# Webinar; How electronics assembly companies can speed up NPI's with accurate quoting and advanced process engineering **9.11.2021**

**Jean Paul Dirven**
**Zone Portfolio Developer, Southern EMEA**
**Electronics Assembly Software solutions**



SIEMENS

# Another Webinar … Why?

Progress is impossible without change, and those who can't change their minds cannot change anything.

George Bernard Shaw



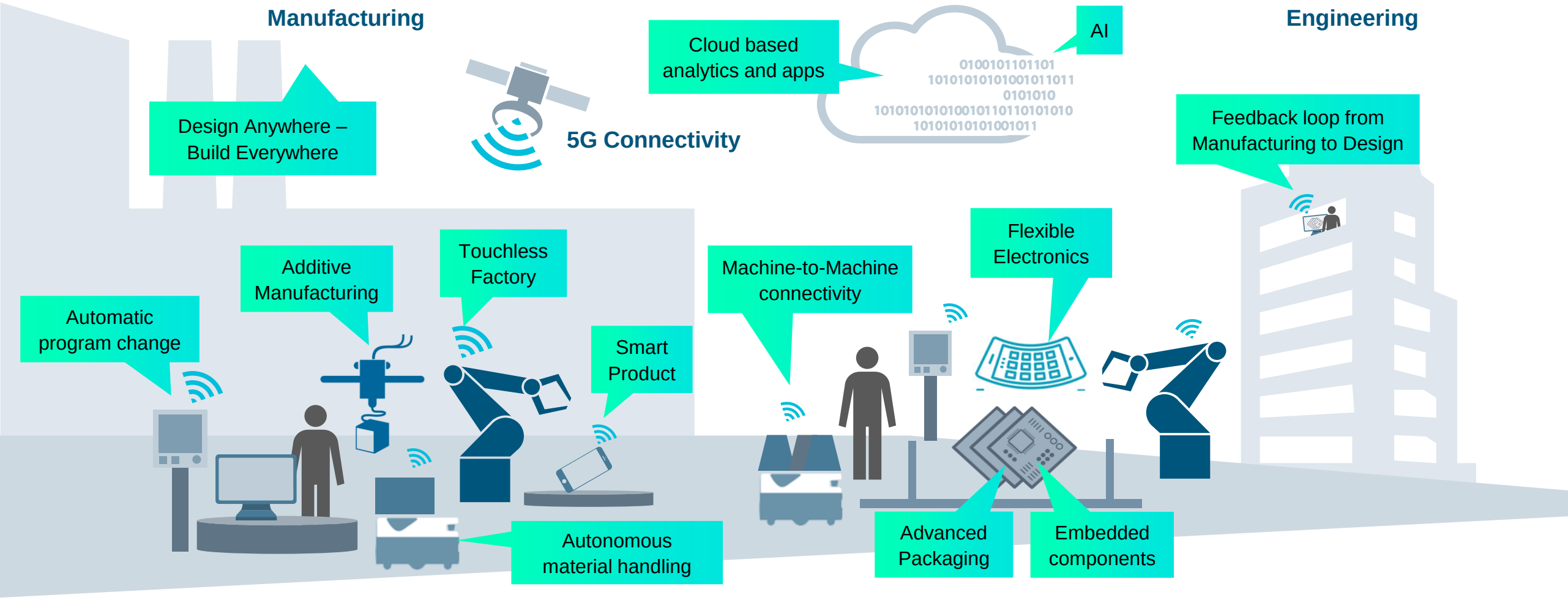
SIEMENS

# Why?



SIEMENS

# Why?
# The vision by 2025 – A radical change for manufacturers

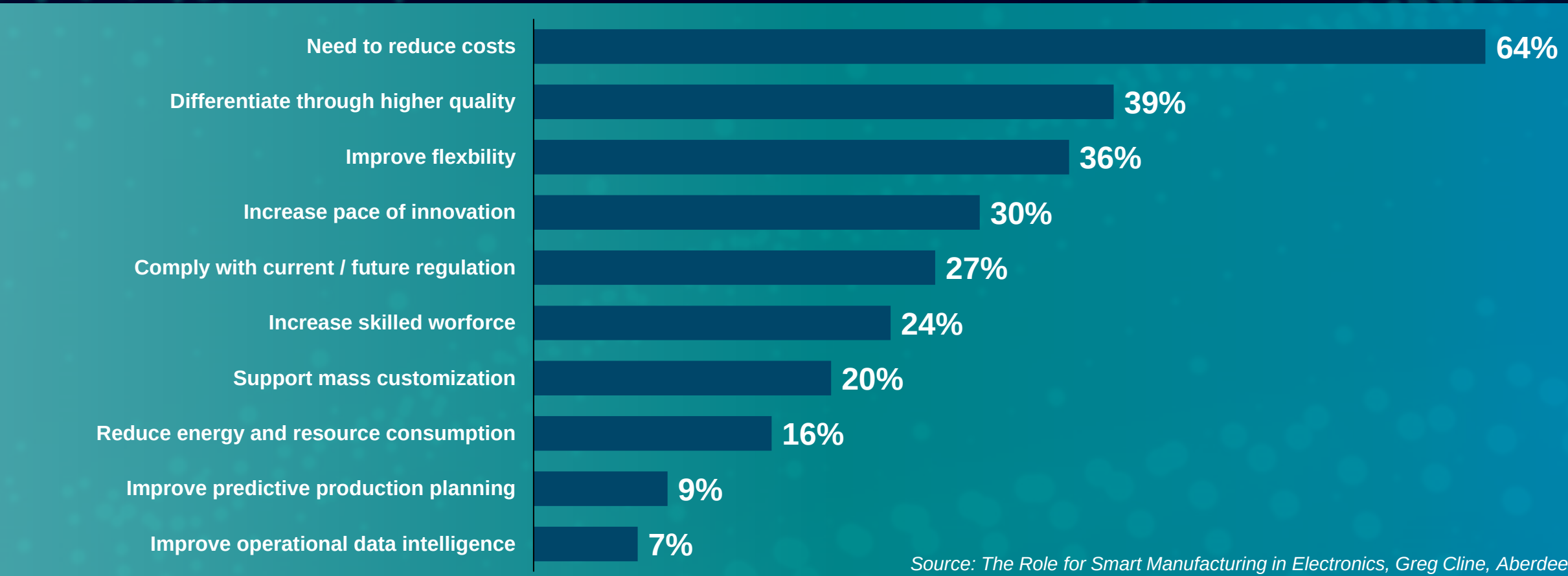





SIEMENS

# Why?
# The voice of the analysts for the Electronics Manufacturer

*Top pressure on Electronics companies; % of Respondents n = 223*



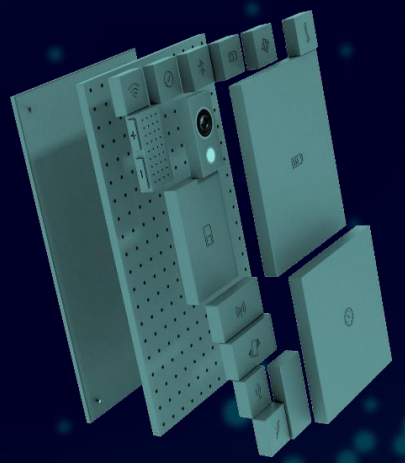

*Source: The Role for Smart Manufacturing in Electronics, Greg Cline, Aberdeen 2018*



SIEMENS

# Why?
# Modern Manufacturing introduces new Challenges

## DELIVERING LOT SIZE ONE



## OPTIMIZING MATERIAL USAGE


## MAKING DATA USEFUL

## COMPLIANCE

ANSI/ISA-95
ISO/TS 16949
IATF 16949
Medical



SIEMENS

# Why?

## Basic Logic if Lot sizes are shrinking?

How to generate enough Throughput to make the numbers in case of smaller lot sizes?

How to quote required Materials at the right price, for sure in times of material shortages?

How to keep Production lines up and running?

More Work Orders and NPI's to get the same volume

More Work Orders means more Quotes

More Work Orders means increased Change Overs

Are '*You*' prepared to quote faster and keep lines running?



SIEMENS

# How?



SIEMENS

# Key concerns in Electronics Process Engineering

How to do fast and accurate quoting

How to quickly and accurately introduce new products

How to ensure best performance of your equipment

How to easily move products between manufacturing sites



SIEMENS

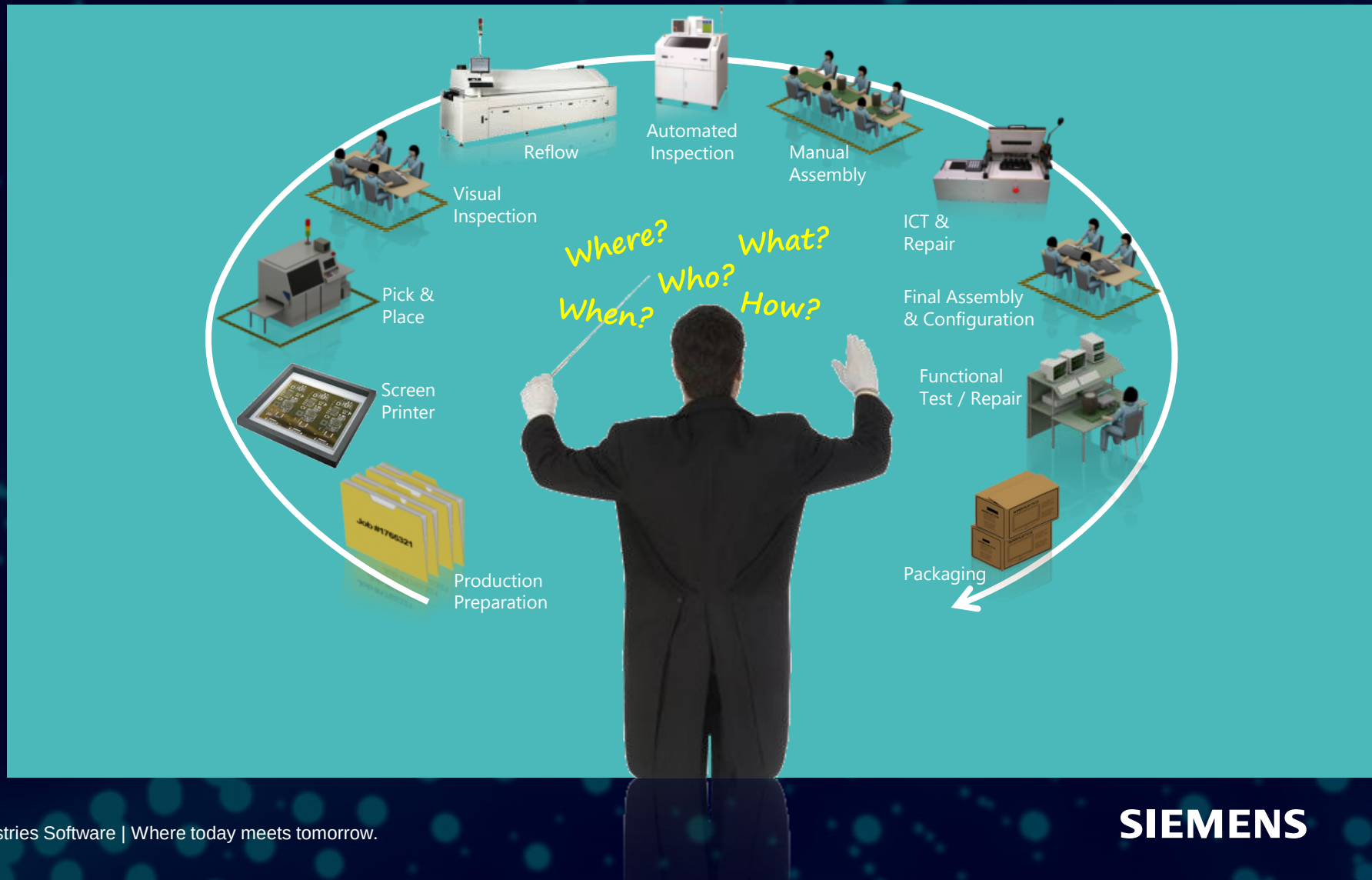
# Key concerns in Electronics Process Engineering

