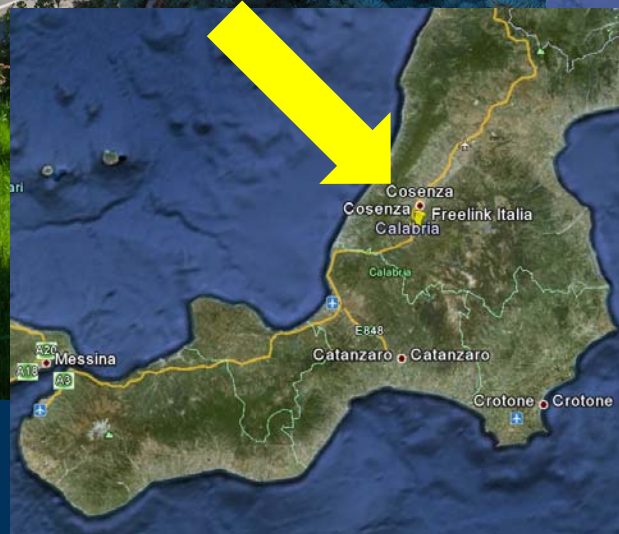


Freelink Italia S.r.l.

High Tech and Electronic Manufacturing Solutions

Shuki Segal
COO

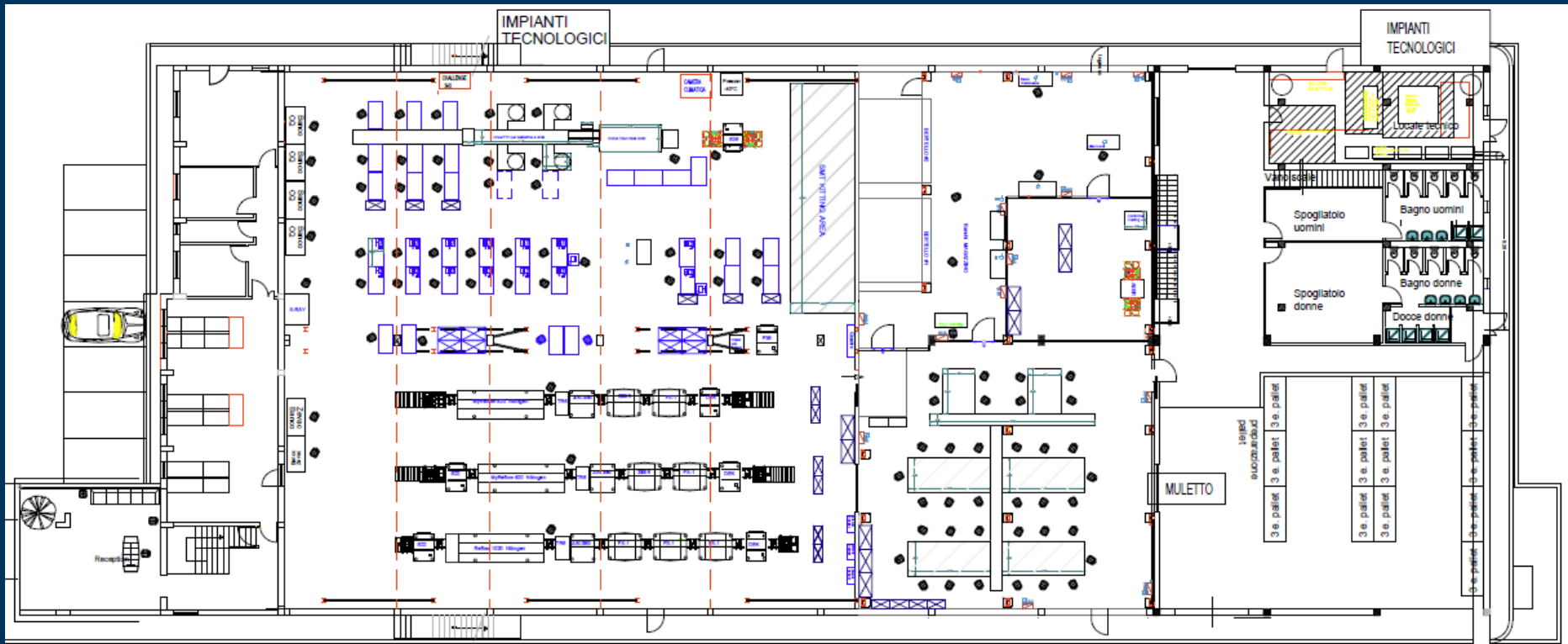
Freelink Italia – Located in Calabria



Freelink Italia – Designed as DR production facility for Israeli Electronic Industry



Piano-Lago – Production Plant



Electronics Manufacturing Introduction

Material



Setup



WIP

Label



**Inspection
and Repair**



Genealogy



Manual Assembly



Production capability Manufacturing lines

- ▶ Three SMD lines organized to fulfil more requirements:
 - ▶ Prototyping and small series
 - ▶ Medium volumes
 - ▶ High volumes
- ▶ One PTH line organized to fulfil more technologies:
 - ▶ PTH
 - ▶ PTH plus SMD
- ▶ Manufacturing capabilities:
 - ▶ 189.500 components per hour according to IPC 9850
 - ▶ 758.000.000 components per year according to IPC 9850
 - ▶ The estimation of our actual manufacturing capability, based on a standard product with 100 SMD components top and bottom, is of 3.500.000 ÷ 4.000.000 products / year

SMD Line A

- ▶ Dedicated to prototyping and small series
- ▶ Productivity (IPC 9850): 39.500 cph
- ▶ Set up:
 - ▶ 1 serigraphic machine with 2D serigraphy inspection
 - ▶ 2 Chip shooter with one head
 - ▶ 1 Pick&place
 - ▶ 1 Oven
 - ▶ 1 AOI Inspection system
 - ▶ Automatic load/unload and pass through



