displays which setups are next in line
- 2 Select the setup
- 3 Return residual materials to storage
- 4 Place feeders that are parked in the preparation area on the table and in the slot indicated on the monitor
- 5 Link the component to the feeder and place it in the slot indicated on the monitor
- 6 Verify the setup by scanning it

Quick tear-downs

- 1 Move the feeder tables to the setup preparation area
- 2 Keep feeders that indicate via their LEDs whether they will still be used in a "holding position" in the setup preparation area.
- 3 Tear down the other feeders; move residual materials and the feeders themselves to storage.



Indicators of weaknesses in setup preparation include:

- Faulty setups
- Line stops caused by the delayed provision of changeover tables
- Material tourism (frequent movements from and to storage)
- Working with printed bills of material
- Schedule changes or rush jobs cause hectic activity and frequently lead to errors
- The quality and efficiency of the setup area varies heavily by people and/or shifts

SIPLACE Material Setup Assistant

The SIPLACE Material Setup Assistant supports your staff in the setup preparation area. It recognizes material that will still be needed, controls the feeder's LEDs, and guides your operators through the setup and tear-down of changeover tables.



Users see at a glance whether materials coming back from the line should be returned to storage or will still be used in one of the upcoming setups and should therefore remain in the setup preparation area. Keeping feeders and materials in the active feeder pool reduces material movements and the number of in/out postings for the main storage area.

When a new setup is prepared, the feeder LEDs indicate which feeders will be needed. When the employee takes a feeder from the active feeder pool, the system displays on a monitor on which table and in which track it should be installed. The same thing happens when feeders have been kitted with material from the warehouse. A simple scan of the component reel is all it takes for the system to display the correct table and track.



ASM Setup Center

ASM Setup Center is the key application for setup and product changeovers. For the kitting process, your employees simply scan the barcode ID of the component reel that is loaded in the feeder. The software reconciles the data with the placement program information and approves the combination or signals an error. For performance-optimized setups, the feeder position is scanned and checked as well.

This safeguards the setup process, prevents errors, and accelerates setup changeovers irrespective of the setup concept. At the same time, the ASM Setup Center functions as a data hub for other software packages: It sends



Aros electronics AB

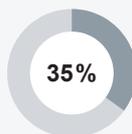
Setup preparation at Aros electronics in Sweden

“Together with ASM we invested in improving our material management system as well as our setup preparation operations. With lot sizes that typically range between 1 and 200 units, being able to execute speedy and correct setup changeovers is of critical importance. Today our setup preparation is paperless with scanner-based setup verifications. We also minimized our material travel and inventory in/ out postings with the SIPLACE Material Setup Assistant and flexible setup concepts. Our employees in the setup preparation area are supported by informative displays. When an operator takes a feeder from the active feeder pool, the monitor displays the correct changeover table and track. And when a setup is torn down, the feeder LEDs indicate what should be done with them. Taken together, these measures minimize errors while reducing time and costs in the setup preparation area,” says Per-Johan Edgren, Manufacturing Process Manager at Aros.

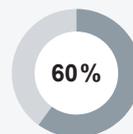
The results:

- Significant increase in the speed and reliability of setup changeovers
- Optimized material flow and significantly shorter travel distances
- Fewer in/out postings in the main material warehouse
- User guidance via monitors and feeders LEDs
- Complete changeover tables can be torn down at the push of a button

KPI improvements at other ASM customers



Reduction in material movements



Reduction in setup effort



Reduction in line downtime



Video
PREPARATION



setup information to ASM Traceability, exchanges fill levels and residual quantities with the ASM Material Manager, and reports feeder deployments to the feeder management software.

Our product portfolio for your PREPARATION workflow

SIPLACE Material Setup Assistant	<ul style="list-style-type: none">  Setup effort  Material travel  Line downtime 	<p>The SIPLACE Material Setup Assistant supports your staff in the setup preparation area. (See highlight)</p>	
ASM Setup Center	<ul style="list-style-type: none">  Productivity  Quality  Costs 	<p>Powerful component verification system. (See highlight)</p>	
ASM Material Manager	<ul style="list-style-type: none">  Productivity  Quality  Line downtime 	<p>The comprehensive software solution for SMT-specific material management supports your employees in all material-related planning and operating steps – from material receiving and warehousing to the setup preparation area to the lines.</p>	
ASM Material Tower	<ul style="list-style-type: none">  Productivity  Quality  Setup effort 	<p>Compact, automatic and MSD-capable storage system that is fully integrated into the ASM Material Manager.</p>	
DEK Verification & Traceability	<ul style="list-style-type: none">  Quality  Line downtime  Costs 	<p>DEK Verification & Traceability is our solution for the seamless documentation of all relevant printing parameters and process data. It also forces the printer operator to use only the consumables and materials that have been approved for a particular job.</p>	
ASM Production Planner	<ul style="list-style-type: none">  Setup effort  Productivity  Costs 	<p>The planning software for your SMT production The system plans based on order due dates while taking the latest status information from your lines into account along with setup changeover and maintenance times. After taking order data from the IT/ERP system, the ASM Production Planner creates setup sequences based on due dates and visualizes the schedule via Gantt charts.</p>	
SIPLACE SiCluster Professional/SIPLACE SiCluster MultiLine	<ul style="list-style-type: none">  Setup effort  Productivity 	<p>With SIPLACE SiCluster Professional (for single lines) or SIPLACE SiCluster MultiLine (for multiple lines), you can pool your jobs into families and generate optimized setups for selected jobs and planning horizons to considerably reduce your setup costs.</p>	
SIPLACE Pro	<ul style="list-style-type: none">  Line down-time  Productivity 	<p>In SIPLACE Pro you create placement programs with the help of wizards – from importing CAD data to running simulations in Virtual Product Build. The placement programs are stored and administered in a central database together with your printing programs.</p>	