**Digitalize BOM Quoting**

**Accelerate NPI**

**Increase line utilization**

**Product portability**






SIEMENS

# Key concerns in Electronics Process Engineering

**Digitalize BOM Quoting**

**Accelerate NPI**

**Increase line utilization**

**Product portability**

- ✓ **Increase efficiency in the process to convert a customer BOM into the Golden Production BOM**
- ✓ **Fast identification of which materials are available in stock and what to be ordered to execute a work order**
- ✓ **Find where you can buy the missing parts at the best price under the optimal and preferred conditions**



SIEMENS

# Key concerns in Electronics Process Engineering

- Digitalize BOM Quoting
- **Accelerate NPI**
- Increase line utilization
- Product portability

✓ **Increase engineering efficiency by using a single tool for all process engineering tasks**

✓ **Eliminate redundant preparation work with Learning Libraries (machine shapes, rotation, stencils for different footprints, etc.)**

✓ **Increase efficiency through automation and use of templates (for work instructions, data import parsers, etc.)**



SIEMENS

# Key concerns in Electronics Process Engineering

**Digitalize BOM Quoting**

**Accelerate NPI**

**Increase line utilization**

**Product portability**

- ✓ **Maximize off-line preparation to eliminate on-line trial and error delays**
- ✓ **Allows fast and consistent machine library data generation and maintenance**
- ✓ **Ability to create family setups to reduce change over time**



SIEMENS

# Key concerns in Electronics Process Engineering

**Digitalize BOM Quoting**

**Accelerate NPI**

**Increase line utilization**

**Product portability**

- ✓ **Leverage ODB++ to seamlessly move production between lines and factories – eliminate engineering time and increase quality of end product**
- ✓ **Allows fast programm portability for any machine platform, including automatic conversion of library data**
- ✓ **Easy assembly project export/import – encrypted for IP protection**



SIEMENS

# Key concerns in Electronics Process Engineering



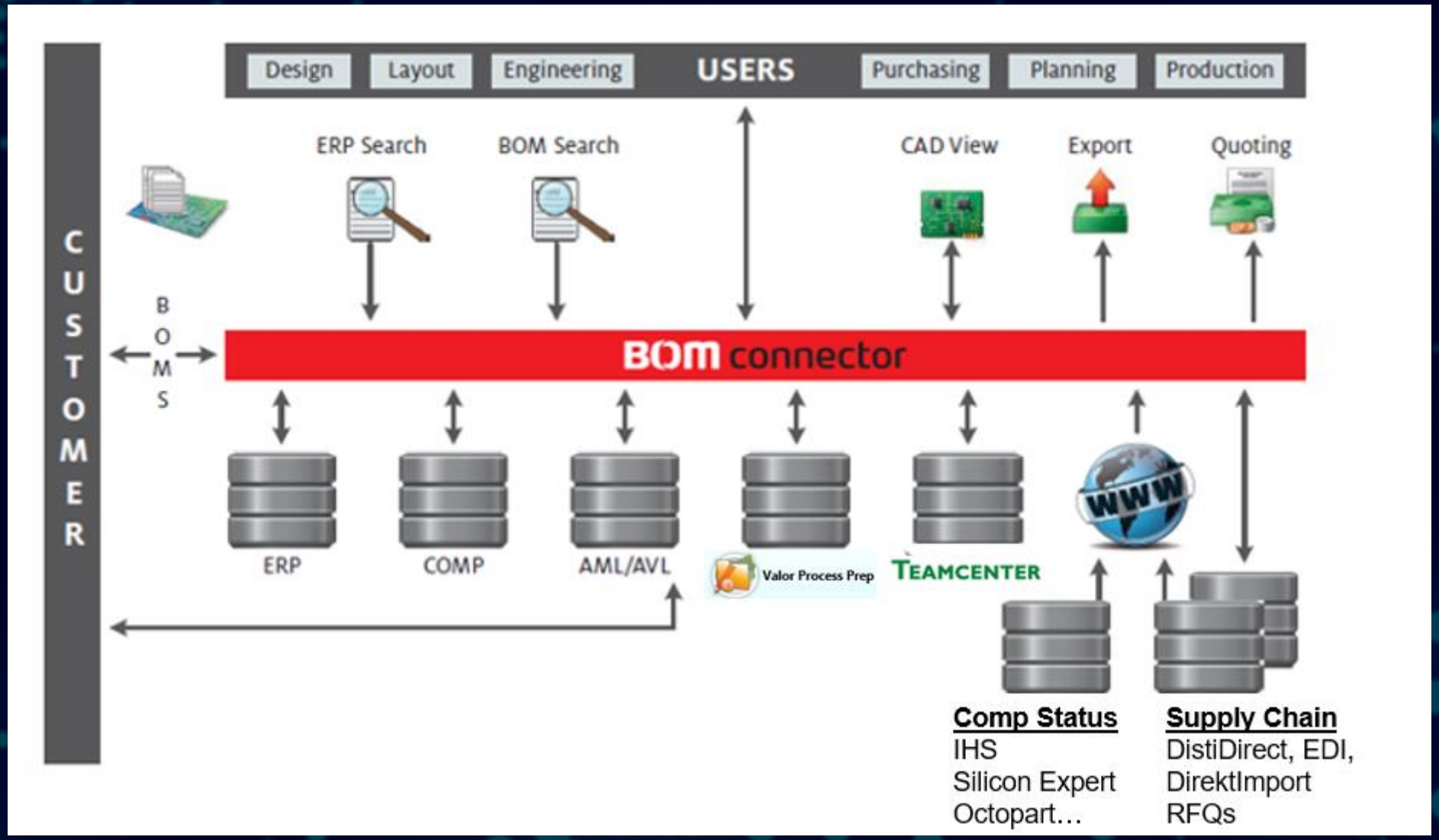

SIEMENS

# What?



SIEMENS

# BOM Connector



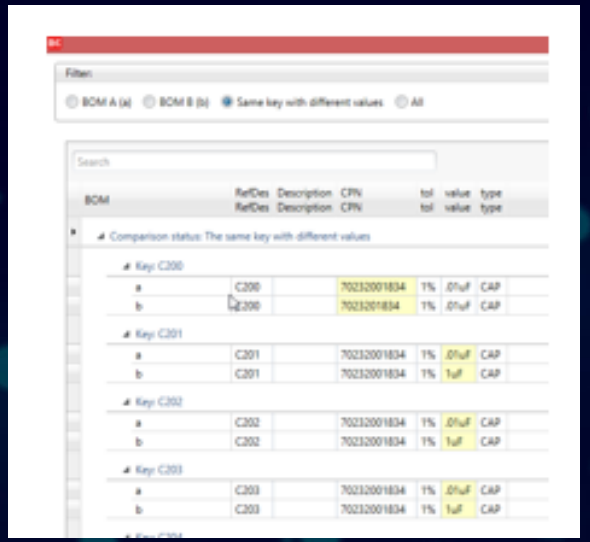



SIEMENS

# BOM Scrubber

- A scrubber tailored for the electronics market
- Reader graphically recognizes patterns and variations
- Proper handling of manufacturer part numbers (MPNs)
- Export a standard desired format using easy-to-create templates
- BOM / PCB Comparisons & Consistency Check
- Check BOM for mistakes (quantity mismatch, part mismatch, etc.)

| | | | | | | |
|---|---|---|---|---|---|---|
| C138-140 | CAP | WIMA2220 | 0U22F 63V | 10% | WIMA | SMDTC03220QAA00K |
| C163 | CAP0612 | 612 | | | | |
| C182,C184 | CAPOL-SM | 810 | 47UF 50V | 20% | VISHAY | MAL215371479E3 |
| C183,C186, | CAPOL-SM | 605 | 10UF 50V | 20% | VISHAY | MAL215371109E3 |
| C188-190, | | | | | | |
| C248 | | | | | | |
| C185 | CAPOL-SM | 810 | 220UF 10V | 20% | MAL215374221E3 | VISHAY |
| C249 | CAP | 603 | 470PF 50V | 20% | | |
| C250 | CAP | 603 | 1NF 50V | 20% | | |
| C252-255 | CAP | 603 | | | | |
| D1 | ZENER | SOD80C | BZV55C5V6 | 20% | NXP | BZV55C5V6 |
| D4-27,D34, | BAS21 | SOT23 | BAS21 | ? | EBV | BAS21 |





SIEMENS

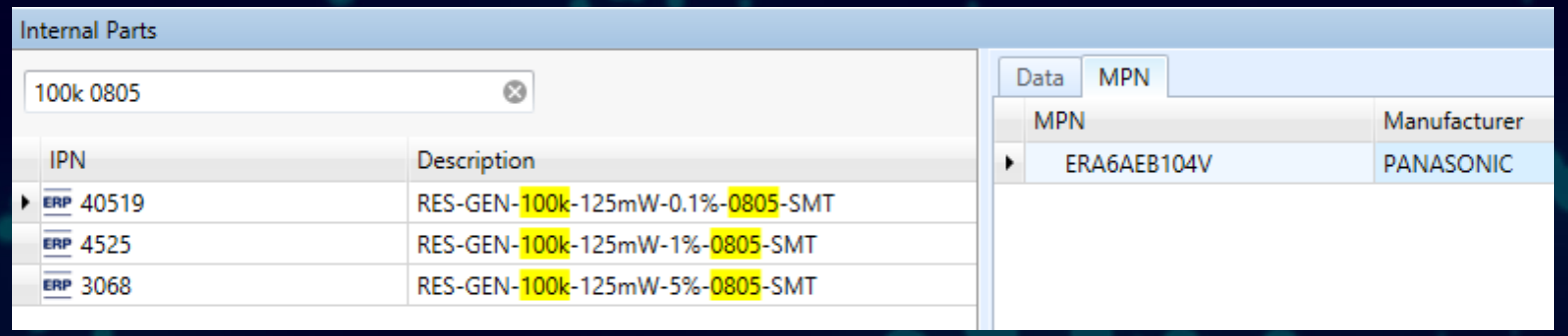
# ERP Integration; How it works is less important than why it is needed