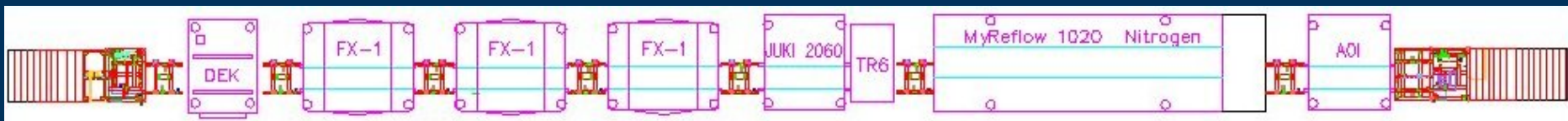
SMD Line B

- ▶ Dedicated to medium volumes
- ▶ Productivity (IPC 9850): : 62.500 cph
- ▶ Set up:
 - ▶ 1 serigraphic machine with 2D serigraphy inspection
 - ▶ 2 Chip shooter with two heads
 - ▶ 1 Pick&place
 - ▶ 1 Oven
 - ▶ 1 AOI Inspection system
 - ▶ Post reflow AOI
 - ▶ Multirack automatic load/unload and pass through



SMD Line C

- ▶ Dedicated to high volumes
- ▶ Productivity (IPC 9850): 87.500 cph
- ▶ Set up:
 - ▶ 1 serigraphic machine with 2D serigraphy inspection
 - ▶ 3 Chip shooter with two heads
 - ▶ 1 Pick&place
 - ▶ 1 Oven
 - ▶ 1 AOI Inspection system
 - ▶ Post reflow AOI
 - ▶ Multirack automatic load/unload and pass through



Quality and process control

- ▶ Defects prevention (ZDP – Zero defect process)
 - ▶ Material incoming inspection with conformity control
 - ▶ Thermal components soaking
 - ▶ Smart system for soldering pastes stocking
 - ▶ Ultrasonic stencil and board washing machines
- ▶ In-line controls:
 - ▶ 2D automatic paste on pad verification machine
 - ▶ 2D automatic stencil aperture clogging verification machine
 - ▶ Oven thermal control profiler
 - ▶ Post reflow AOI (on a sampling basis for real time feed-back)
- ▶ Off-line controls:
 - ▶ 3D automatic paste on pad inspection (API) machine
 - ▶ X-Ray automatic inspection (AXI)
 - ▶ Post reflow AOI verification (100% basis of boards)
 - ▶ 2D and pseudo3D optical vision systems



Traceability

- ▶ 3 automatic warehouses with WM (Warehouse management) SW and with a load capacity of 16.000 different codes
- ▶ 800 smart feeders with RFID technology
- ▶ Marking systems:
 - ▶ Bar codes printers
 - ▶ 2D laser marking
- ▶ In-line and off-line bar codes readers
- ▶ Specific software to:
 - ▶ Identify manufactured quantities for material management
 - ▶ Identify defectiveness for QC feedback
 - ▶ Identify unproductive activities to set up corrective actions to increase effectiveness and throughput of process
 - ▶ Identify the throughput, restart time, working time of each system in order to optimize them
 - ▶ Collect and trace data of all process related to quality and configuration of each product of each manufactured batch.



MES Solutions

Process Traceability



Kitting

Screen
Printing



API – Paste
Inspection



SMT
Placement



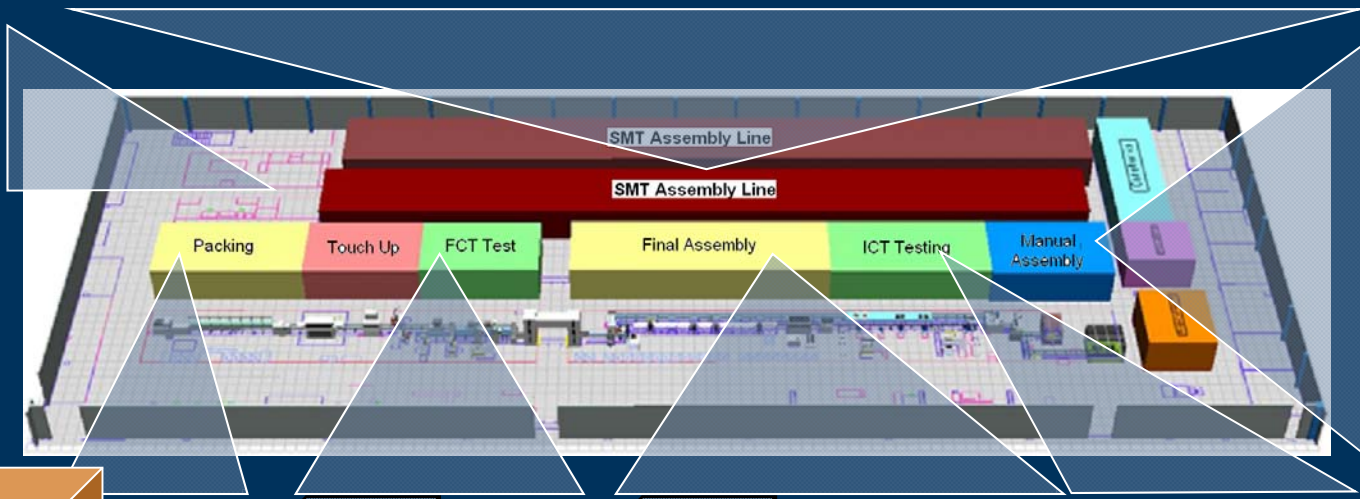
Reflow
Soldering



AOI
Post Reflow



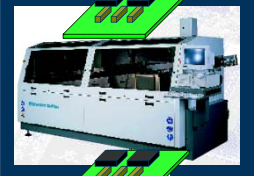
AOI
Repair



PTH
Assy



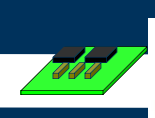
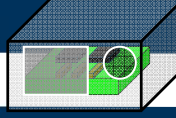
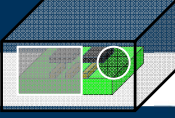
Wave