FACTORY
INTEGRATION



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MONITORING



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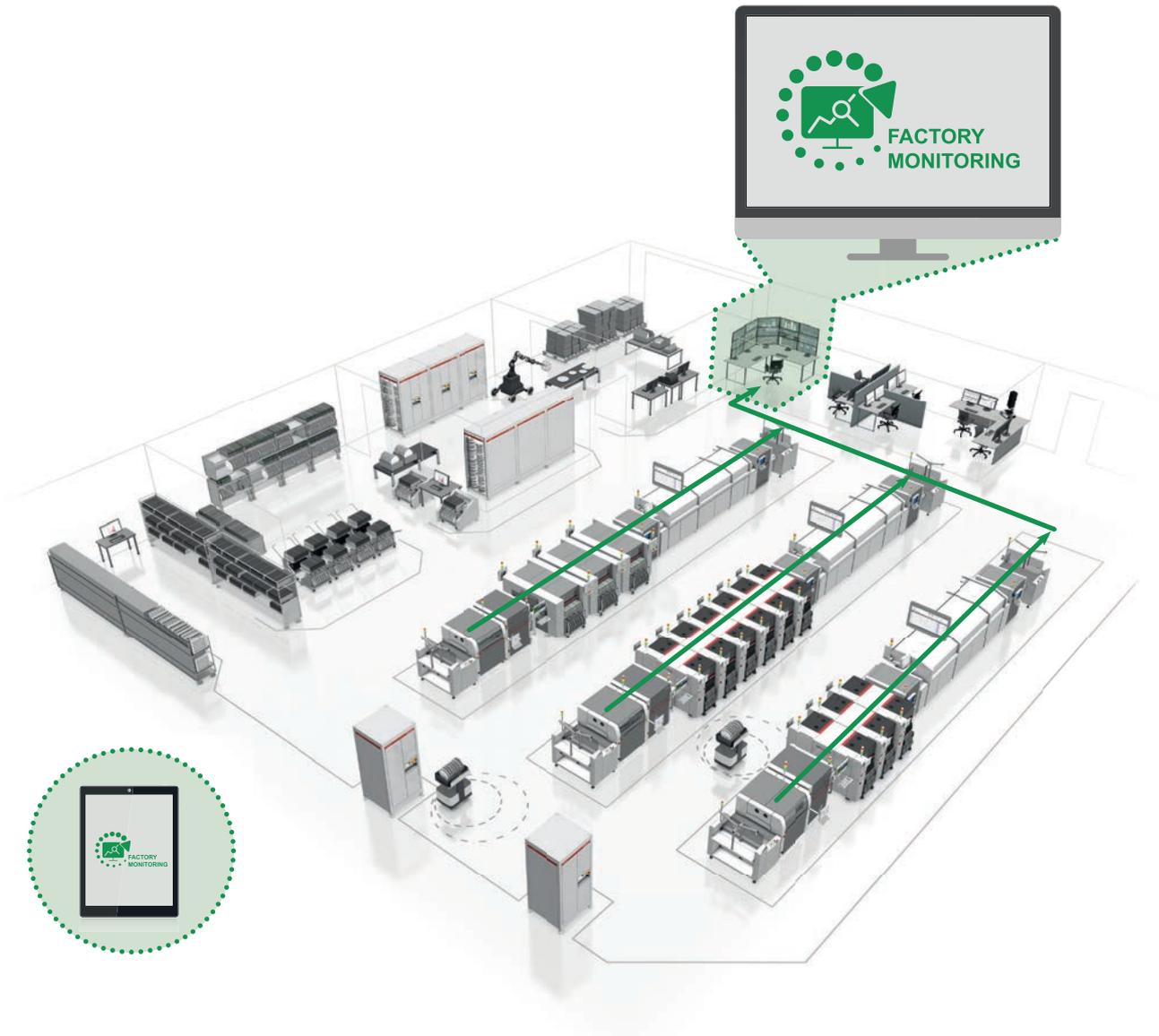


PLANNING

FACTORY MONITORING

Control requires transparency – in real time

Optimize your production on the basis of real-time data.