The “how” depends on the ERP system

The “why” does not – it links the ERP system directly into the quoting

It helps the user better locate internal component stock

It helps get information back into the ERP system





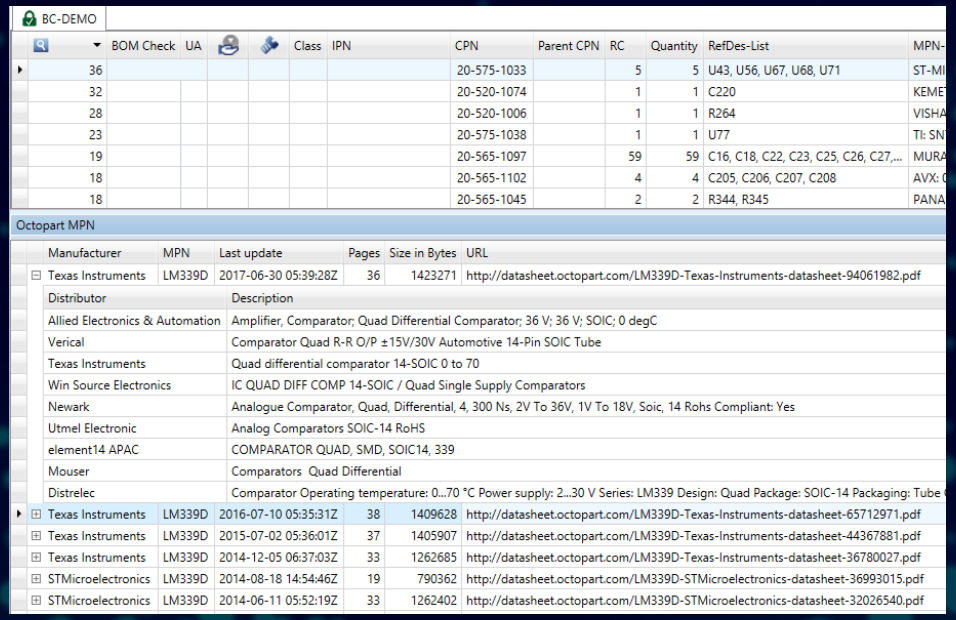

SIEMENS

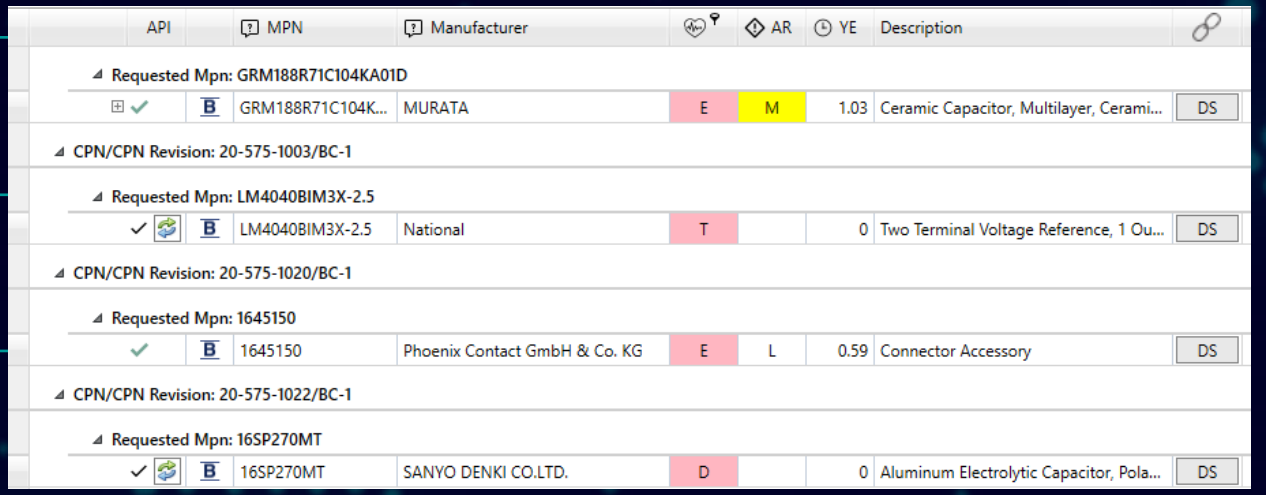
# Clean-up & Validity Checking

Clean-up and enhance the customer BOM with information from the ERP system

Add missing information

Check for obsolete parts




Fast search of the Octopart portal

Confirm MPNs are valid

Copy Octopart description to your BOM

Quickly access the Octopart datasheet directly from BOM



SIEMENS

# Enrich the BOM to make it the Golden BOM

Direct pull of the layout data from within Process Prep

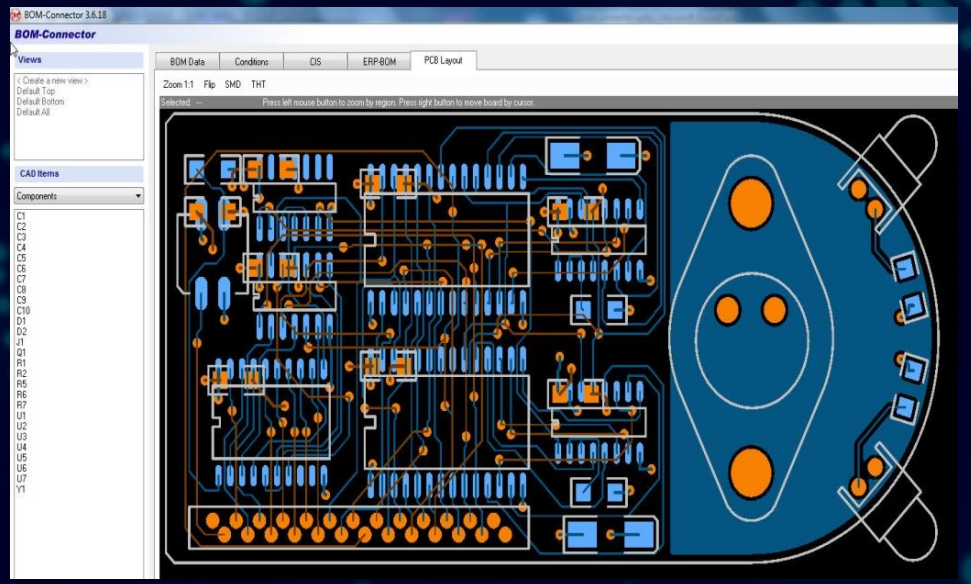
Extract CAD attributes such as Geometry and technology from design and insert into your “Golden BOM”

Cross-link between BOM and design

Check for discrepancies

Export a standard desired format using easy-to-create templates

Viewer can search for comps, nets, pins, etc.




BC-DEMO_KD

| CPN | Description | UA | GEOMETRYN | Device Type | Value | +Tol | RefDes | TB | PINS | TECHNOLOGY |
|---|---|---|---|---|---|---|---|---|---|---|
| 20-520-1006 | 560R 0805 1% | GeomMismatch | 0603 | Resistor | 560 | 5 | R264 | B | 2 | SMD |
| 20-520-1007 | 1K27 0603 +1%/-1% | | 0603 | Resistor | 1.27K | 5 | R268 | B | 2 | SMD |



SIEMENS

# Quoting

Get prices from ERP system or directly from your supply chain

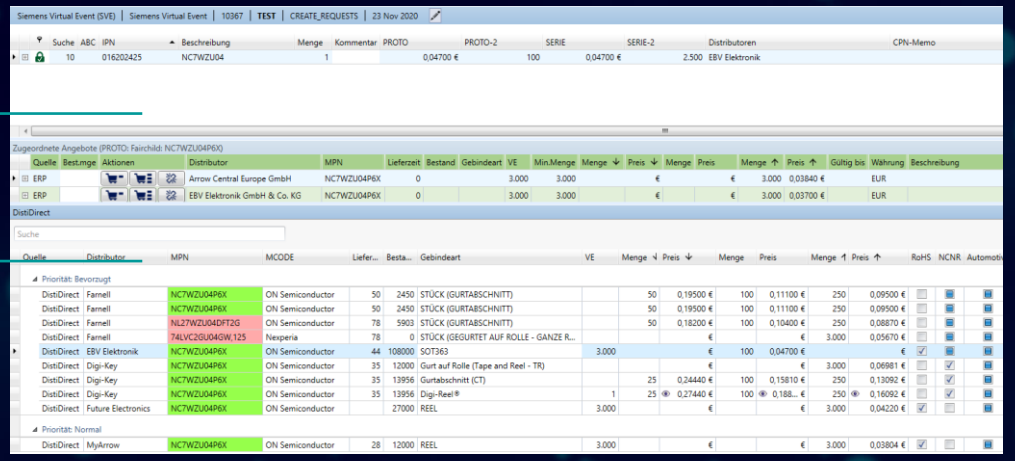
DistiDirect checks real-time with distributors such as Digi-Key, Arrow, Future Electronics and others (use of company login and preferred Pricing)

Color-coded displays helps sort through multiple search results

“Best Price” function automatically selects the right supplier for your project based on your rules

Check for MPN or SKUs and suggest alternates

Reduce quoting time






SIEMENS

# Components Quoting & Ordering

Send out distributor RFQs with a mouse-click

Link distributor quotes and price lists

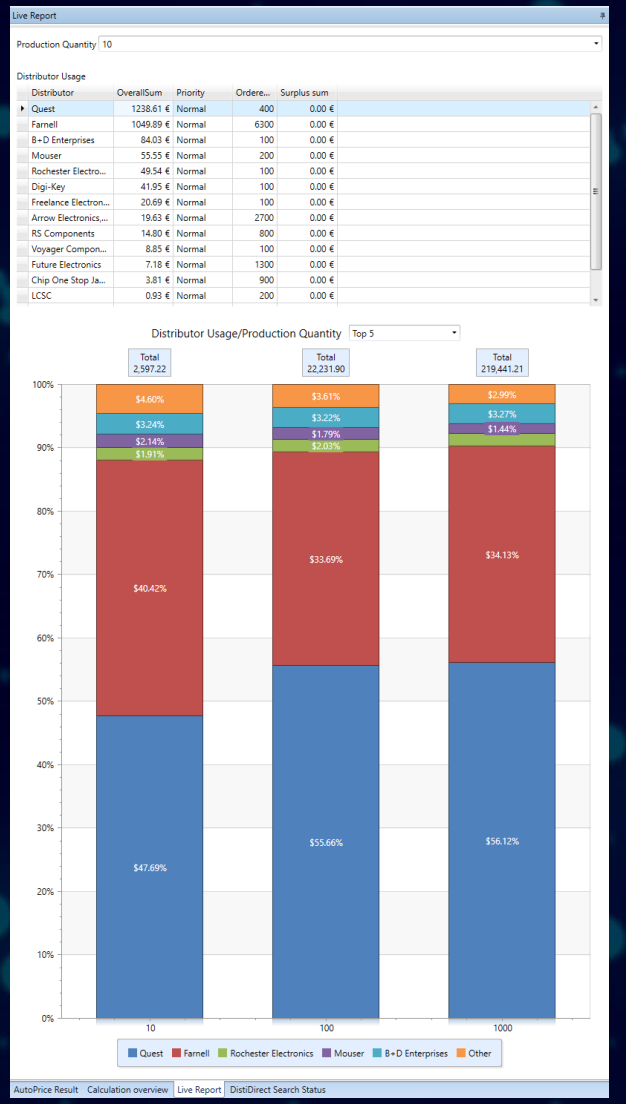
Distributor status maintenance – preferred, “black list” etc.

Purchase quantities and bulk pricing calculated based on production quantities

Distributor report shows breakdown by supplier and assists with consolidation

Support for consignment parts and multiple currencies

Save quotes and prices to the BOM Connector database.