AOI
Post Wave



Shi



AOI
Repair

Packaging

FT
Diagnostics

Functional
Test

Assembly
Repair

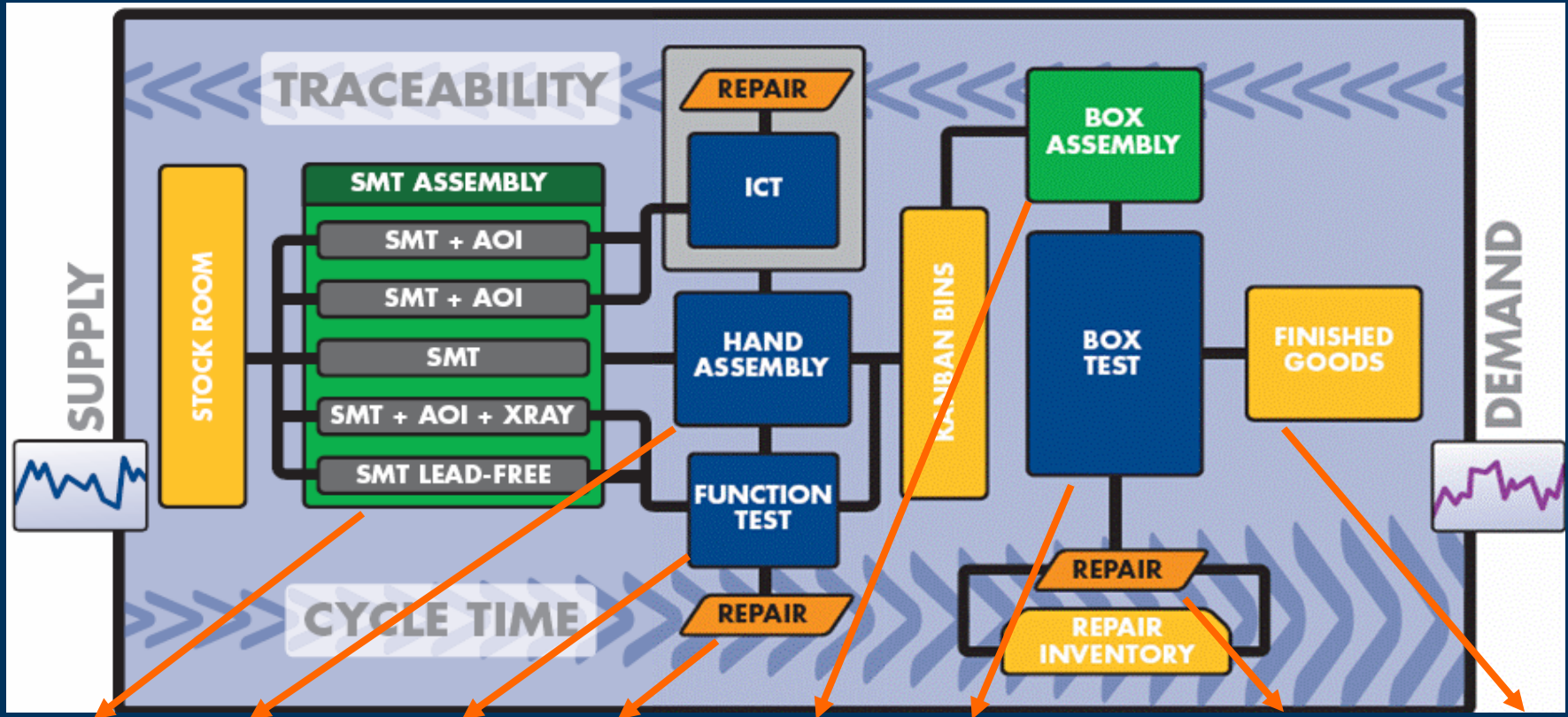
Final
Assembly

ICT
Repair

ICT

MES Solutions

Material Traceability



SMT Assembly
PCB, S/N, Paste,
Components, MSD



PTH Assembly
Solder,
Components



Functional Test
Software,
Firmware



Repair
Replaced
Component



BOX Assembly
PCB / BOX S/N,
Components
(TFT, Display)