Only what gets measured will be improved. This definitely applies to the smart SMT factory, and modern systems offer entirely new sets of capabilities. Data can be collected from the machines directly and automatically in real time. Intelligent software aggregates this data into informative KPIs with options for quick and flexible drill-downs or the tracking of individual products and components. And monitoring your factory in real time enables you to respond instantly to all sorts of events while flexible analyses of historical data highlight trends and process changes.

A modern factory monitoring system also identifies process irregularities and automatically notifies certain technicians or managers when needed. And to speed up the troubleshooting process, smart monitoring systems provide your teams with the necessary information and documentation – anywhere, any-time, and on a wide range of devices.



Fully integrated: At BYD, the MES displays all machine and process data



Process sequence

- 1 Production monitoring:
 - a. Real-time collection of machine and process data
 - b. Analysis, notification of the appropriate people, initiation of corrective measures
 - c. Automated reporting
- 2 Material availability monitoring:
 - c. Real-time data on component and material consumption/ fill levels on all machines
 - d. Early warnings when machines are about to run out of material enables proactive replenishment
- 3 Traceability:
 - a. Recording of component and process data for all products
 - b. Storing this data permits subsequent tracing
 - c. Reliable process interlocking



Indicators of weaknesses in factory monitoring include:

- No real-time collection and visualization of status and process data
- Data is maintained in separate systems/no central view and aggregation
- High manual reporting effort
- Reports and documentations are rigid and paper-based
- Alarms and escalations are not automated
- No integration of smart devices (push mail/messenger, smart glasses, smart watches)
- Alarms without user guidance
- No traceable material and process information about assembled products



ASM Performance Monitor

The ASM Performance Monitor determines line status and important key performance indicators (KPIs) in real time.

The ASM Performance Monitor displays line status information and major KPIs in easy-to-read target vs actual charts with customizable reference values. The ASM Performance Monitor delivers not only detailed data for analysis by technicians and process engineers, but keeps the production staff informed about things like job progress, target achievement and potential improvements by displaying important information on large monitors installed in the factory.

- Real-time visualization of KPIs
- Configurable graphical target vs actual comparisons
- For all areas of the factory: scheduling, logistics, shop floor, etc.



ASM Traceability

Fearing the cost of large recalls and the harm they inflict on the company's image, more and more customers require proof that their products were manufactured according to specifications. ASM Traceability converts these requirements into competitive benefits for your company. ASM Traceability ensures transparent monitoring and seamless traceability, for example through mandatory setup verification.

ASM Traceability links all the quality- and production-relevant information that is provided by systems and sensors such as printers, placement machines, Setup Center, scanners, splice sensors, fill level meters and barcode readers. The data is stored in high-performance databases for easy and flexible access.

- Process stability: Linking the information minimizes errors, for example by enforcing correct setups via scanning
- Maximum transparency: ASM Traceability combines all production- and quality-relevant data from the shop floor
- Minimum effort: ASM Traceability collects the data from software, readers and sensors, most of which are already installed on your line
- Rapid data access thanks to high-performance database technologies
- Integrates consumption data from DEK printers
- Your production gets "upgraded" among demanding customers in industries like automotive, medical technology and aerospace.





Factory monitoring at ASM's electronics factory in Germany

ASM operates one of the world's most modern and flexible electronics factories in Munich. It is part of the company's placement machine factory, which recently won the prestigious "Factory of the Year" award. On two state-of-the-art SMT lines, ASM manufactures and tests with the help of robots small lots of modules in sync with the placement machine production, as well as development prototypes.

The factory monitoring system is critically important for the high productivity of the high-mix/low-volume factory. Monitors installed above the lines display status information and notify the staff of upcoming product changeovers and assists. Other monitors in the factory display KPIs, order and process data in real time. Upon demand and in team meetings, the associated detail data is available with just a few clicks. Additional analyses and views can be easily generated as well. Work instructions and documentations is available online at all workplaces, which means that they are always up-to-date.

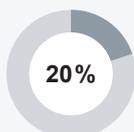
"The many parallel and complex work steps in our highly flexible electronics production can be successfully synchronized only on the basis of reliable and consistent real-time data."