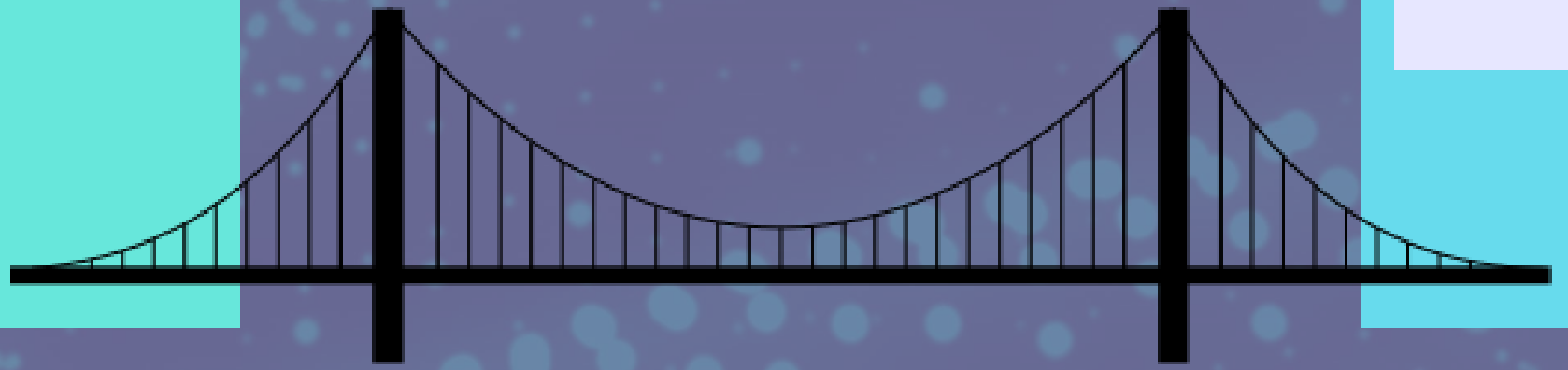

SIEMENS

# Harmonized process through a single engineering tool

## Design

- Product data cannot be transferred **directly** to the line
- Valor Process Preparation generates **manufacturing execution instructions** for automated and manual stations, including:
  - ✓ BOM validation
  - ✓ Stencil design
  - ✓ Line balancing
  - ✓ SMT, Test and Inspection programming
  - ✓ Generation of documentation work instructions

## Manufacturing





SIEMENS

# Harmonized process through a single engineering tool

BOM CAD Product Data

UniCam NPI Version 9.1

FABmaster GOLD

CAM350

Machine Vendor Interface

Machine Vendor Interface

Machine Vendor Interface

SMT, AOI Machines

FPT, ICT Machines

Stencil Design

**BEFORE: Product model created multiple times**

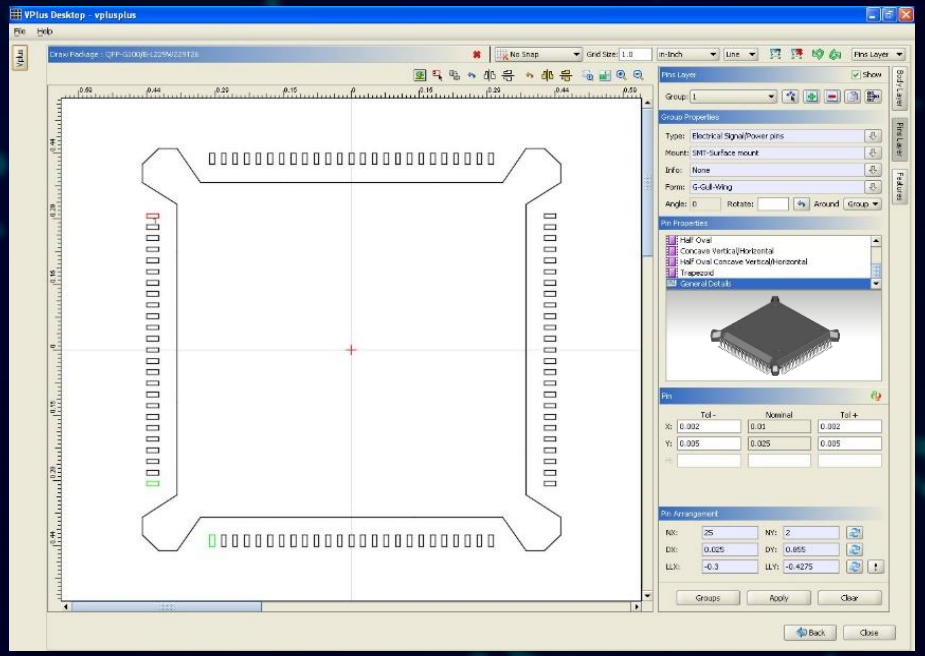
BOM CAD Product Data

Valor Process Preparation

SMT, AOI, ICT, ICT, STENCIL

**AFTER: Time-to-production reduced by more than 20%**

# Harmonized process through a single engineering tool
# Valor Parts Library (VPL), Physical Components Library

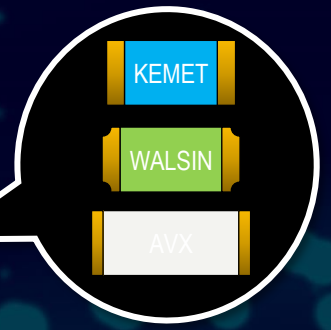


ISO9001-certified library covering over 35 millions part numbers

- Accurate shape data
- Pin contact area
- Component classification (JEDEC)

Enables accurate virtual-prototype build

| | Item | CPN | Manufacturer | MPN | VPL-Package |
|---|---|---|---|---|---|
| 1 | 1 | G8316005-244 | KEMET | C1210C22K5RAC-LWR | DSO-C2/X-L60W32T25 |
| 2 | | | WALSIN | 1210B22K5KKCT-CRM | DSO-C2/X-L60W31T3 |
| 3 | | | AVX | 10125C224KATA2A-KOL | DSO-C2/X-L64W25T3 |



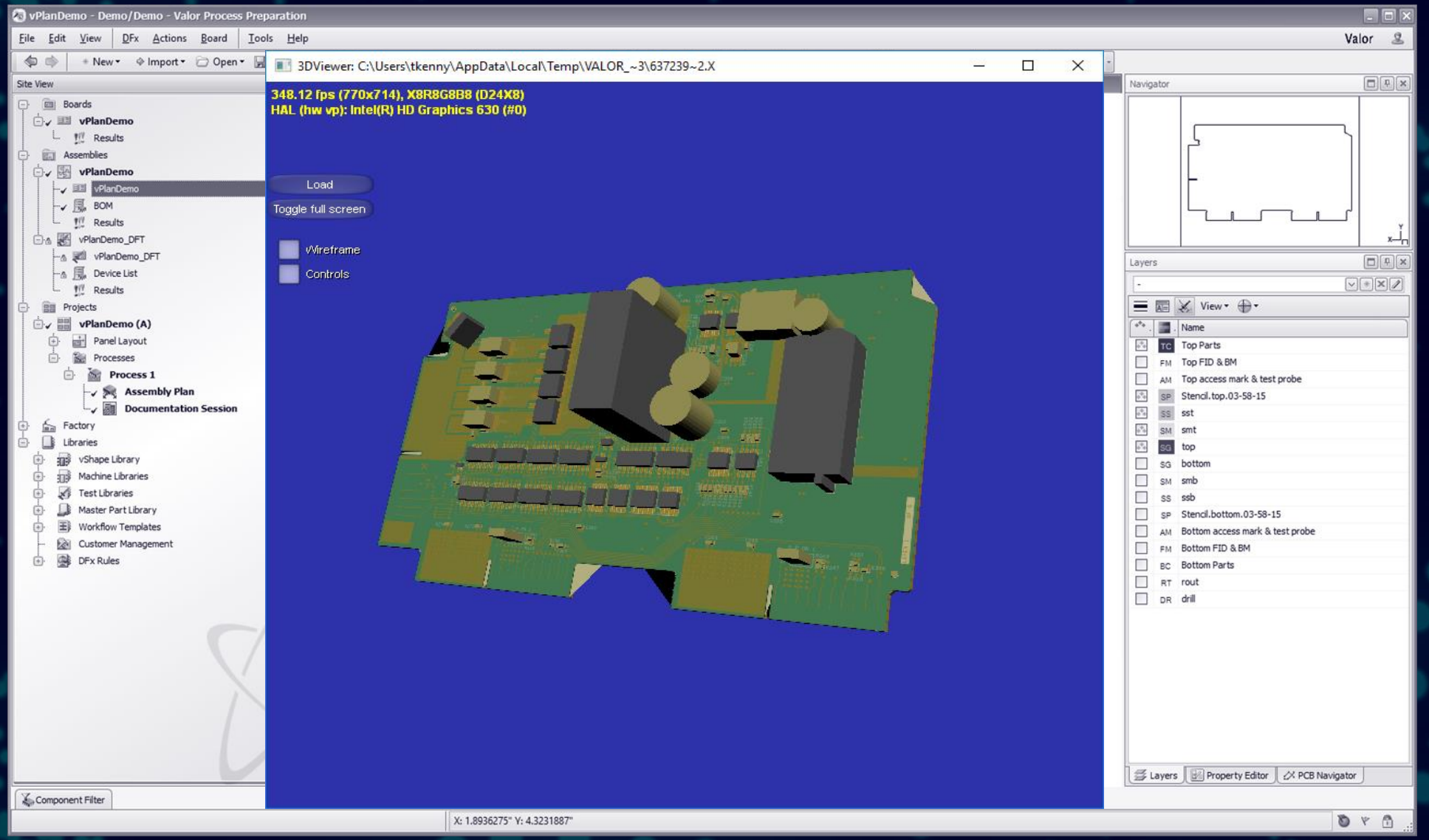

Shapes of alternate parts in the AVL can be easily compared for inconsistencies

(example: the parts provide the same electrical function, but require different pad layouts)



SIEMENS

# Harmonized process through a single engineering tool






SIEMENS

# Harmonized process through a single engineering tool

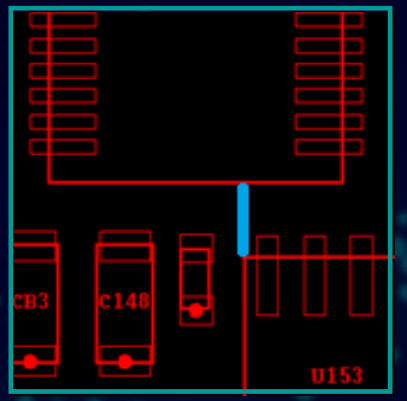
## Design for Assembly

### Customer Requirements

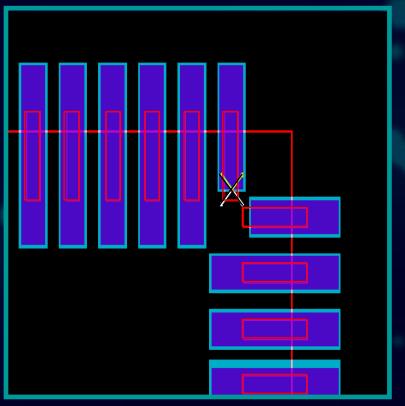
- Concurrent DFM
- Reduction of NPI Cycle Times
- Improved Process Yield
- Improved Quality