Functional Test
Software,
IDs, License



Box Repair
Replaced PCBs,
Mech. Components

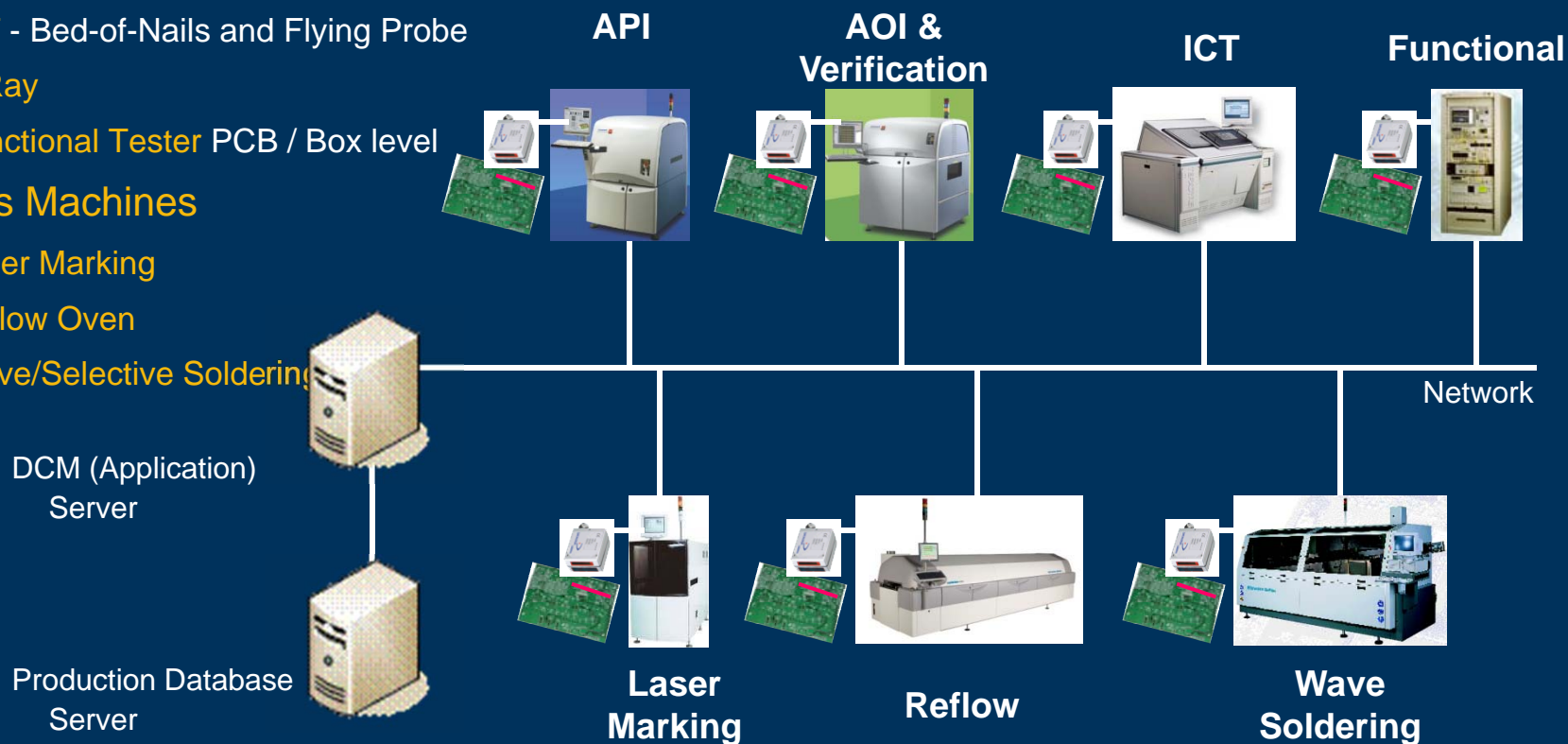


Packaging
Add-On,
Custom S/N
License

Production – Automatic Data Collection

DCM Interface examples

- ▶ **DCM** – Data Collector Module
- ▶ **Tester** – Test Report automatically collected and parsed
 - ▶ **API** – Automatic Paste Inspection
 - ▶ **AOI** – Automatic Optical Inspection
 - ▶ **ICT** - Bed-of-Nails and Flying Probe
 - ▶ **X-Ray**
 - ▶ **Functional Tester** PCB / Box level
- ▶ **Process Machines**
 - ▶ **Laser Marking**
 - ▶ **Reflow Oven**
 - ▶ **Wave/Selective Soldering**