Allesandro Bonara, Head of the ASM Electronics Factory

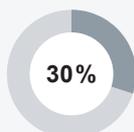
The results:

- Low error rate due to the real-time collection of production data
- Significant increase in the speed and reliability of setup changeovers
- Optimized material flow and significantly shorter travel distances
- Fewer in/out postings in the main material warehouse
- User guidance via monitors and feeders LEDs

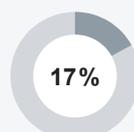
KPI improvements at other ASM customers



Increase in productivity



Increase in equipment utilization



Reduction in material inventories



Video
FACTORY MONITORING



Our product portfolio for your **FACTORY MONITORING** workflow

ASM Performance Monitor	<ul style="list-style-type: none">  Equipment utilization  Costs  Productivity 	<p>The ASM Performance Monitor determines the line status and important key performance indicators (KPIs) in real time. (See highlight)</p>	
ASM Traceability	<ul style="list-style-type: none">  Quality  Costs 	<p>ASM Traceability ensures transparent monitoring and seamless track-and-trace. (See highlight)</p>	
SIPLACE Explorer	<ul style="list-style-type: none">  Equipment utilization  Costs  Productivity 	<p>Our fully browser-based software for multi-site line monitoring and benchmarking with real-time data. With a few clicks you can display and filter all essential line data, generate reports, and export data to Excel, KPI monitors or professional business intelligence tools. A long-term archiving system makes sure that the data is available for comparative analyses.</p>	
ASM OIS (Operator Information System)	<ul style="list-style-type: none">  Productivity  Costs  Quality 	<p>The ASM Operator Information System visualizes all major performance data of your placement machines: production data, availability, capacity utilization, reject rates, etc. – also as trends and as an early-warning system while the line is running. If certain thresholds are crossed, the software issues special warnings. All the information is also available offline for technicians, production managers or schedulers.</p>	
ASM Line Monitor	<ul style="list-style-type: none">  Equipment utilization  Line downtime  Productivity 	<p>Everything that matters on a single screen at, or above the line. The ASM Line Monitor bundles all relevant material status information for an SMT line. Traffic light functions warn of critical situations and allow your employees to take corrective action before a line stop occurs.</p>	
ASM OIB (Operations Information Broker)	<ul style="list-style-type: none">  Quality  Costs 	<p>With the modular ASM OIB (Operations Information Broker) you transmit all production-related to wherever it is needed (for example, to the MES). Its “board gatekeeper” ensures reliable processes, because the production run will start only when all materials have been verified and the process parameters set correctly.</p>	
ASM OIB Process Data Interface	<ul style="list-style-type: none">  Quality  Costs  Transparency 	<p>The ASM Traceability software uses the ASM OIB process data interface to transmit process events that the SIPLACE machine generates during the placement process to other IT solutions (for example, the MES).</p>	

Our product portfolio for your FACTORY MONITORING workflow

ASM Command Center

-  Equipment utilization
-  Number of operators
-  Productivity

Our highly innovative ASM Command Center revolutionizes classic operator models with their rigid assignments of lines and operating staff. The ASM Command Center monitors the production lines. If manual assists are needed, the system uses smart devices (smart watches, mobile phones, tablets, VR glasses) to notify the employees who have the necessary training. In addition, it automatically provides the necessary information.

With ASM Command Center you can form teams that support your lines in a flexible, competent and task-oriented manner. Assists that don't require an operator's physical presence on the line can be performed on a central console. The result: a smarter organization and more efficient and effective line support – in many cases with fewer people.



ASM EDM (Engineering Data Manager)

-  Quality
-  Costs

The ASM EDM uses a central control system to prevent the use of different versions of the same program within the factory. This reduces the risk of errors. The ASM EDM system stores the placement programs created in SIPLACE Pro on a central server. To make sure that all changes are being considered, the latest program versions aren't downloaded to the line computer until just before the production start.