### Comprehensive Set of Assembly Analysis

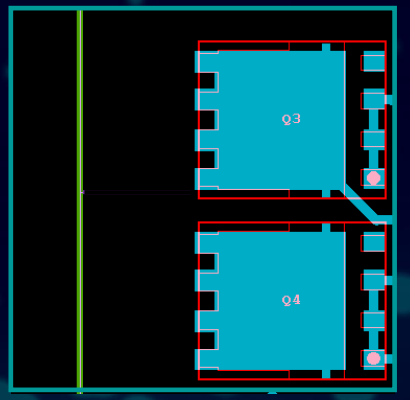
- +400 Assembly Level Checks
- Identifies issues that can affect yield, cost and reliability
- Identifies causers of scrap or extra handling costs
- Utilizes Valor Parts Library to identify solderability issues
- Automated Reporting



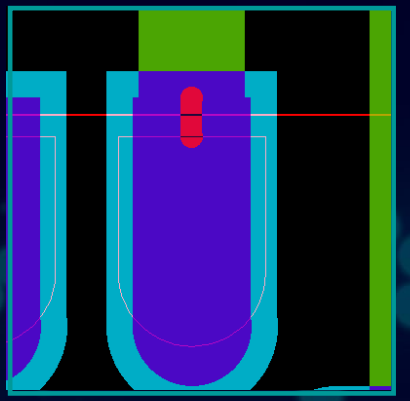

**Component clearance requirements vary by type, orientation and placement machine**



**Pin overhanging soldermask can cause solder bridging**




**Toeprint too close to conveyed edge can be damaged by SMT gripper**



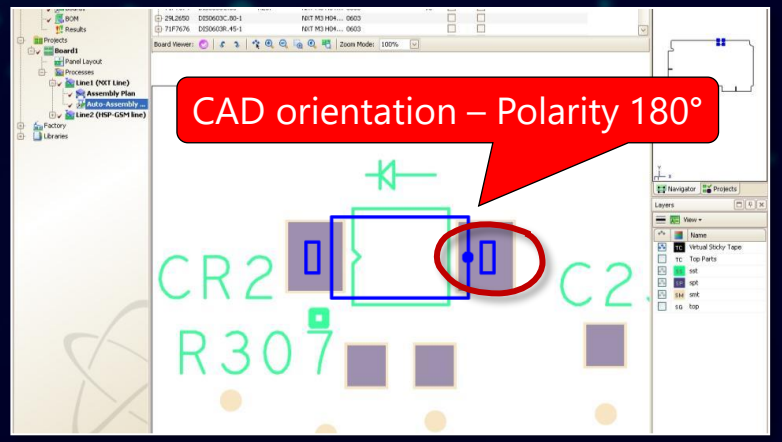
**Insufficient heel distance will lead to a weak solder joint**

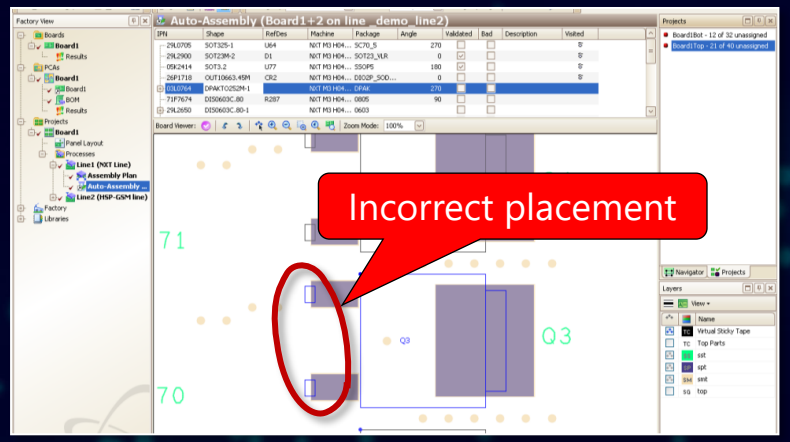


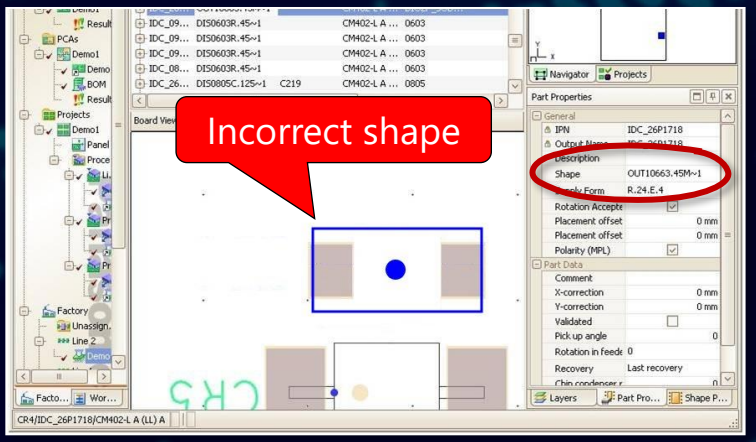
SIEMENS

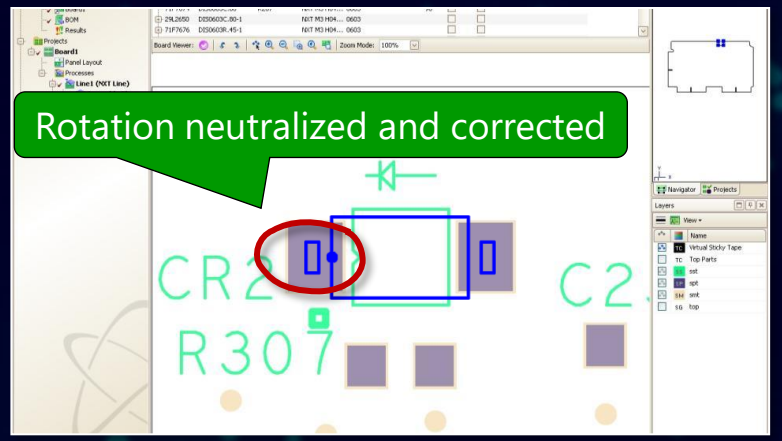
# Harmonized process through a single engineering tool

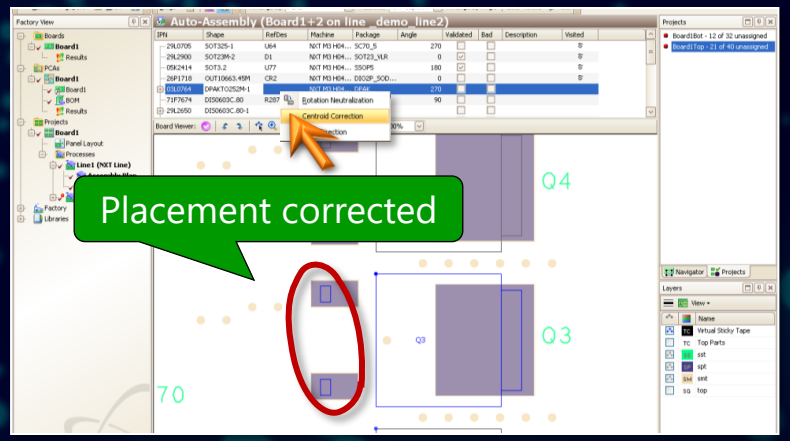
## “Virtual Sticky Tape” – Offline placement simulation