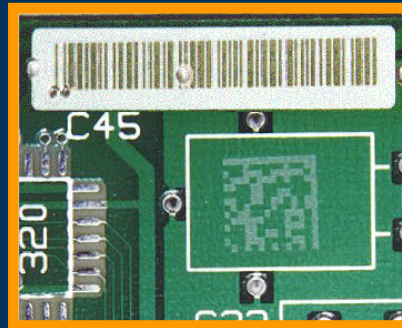
Unique Identifiers & Barcode

► Unique Identifiers & Barcodes

- Material
- Resources
- Operators
- Locations

Material

PCB



Reels, Sticks



Resources

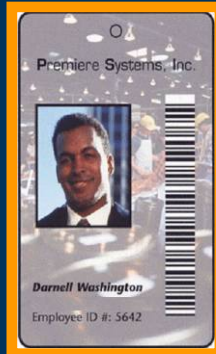
Machines, Slots, Feeders



Locations

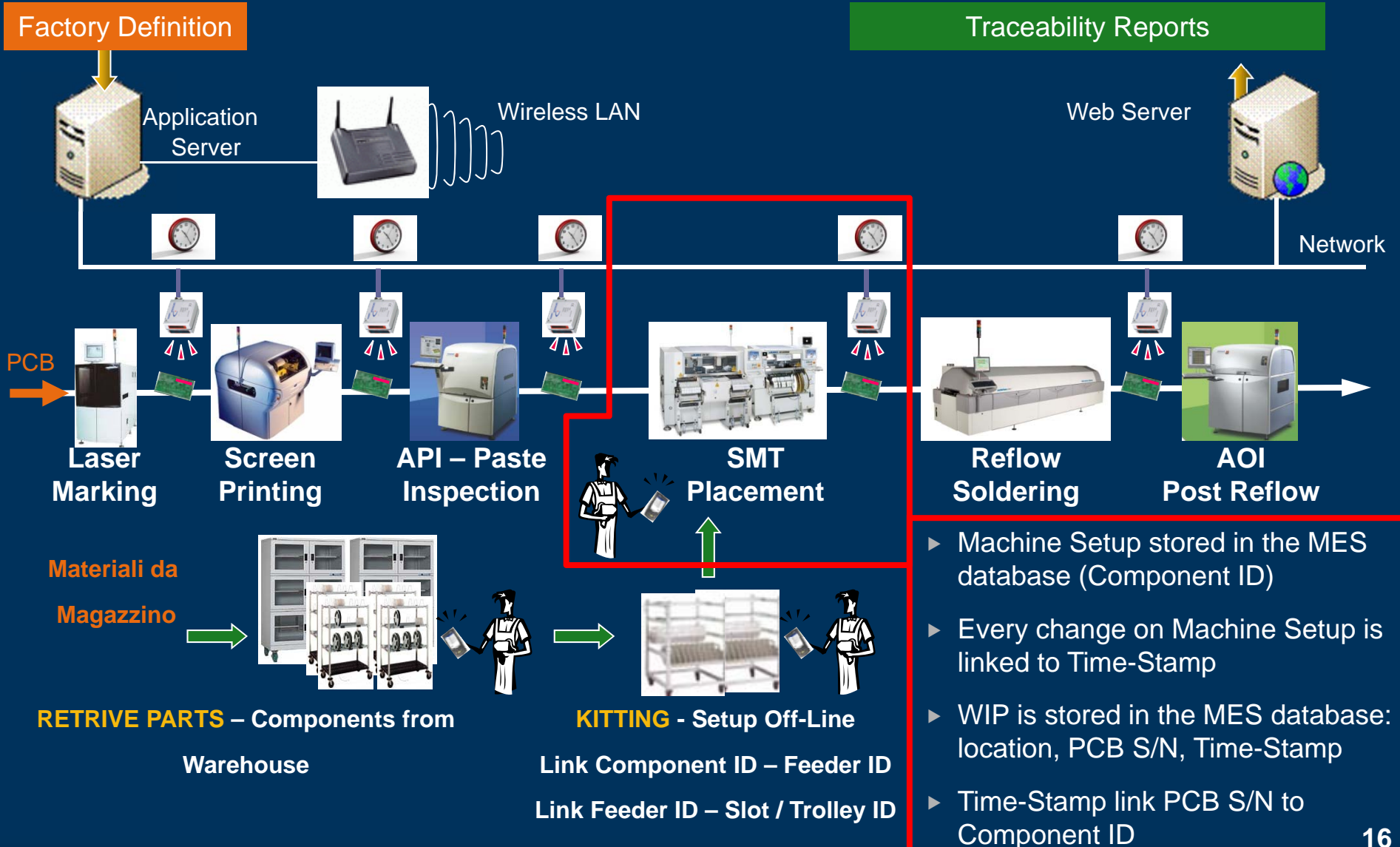


Operators



Traceability

Link PCB S/N to Component ID



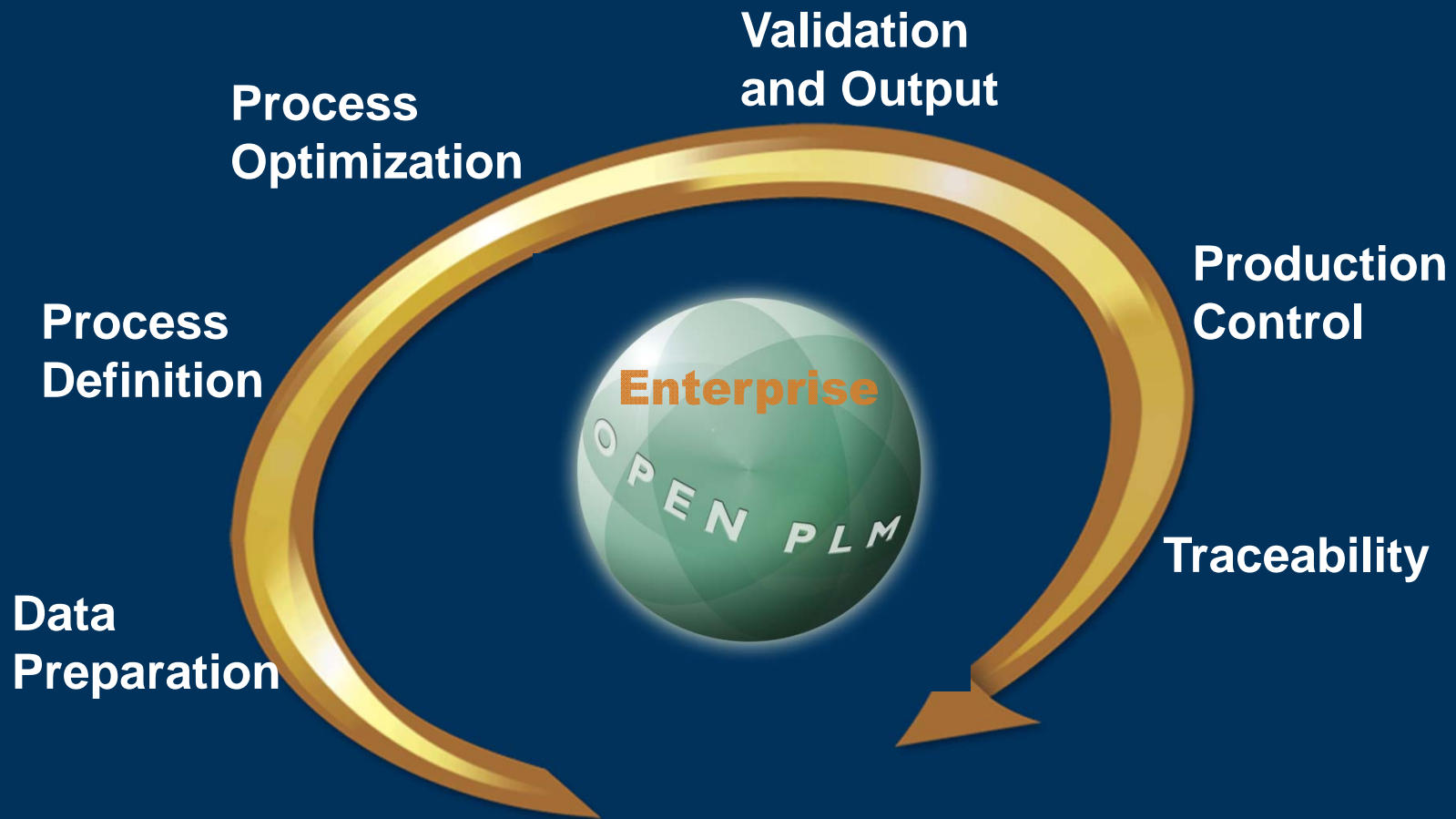
High Tech & Electronics Digital Manufacturing Solutions