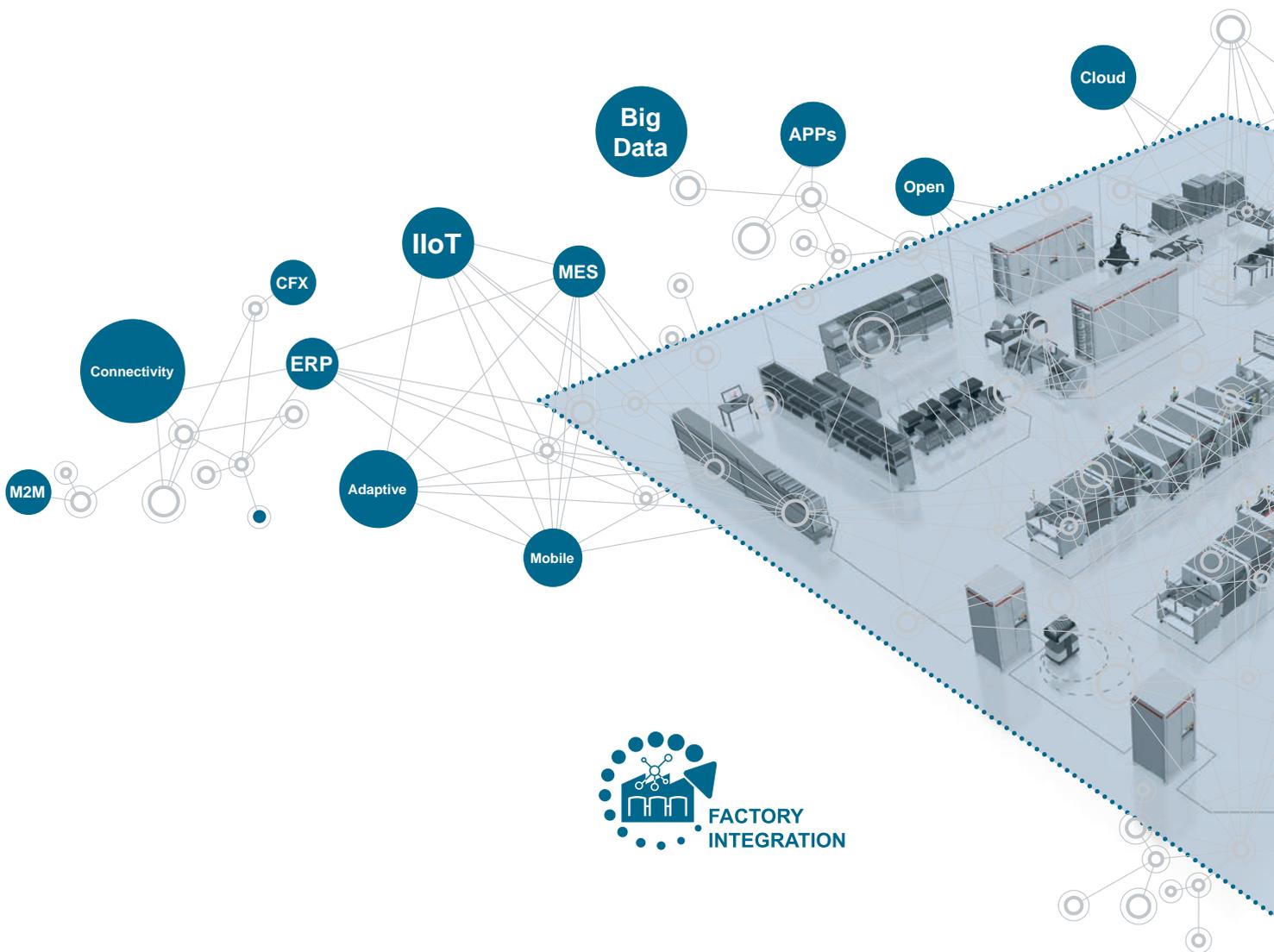
If properly authorized users make program changes on the line, ASM EDM recognizes this and requires an appropriate approval before the changes are transferred to the central archive.



FACTORY INTEGRATION

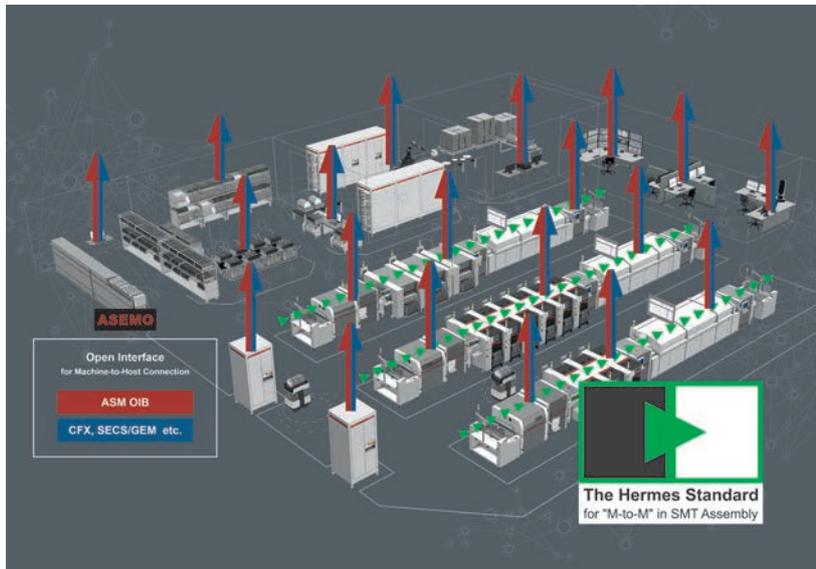
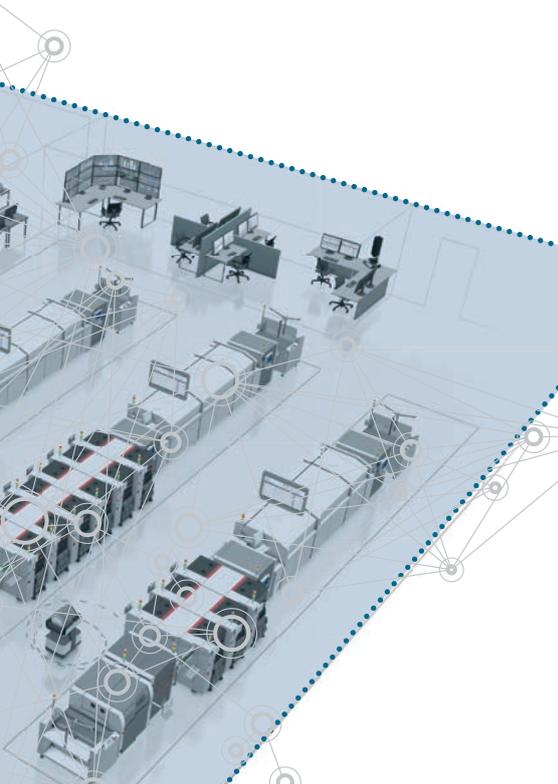
Your location becomes part of a global network