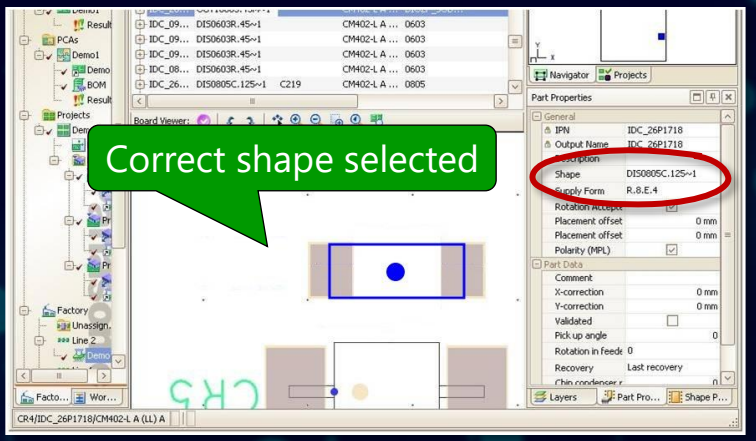


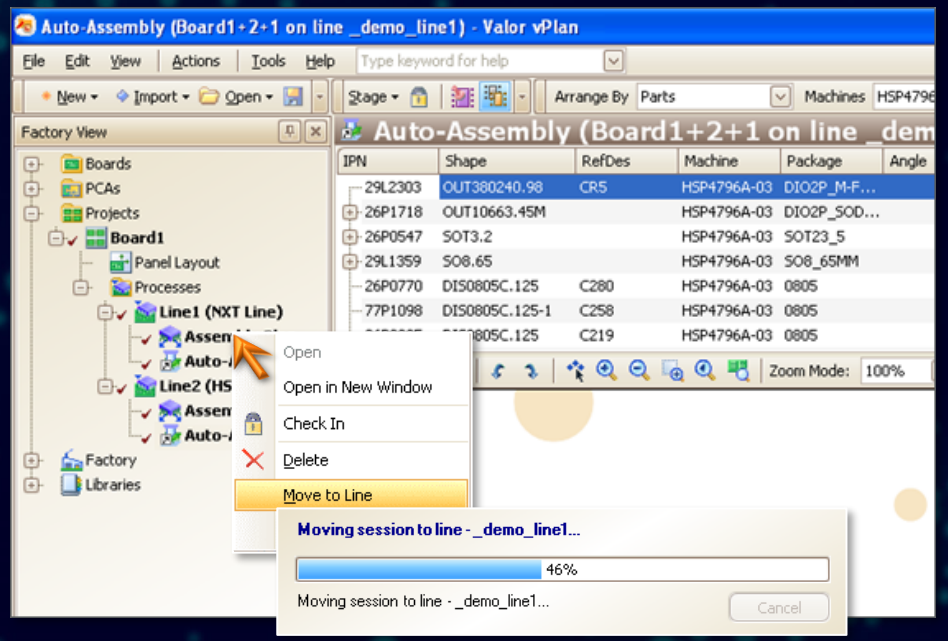



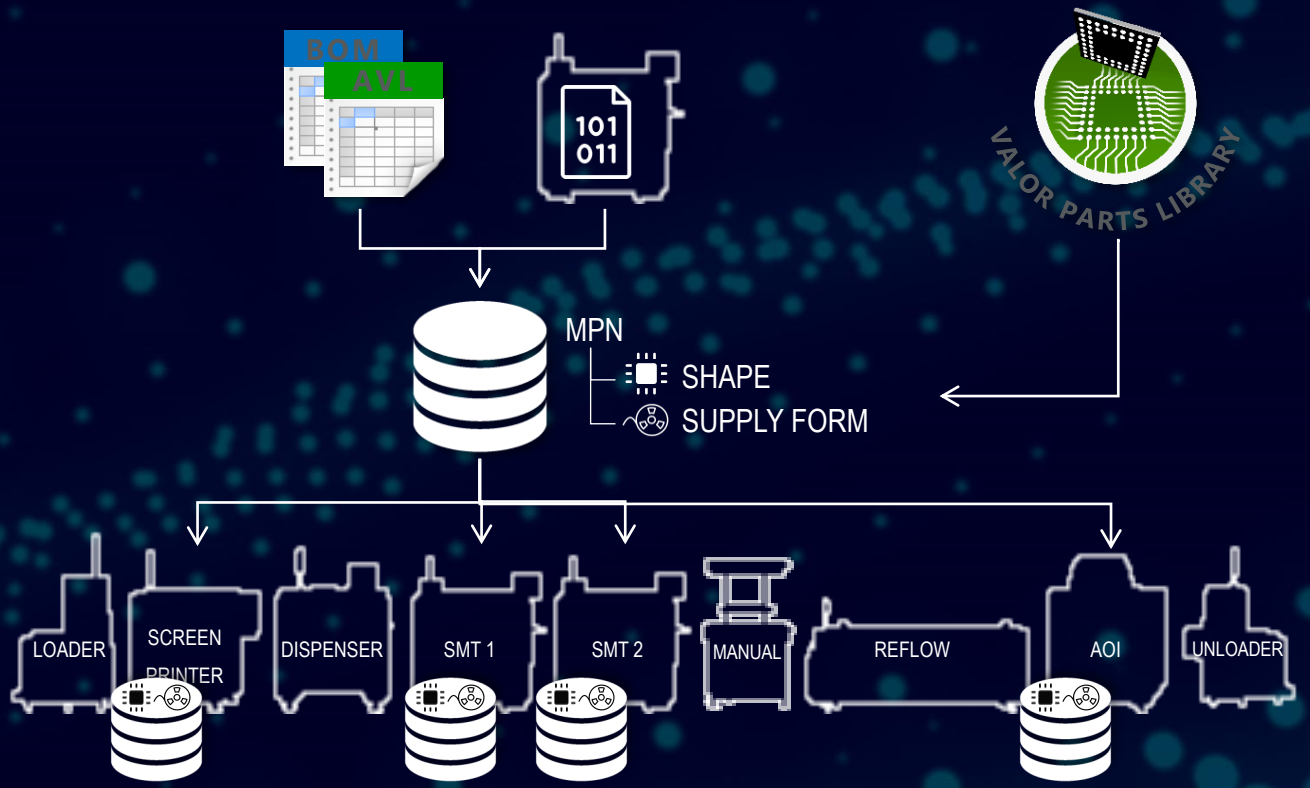



SIEMENS

# Harmonized process through a single engineering tool

## Auto Shape Generation of Machine Libraries




Part libraries can be created for each machine directly from the Master Parts Library

Native machine programs can also be imported and quickly converted into alternate machine format

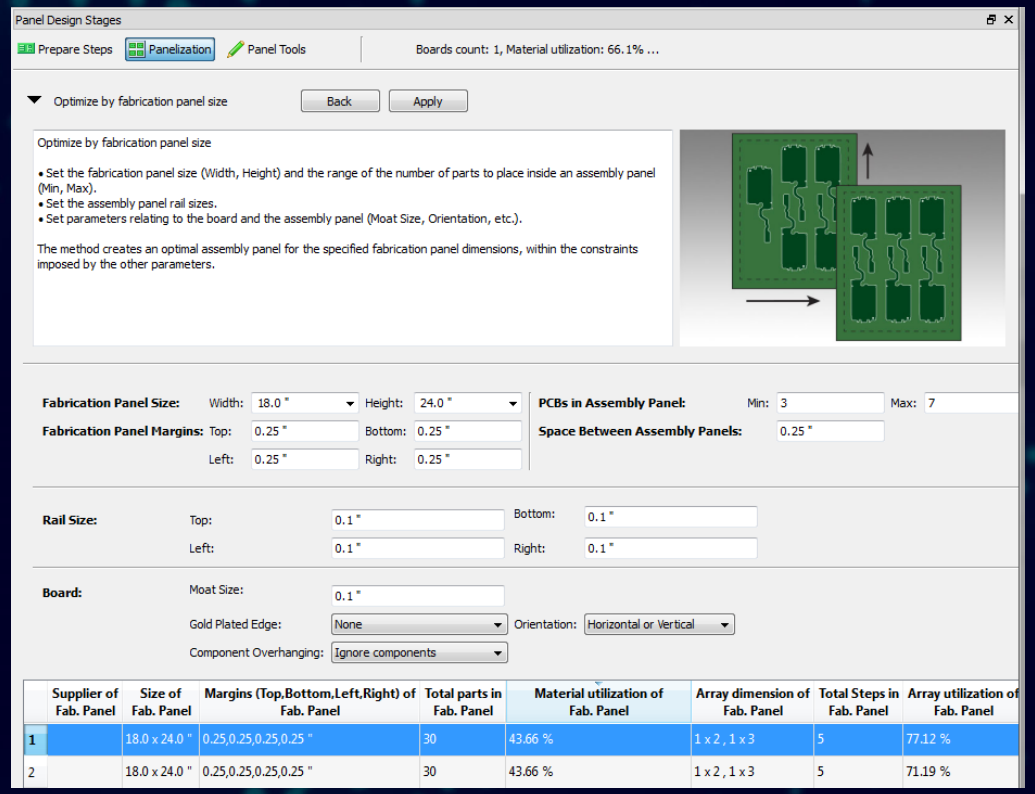
Users can create/modify custom parameters to enhance part/shape data

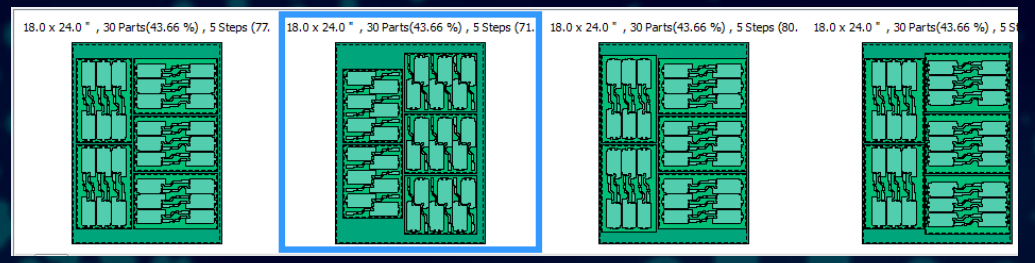


SIEMENS

# Harmonized process through a single engineering tool

## Advanced Panel Design



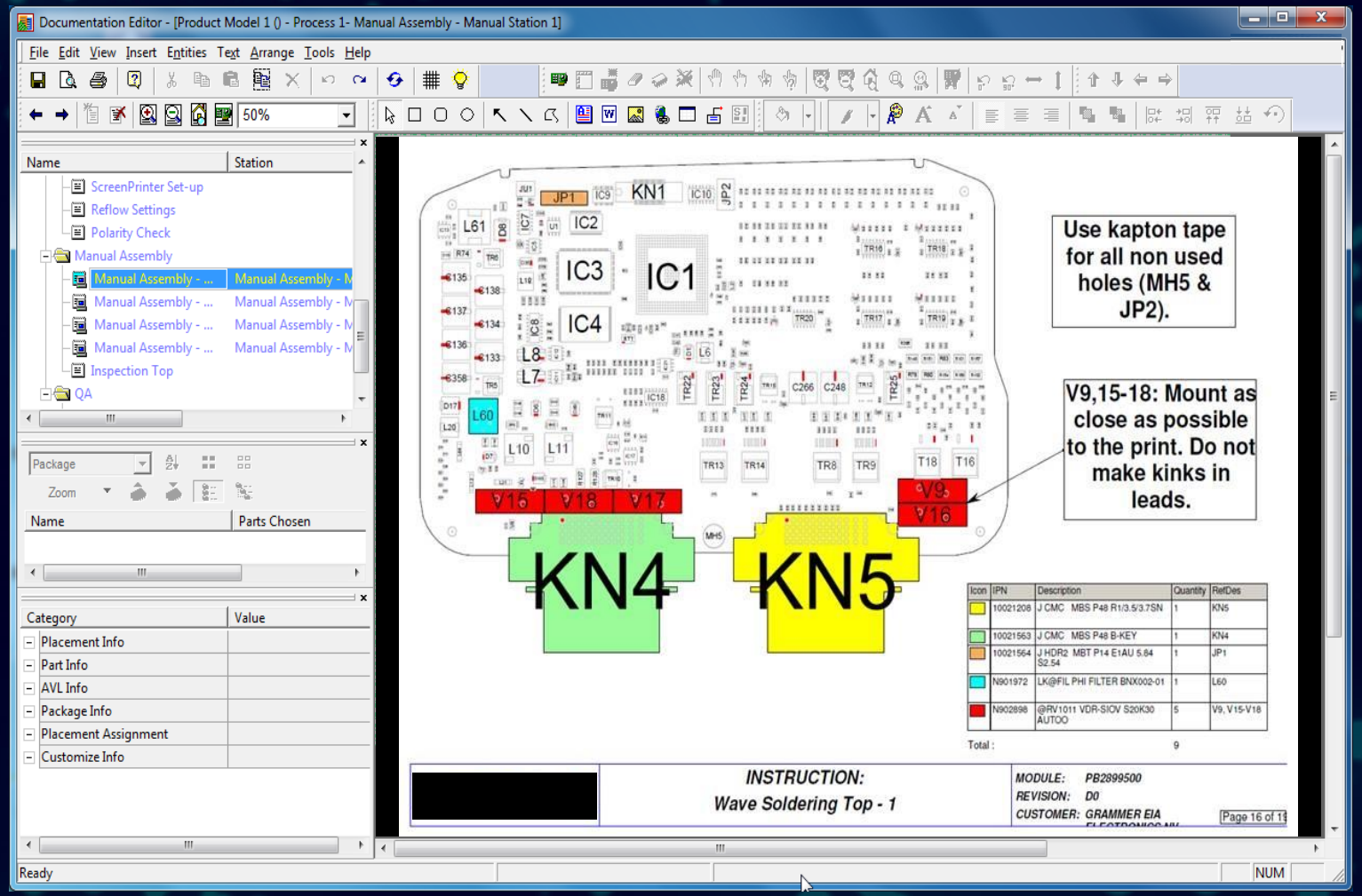




- Advanced PCB Assembly panel design capabilities including editing, breakaway-tabs and copper balancing
- Automated nesting of shapes to optimize material usage
- “Step-and-Repeat” capability
- Dimensioning