- ▶ Most commonly used **NPI** solution for PCB Assembly
- ▶ Dedicated **MES** solution designed for the Electronic Industry



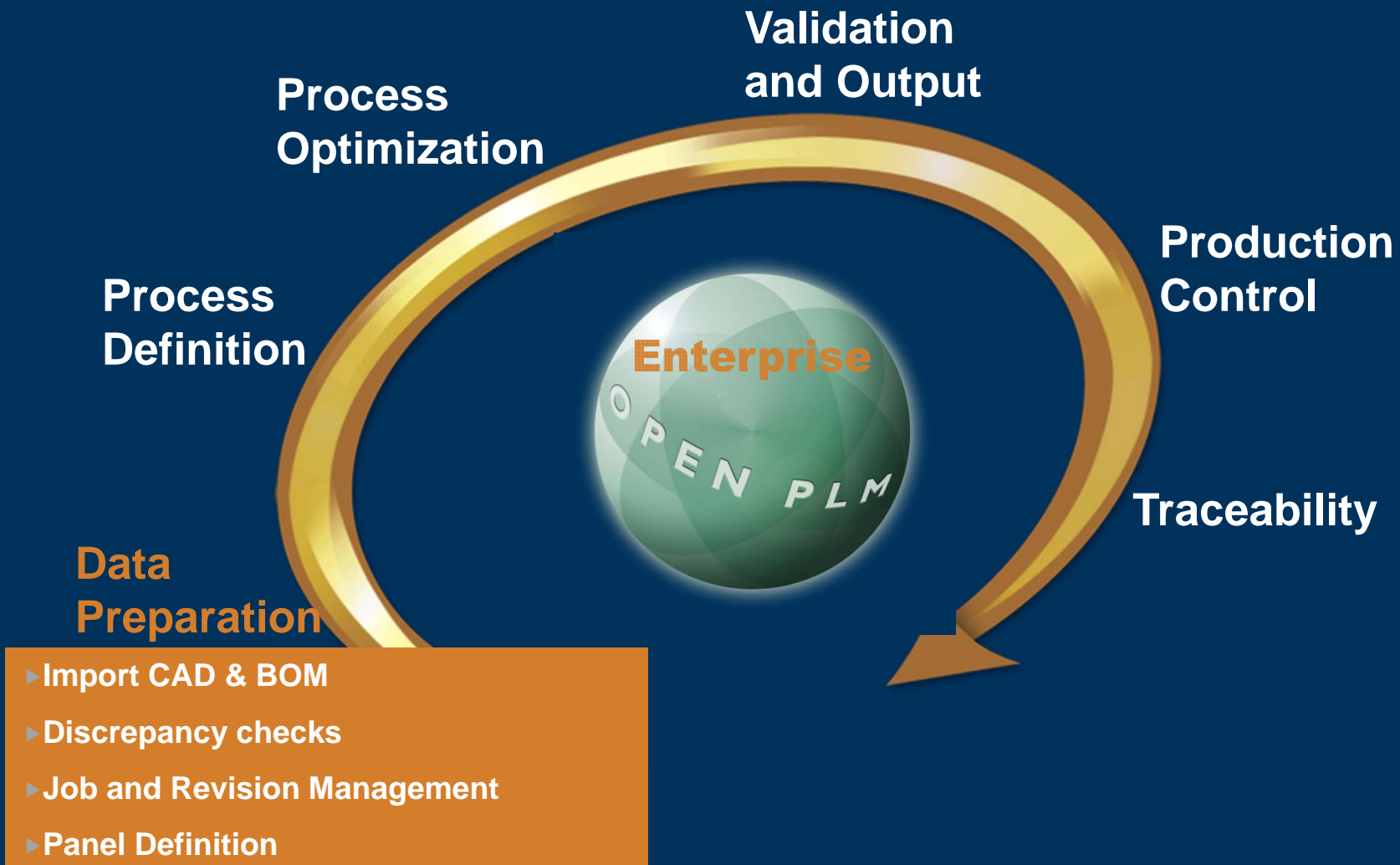