Connect all your factories and locations.



Benefit from making your factory part of a global network. Make your production data available anywhere via modern and specially secured IT infrastructures. Your lines and locations become transparent, and you can be seemingly everywhere at the same time. You can even integrate your SMT production throughout all chains of your enterprise or your customers while maintaining maximum data security.

At the same time, you can deploy experts in more than one location and therefore much more efficiently by using remote systems, mobile devices and data glasses. The same applies to the technical support of equipment suppliers. Remote support systems allow their technicians to access your equipment for diagnostics as well as predictive and preventive maintenance.



Factory integration in practice

Since many of today's electronics manufacturers operate a network of factories at various sites, they require all process steps to be transparent irrespective of their physical location. This is the only way to harmonize orders and capacities while optimizing process quality and productivity throughout the network.

Innovative ASM solutions make your global production network transparent today – from providing production data via OIB to central support structures with ASM Remote Smart Factory or to the Industrial-Internet-of-Things (IIoT) platform ASEMO for the global transmission, storage and analysis of your production data.

The results:

- Complete information about locations, orders and processes anytime and anywhere
- Flexible production control
- Monitoring and assurance of quality standards
- Efficient utilization of distributed production capacities
- Cloud-based real-time collection and analysis of production data (IIoT)



Indicators of weaknesses in factory integration include:

- Lines, shop floor areas, locations and departments are not electronically linked
- No external access to data
- Manual exchange of data (via reports, e-mail attachments, etc.)
- Employees use unsafe consumer tools as makeshift communication solutions (data transfer, chat, collaboration tools, etc.)
- No interconnectivity between processes for real-time control, tracking and interlocking.



Video FACTORY INTEGRATION at VEGA





ASM Remote Smart Factory

ASM Remote Smart Factory takes you to the next level in service quality and cooperation between manufacturer and customer

At the core of this solution is a global, highly secure IT infrastructure that uses special connector hardware which integrates all ASM solutions in your production into a special network and links it to ASM's global IT infrastructure. It enables us to establish direct connections between our support teams and your technicians and systems.

Giving our technicians direct access to data and machines relieves your employees, provides the fastest response times, and delivers quick and effective results. Once established, physically separated teams of your employees can use this infrastructure as well – for chats, training seminars, videoconferencing, linking VR glasses for remote assists, access to machines and data, and a whole lot more.

- Highly secure B2B and industry-compatible infrastructure
- Transparent logging of all remote support calls (times, agents, access types, settings, etc.)
- ASM-internal escalation and consultation of experts all over the world
- Full control over access, procedures and data
- Quicker responses, faster service, minimized downtime, and reduced cost of ownership through lower operating costs and increased equipment utilization



ASM OIB (Operations Information Broker)

The ASM OIB (Operations Information Broker) is an open interface and data hub for production data. It makes it possible to transmit all production-related to wherever it is needed (for example, to the MES).

The OIB's modular structure makes it easy to keep your data communication lean and efficient. Only data that the target application actually needed is transmitted, such as SIPLACE and DEK Traceability data, process data, component consumption data, etc.



ASM Command Center

The innovative software solution for the smart operator.

Our highly innovative software revolutionizes classic operator models and the rigid assignment of lines and operating staff by allowing you to form small multi-line teams of employees with different skills.

To schedule their deployment, ASM Command Center permanently monitors your production lines and analyzes all data and status messages. If manual assists are needed, the system uses smart devices (smart watches, mobile phones, tablets, VR glasses) to notify the employees who have the necessary training. In addition, it automatically provides them with the information they need.