SIEMENS

# Harmonized process through a single engineering tool
## Documentation creation

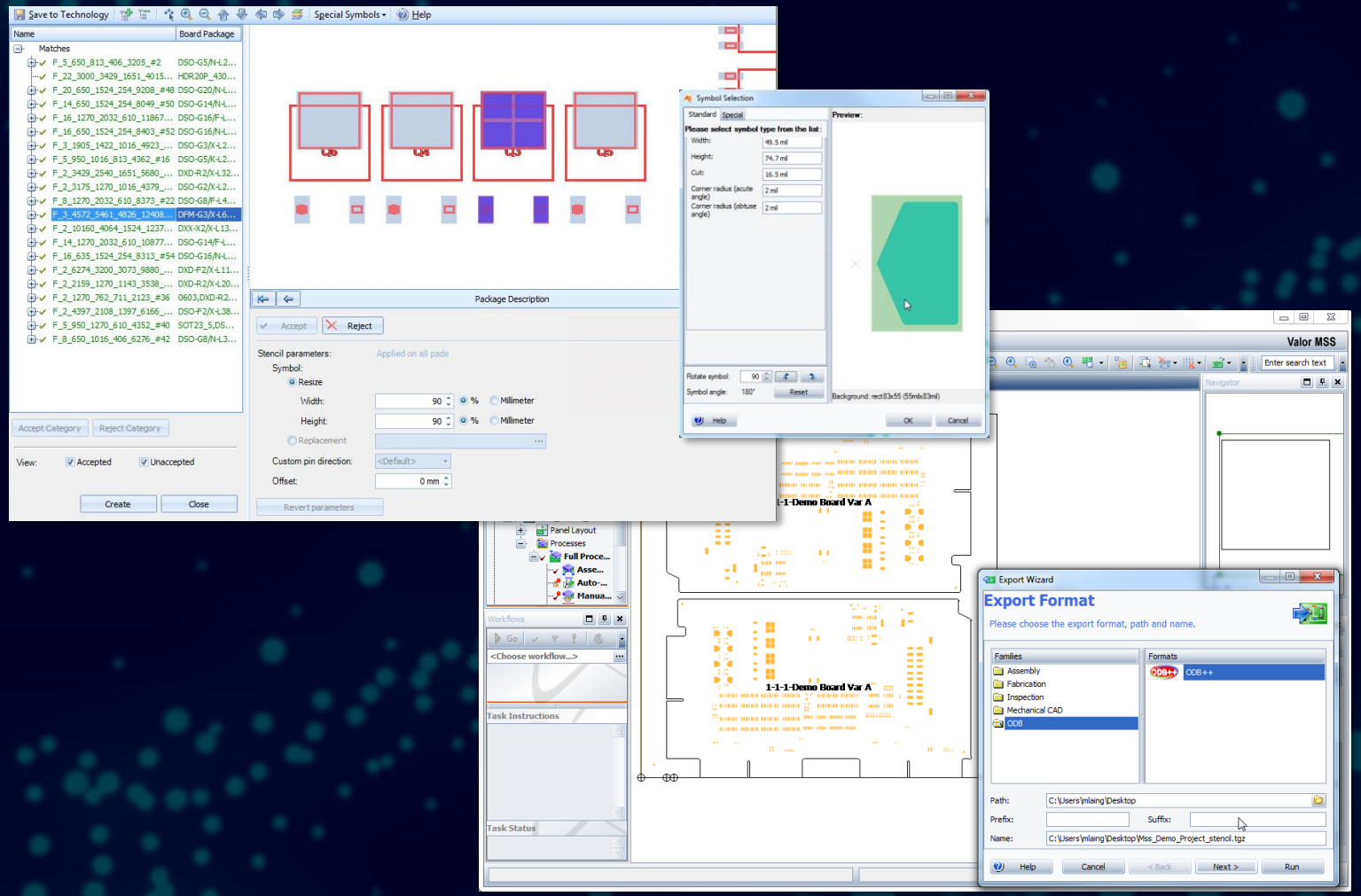



Built-in and user-defined templates for static and interactive documentation

Include any design, product model, SMT, Test, and other production information

Can include embedded images and files (e.g. JPG, PDF)

# Harmonized process through a single engineering tool
## Stencil design




Automatically create stencils from product model

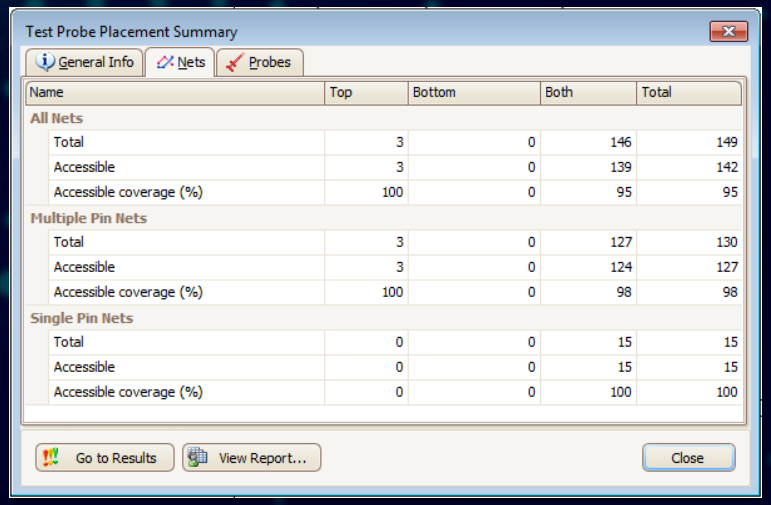
Customizable rules and aperture properties

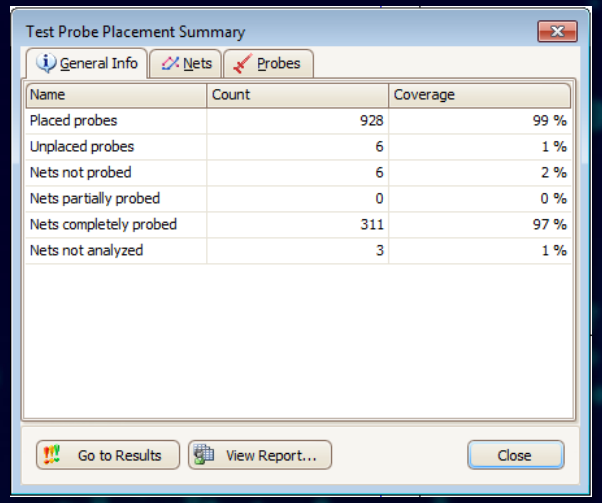
Output to ODB++ or Gerber 274X

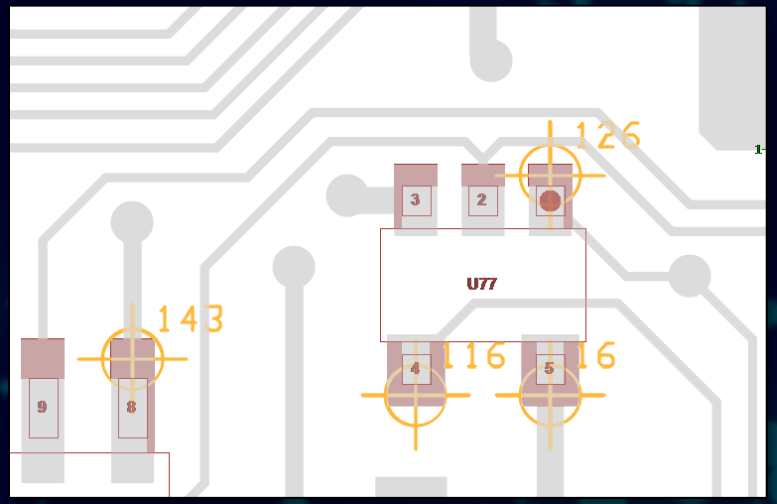


SIEMENS

# Harmonized process through a single engineering tool
## Complete testability analysis (DFT) of PCAs




Identification of high-risk areas

Feedback to Design about inaccessible points

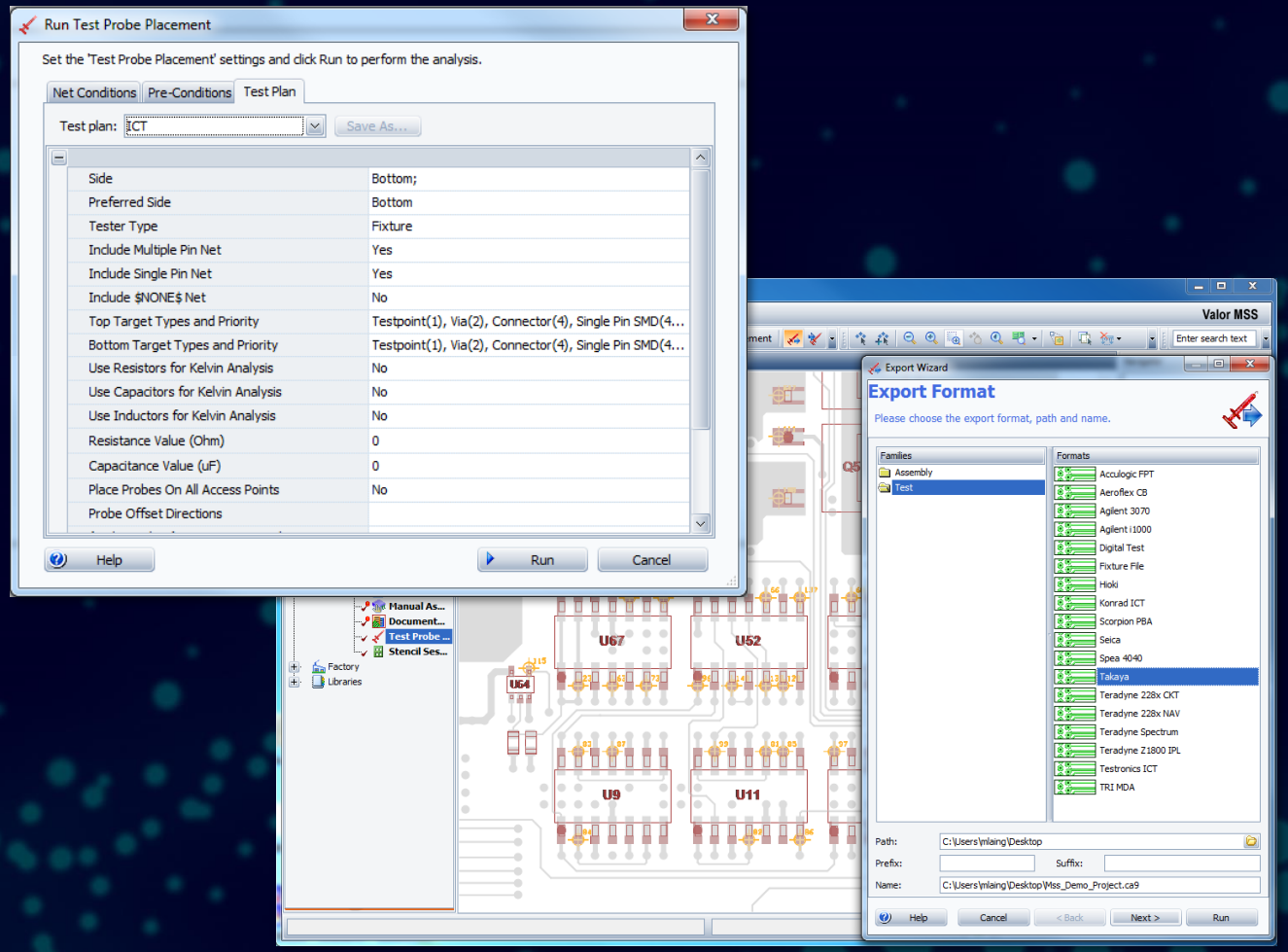
Comprehensive yield analysis to quantify testability



Unrestricted | © Siemens 2020 | 2020-12-14 | Siemens Digital Industries Software |
Where today meets tomorrow.

SIEMENS

# Harmonized process through a single engineering tool
## Tester and inspection programming




Automated test probe selection and positioning based on available access to each electrical node

Full reporting of placements including reason codes for inaccessible points

Leading industry tester formats supported

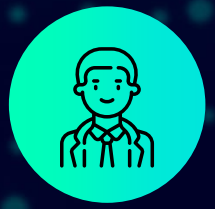
AOI & AXI tester programming



SIEMENS

# Planning and Scheduling Optimization

## Enabling accurate scheduling at the planner level; Family Setups



SHOPFLOOR

ERP

SUPPLY CHAIN

**ONE-TIME SETUP**

**Line / Machine Configuration**
(Machine type/feeder types/# feeders)

**REQUIRED**

**Products or "NC" Programs**
(IPNs/# assertions / tact time)

**Parts Library**
(IPNs / Feeders / Machines)

**Work orders** for day / week / month (no. of products, due date)

**OPTIONAL**

**Calendar**
(shifts / vacation / maintenance)

**Attributes**
(conveyor width / oven profile)

**Material Stock**
(Line / Supermarket / Warehouse)

INPUTS

Results within minutes!