Solutions for Electronic Industry

The Manufacturing Process



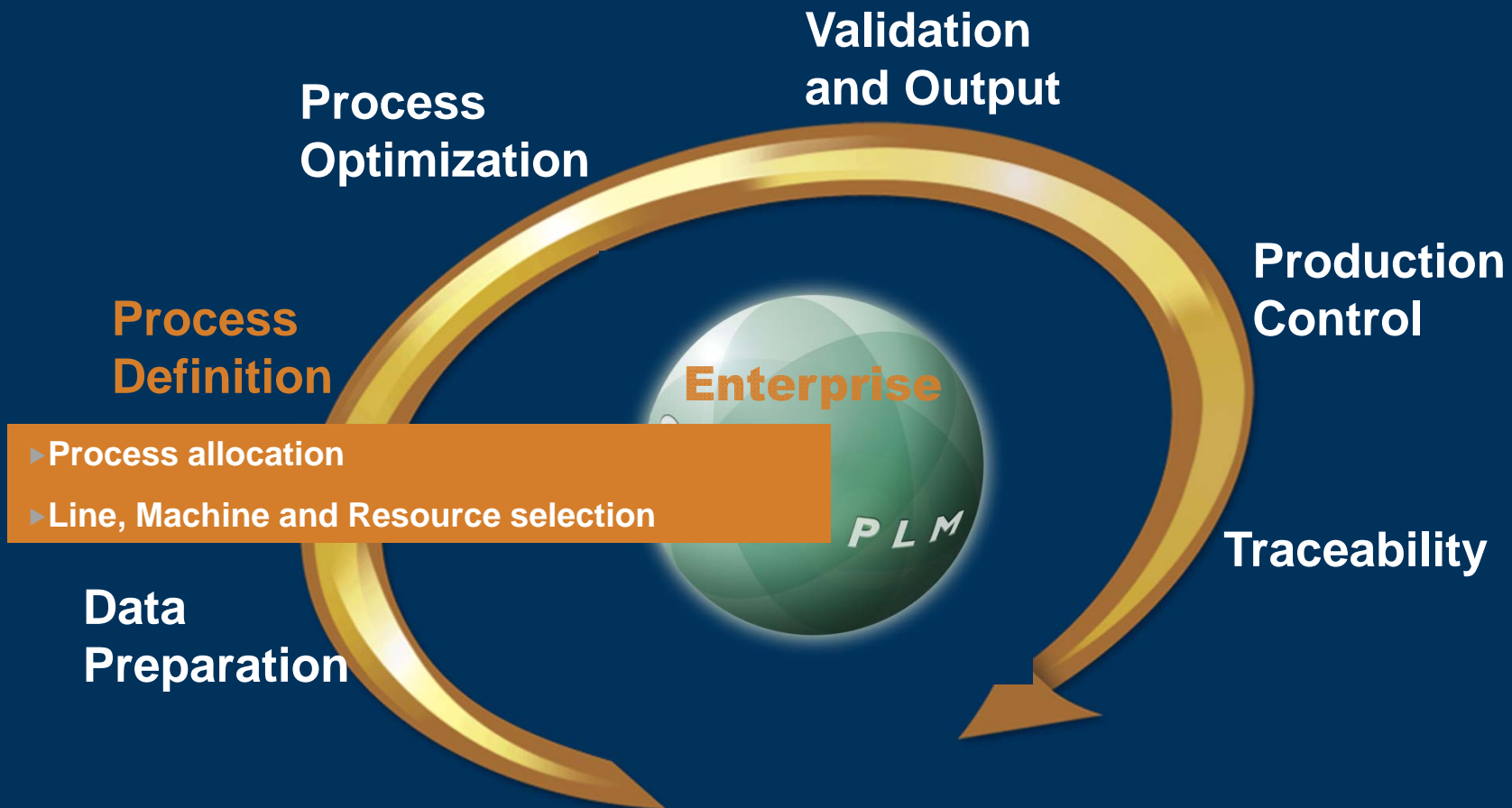
Solutions for Electronic Industry

The Manufacturing Process



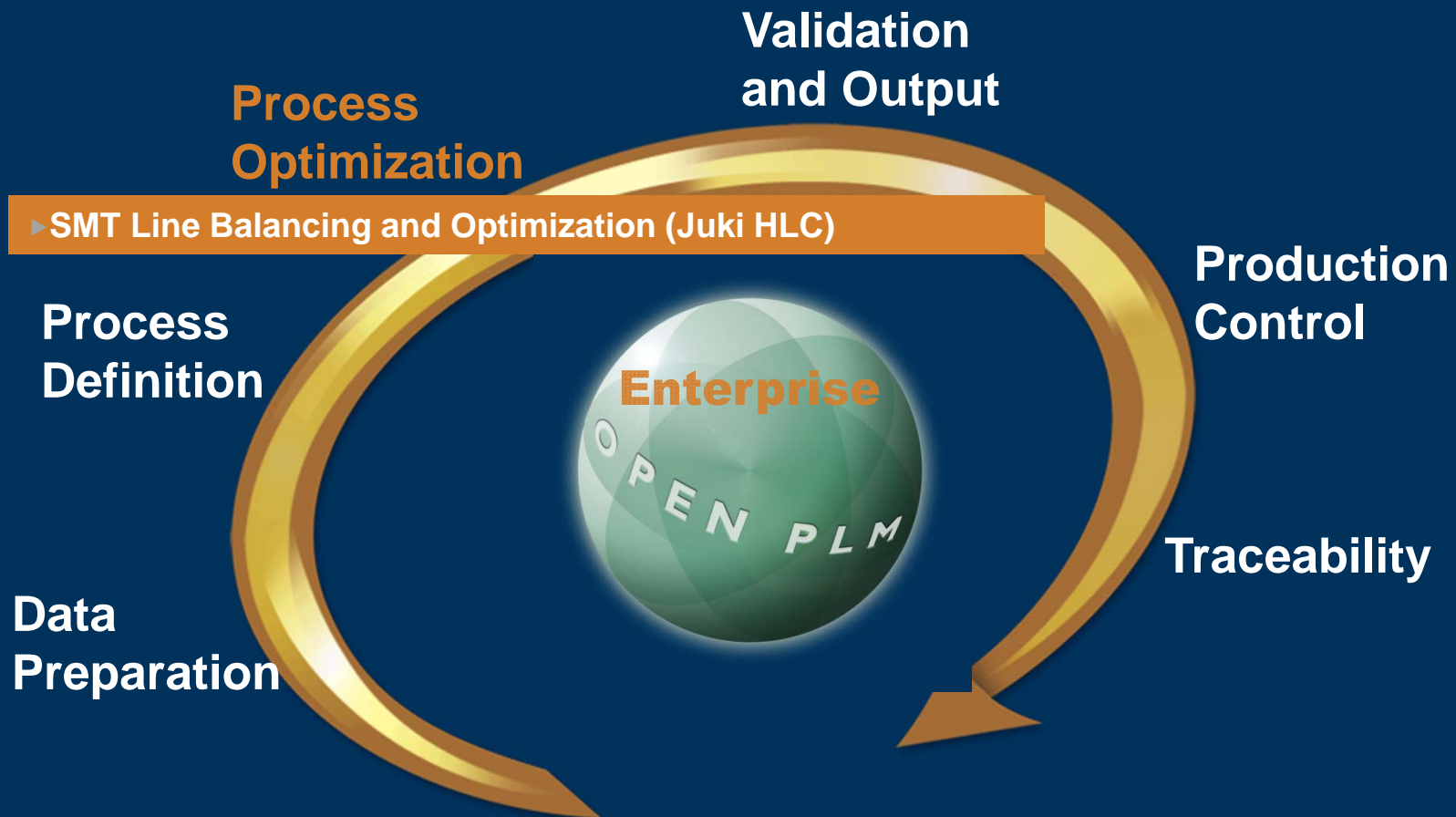