With ASM Command Center you can form teams that support multiple lines in a flexible, competent and

task-oriented manner. Another benefit: assists like setting adjustments that don't require an operator's physical presence on the line can be performed on a central console.

- Automatic, centralized monitoring of all lines
- Forwarding of alarms and assistance requests to specific people
- Intelligent operator deployment that's based on each person's skills and competencies ("smart operator")
- Integration of smart devices/smartwatches
- Central control of remote assists
- Improved efficiency and quality of ongoing production support

In combination with an MES, the "Board Gate Keeper" OIB component ensures that your processes are safe by making sure that the production will start only if the correct and verified machine data is available and all process parameters are properly set. Comprehensive networking minimizes errors, for example by enforcing correct setups via scanning



Our product portfolio for your **FACTORY INTEGRATION** workflow

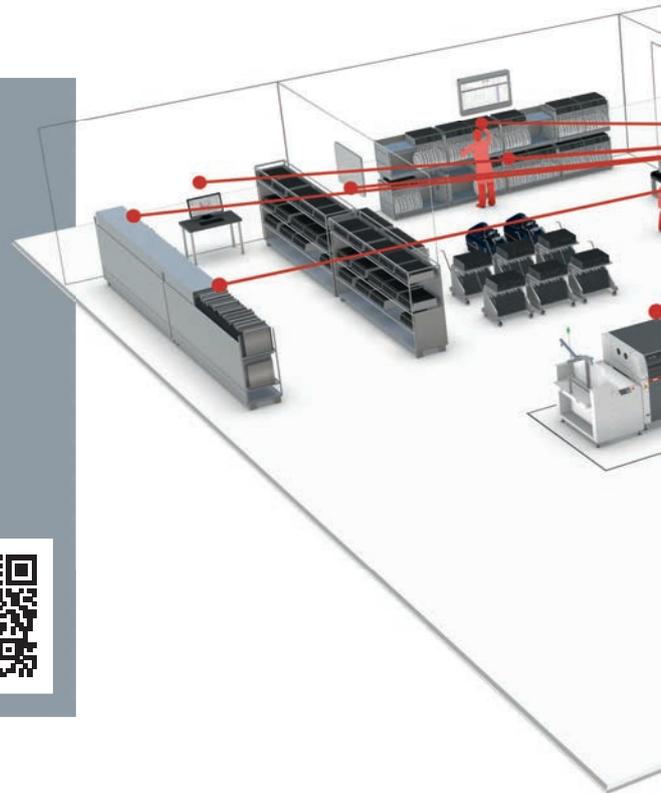
ASM Remote Smart Factory	<ul style="list-style-type: none">  MTTR (mean time to repair)  Costs 	<p>Direct access to data and machines relieves your employees, provides the fastest response times and delivers quick and effective results. (See highlight)</p>	
ASM Command Center	<ul style="list-style-type: none">  Equipment utilization  Number of operators  Productivity 	<p>Our intelligent software solution provides the foundation for the “smart operator” concept. (See highlight)</p>	
ASM OIB (Operations Information Broker)	<ul style="list-style-type: none">  Quality  Costs 	<p>With the modular ASM OIB you transmit all production-related data to where it’s needed (for example, the MES). (See highlight)</p>	
ASM OIB Process Data Interface	<ul style="list-style-type: none">  Transparency  Quality 	<p>The ASM Traceability software uses the ASM OIB process data interface to transmit process events that the SIPLACE machine generates during the placement process to other IT solutions (for example, the MES).</p>	
ASM Process Expert	<ul style="list-style-type: none">  Operator assists  Process stability  Yield 	<p>As a state-of-the-art expert system, the ASM ProcessExpert stabilizes and optimizes your printing process – in real time and optionally entirely on its own. It records and stores all details of your printing process, combines printer settings with product and process data, forgets nothing, and learns from each printed board.</p> <p>Important for factory integration: If the ASM ProcessEngine databases are linked, each expert system learns from the printing processes in your other lines and locations automatically. This means that each process optimization will be instantly available at all locations.</p>	

What now?

Your path to the smart SMT factory and to more efficient workflows

Its position as a technology leader and the world's largest equipment supplier to the modern electronics manufacturing industry makes ASM your partner of choice on the road to integrated processes.

- Take advantage of our global network: Consult our production experts at the SMT Center of Competence and visit reference customers who are members of the SMT Smart Network.
- Run the SMT Smart Factory Check: Online with our SMT Smart Factory Checklist or with one of our experts on your factory floor.



The intelligent factory of the future is not available "off the rack", This poses new challenges for customers and equipment suppliers alike and makes investment projects more complex. Customers' level of advancement varies significantly, and each company has its own objectives and requirements.