SIMULATION ENGINE

**Now** this can be done at the planner level!!



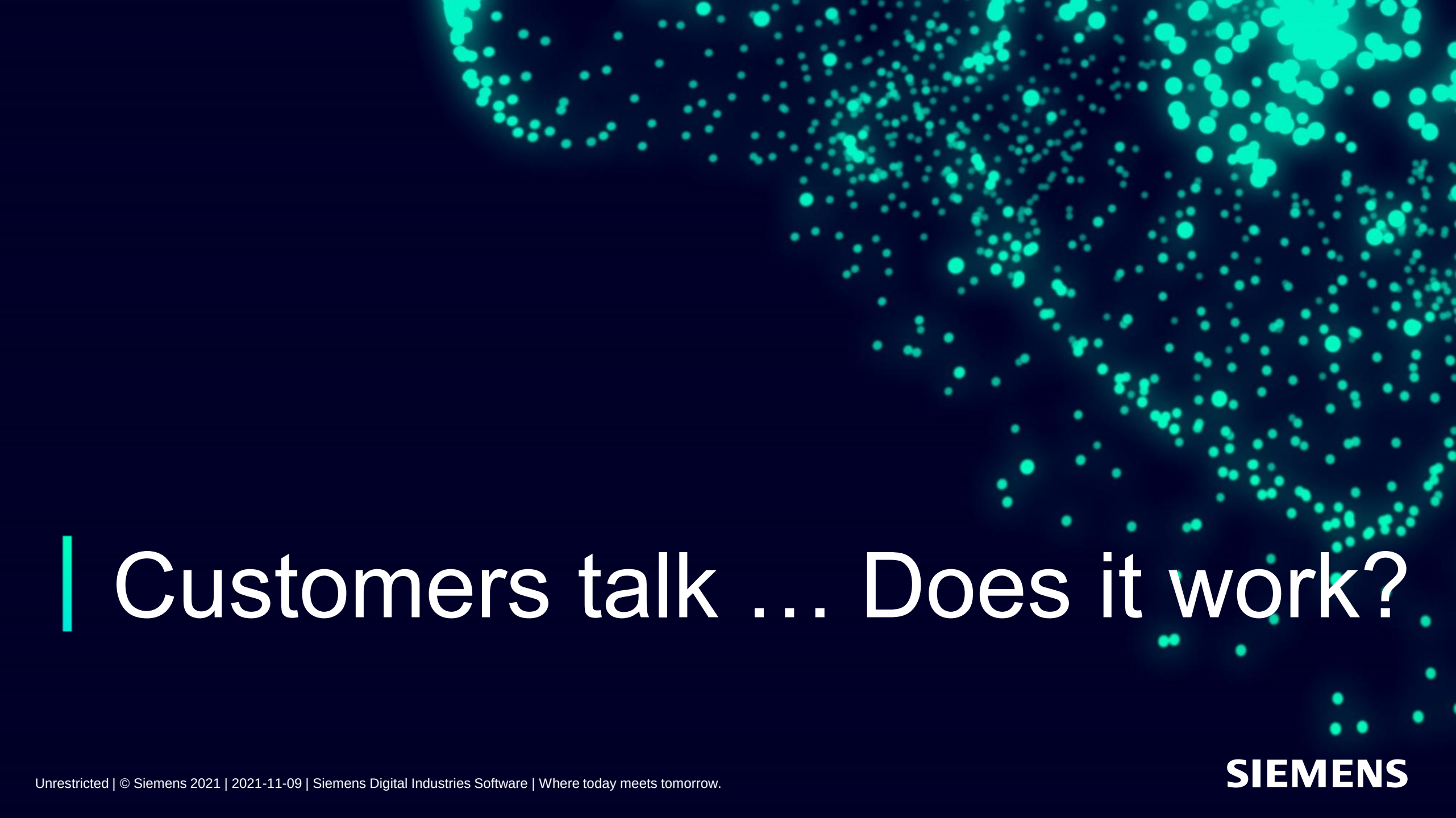
SIEMENS

# Summary

| | |
|---|---|
| **Digitalize BOM Quoting** | ➢ Optimize time for quoting to avoid making it the bottleneck<br>➢ Increase quoting accuracy by direct Supply Chain connection |
| **Accelerate NPI** | ➢ Decrease engineering lead-time and effort using single tool<br>➢ Eliminate redundant work with Learning Libraries & Automation |
| **Increase line utilization** | ➢ Increase through-put making first time right machine programs and rules driven automatic machine shape generation<br>➢ Increase asset utilization looking for family setups |
| **Product portability** | ➢ Increase flexibility with easy conversion of machine programs and machine libraries from one machine brand to another<br>➢ Secured project exchange between different production sites |



SIEMENS



# Customers talk … Does it work?



SIEMENS

## Solution

**Valor Process Preparation**
**Valor BOM Connector**
**Valor Parts Library**

Adopt automation solutions from Siemens to help quicken preparation times and streamline the quotation process.

Layout errors and incorrect assemblies

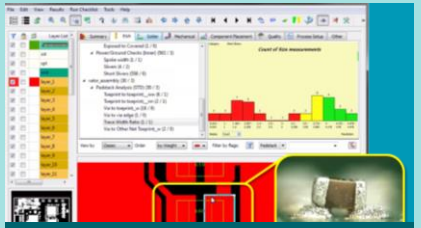
**+10%** Accelerated SMT process

**+30%** Stencil preparation quicker

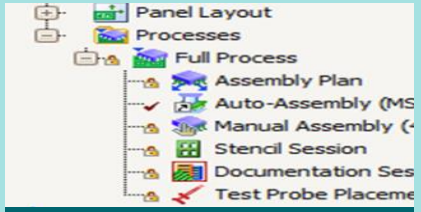

## SOLUTION

Improved NPI time and cost, standardized engineering flow and tools, and improved global manufacturing flexibility

## INTEGRATED SOLUTION: **LEAN NPI**



Manufacturability Analysis

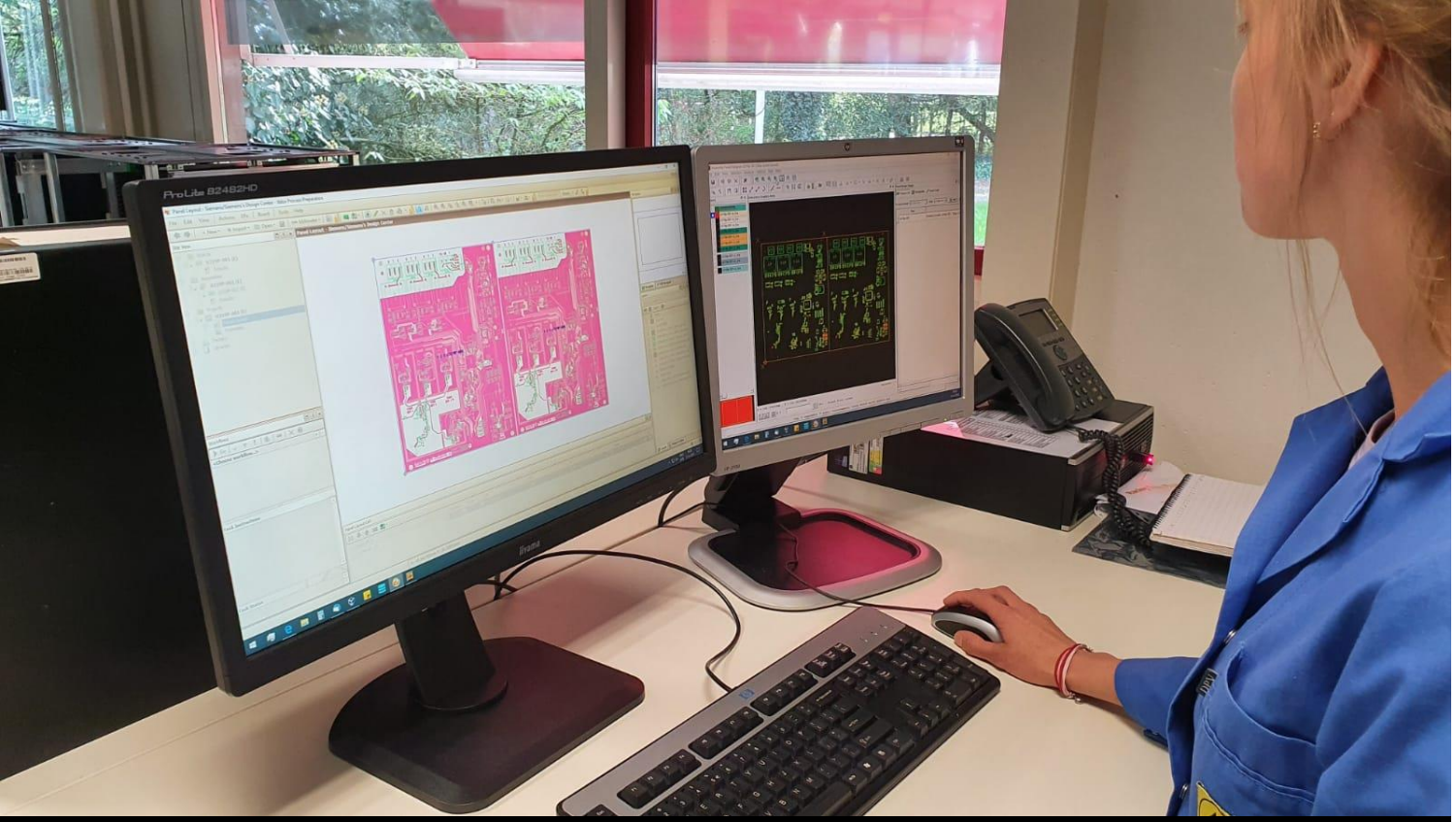



PCB Process Planning

**40%** ENGINEERING TIME SAVED

**50%** NPI TIME SAVED

**$0.4M** ANNUAL SAVING



“We won 50% of our time. What we use to do in 2-3 days, we can do in 0,5-1 day, and half the manpower is required: operators that were used for repetitive tasks can now shift to more specialized tasks.”

Minno de Roo, Director, Punthronix

Phuntronix

SIEMENS
Ingenuity for life

## Solution

Valor Process Preparation

**The entire NPI process runs smoother, more effective and much faster.**

**+50% NPI process speed**

**25% reduced downtime**

**30% shorter lead time**

# What is next? Think About this …

80% of manufacturing costs are materials

Good material management system can reduce material inventory with 1 to 3%

But… supply chain prices can vary up to 30%

So …If 250K€ investment to reduce material inventory and save 1 to 3% on material cost, is a valid ROI argument

How about investing less than 20K€ to reduce 10% on material cost?

To improve is to change and to be perfect is to change often.

Winston Churchill



SIEMENS

# Contact

**Jean Paul Dirven**

**jean-paul.dirven@siemens.com**

**+32 477 70 98 21**



SIEMENS