Your factory does not have to be the most advanced right away and in all aspects – only in the processes that are most critical to you. If you produce in multiple locations and are closely integrated into your external or internal customers' supply chains, making rapid progress in factory integration will be your top priority. Others position themselves as specialists for small lot sizes and pre-production runs. Such companies depend mostly on rapid improvements in virtual production and an advanced level of automation in material management, preparation and production operations.

ADAMOS

ASEMO

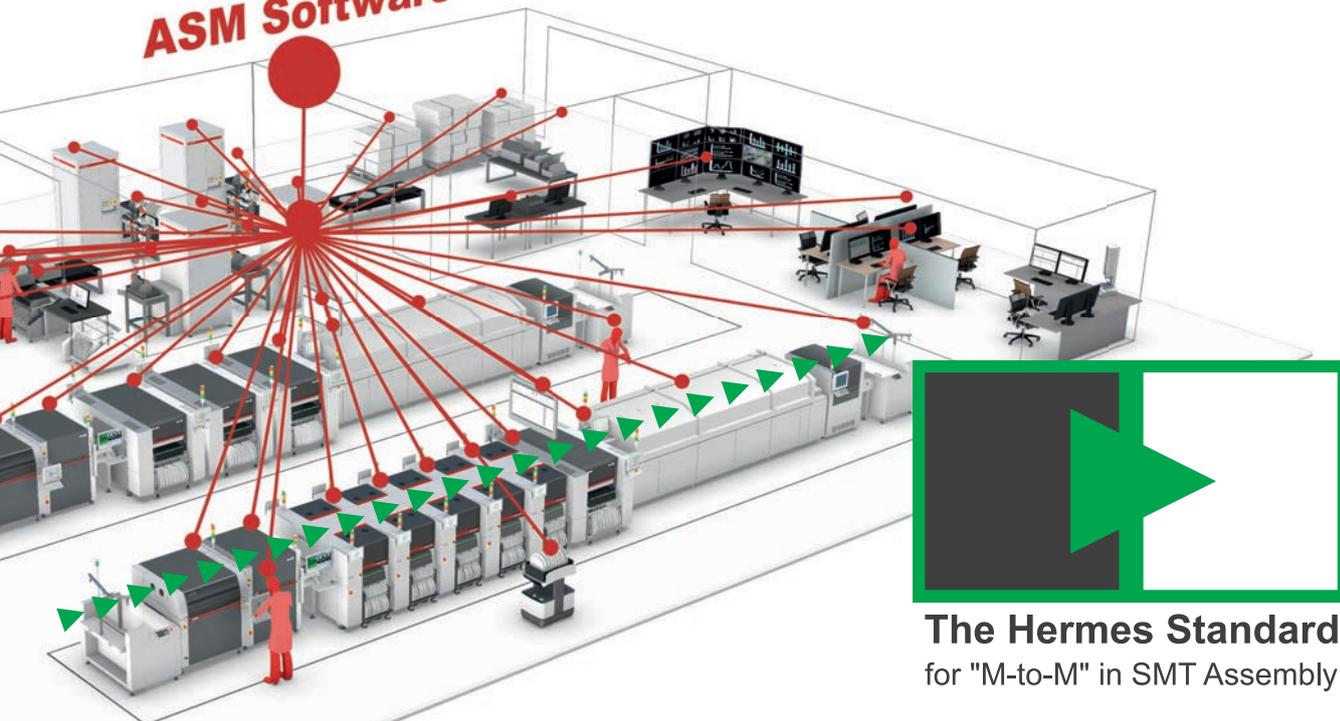


Open Interface
for Machine-to-Host Connection

ASM OIB

CFX, SECS/GEM etc.

ASM Software



The Hermes Standard
for "M-to-M" in SMT Assembly

Learn from the best

As the industry's technology leader, we have brought together large and small companies from all of the world's regions in the SMT Smart Network. Its members represent the best in the world in selected processes. Together with them we develop solutions and best practices in the eight core processes of the smart SMT factory.

You can learn from these companies, examine their approaches, adopt them, or modify them to work for your specific requirements. Discuss your objectives and requirements with your ASM representative. Tell us in which areas and processes you want to become smarter and which KPIs you want to use to measure these improvements.

Get the most from our SMT Center of Competence

Next, make an appointment to visit one of ASM's SMT Centers of Competence, where you will meet production and process experts who are members of the SMT Smart Network. They will lay out solutions for improving the processes that are most critical to you. They will also demonstrate best practices in the SMT Center of Competence and optionally arrange visits to reference customers or workshops.

Take the first step now. Contact your ASM representative.



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ASM Assembly Systems GmbH & Co. KG
Rupert-Mayer-Strasse 44 | 81379 Munich | Germany
Phone: +49 89 20800-27819 | Fax: +49 89 20800-36692 | E-mail: smt-solutions.de@asmpt.com

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