Solutions for Electronic Industry

The Manufacturing Process



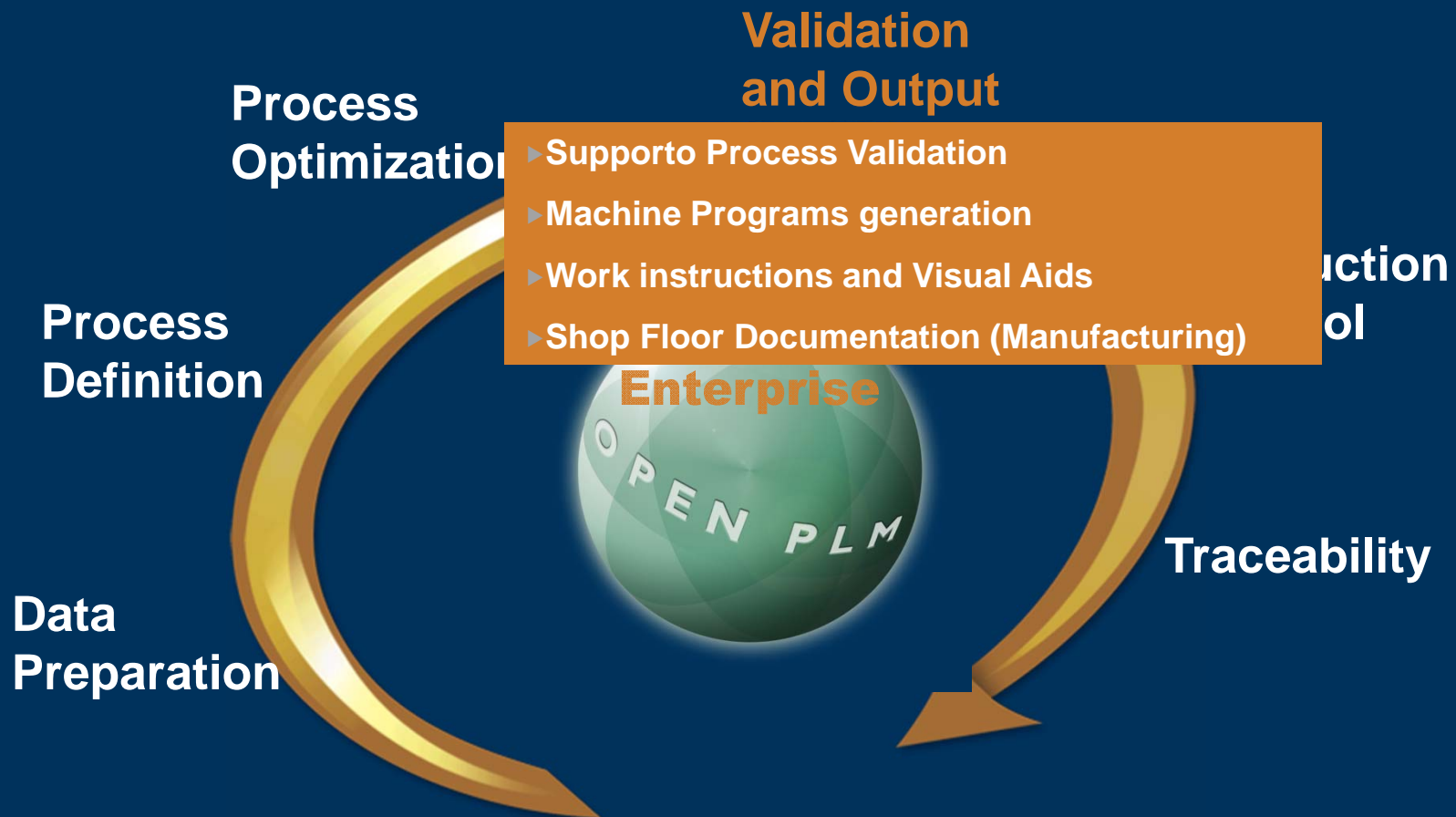
Solutions for Electronic Industry

The Manufacturing Process



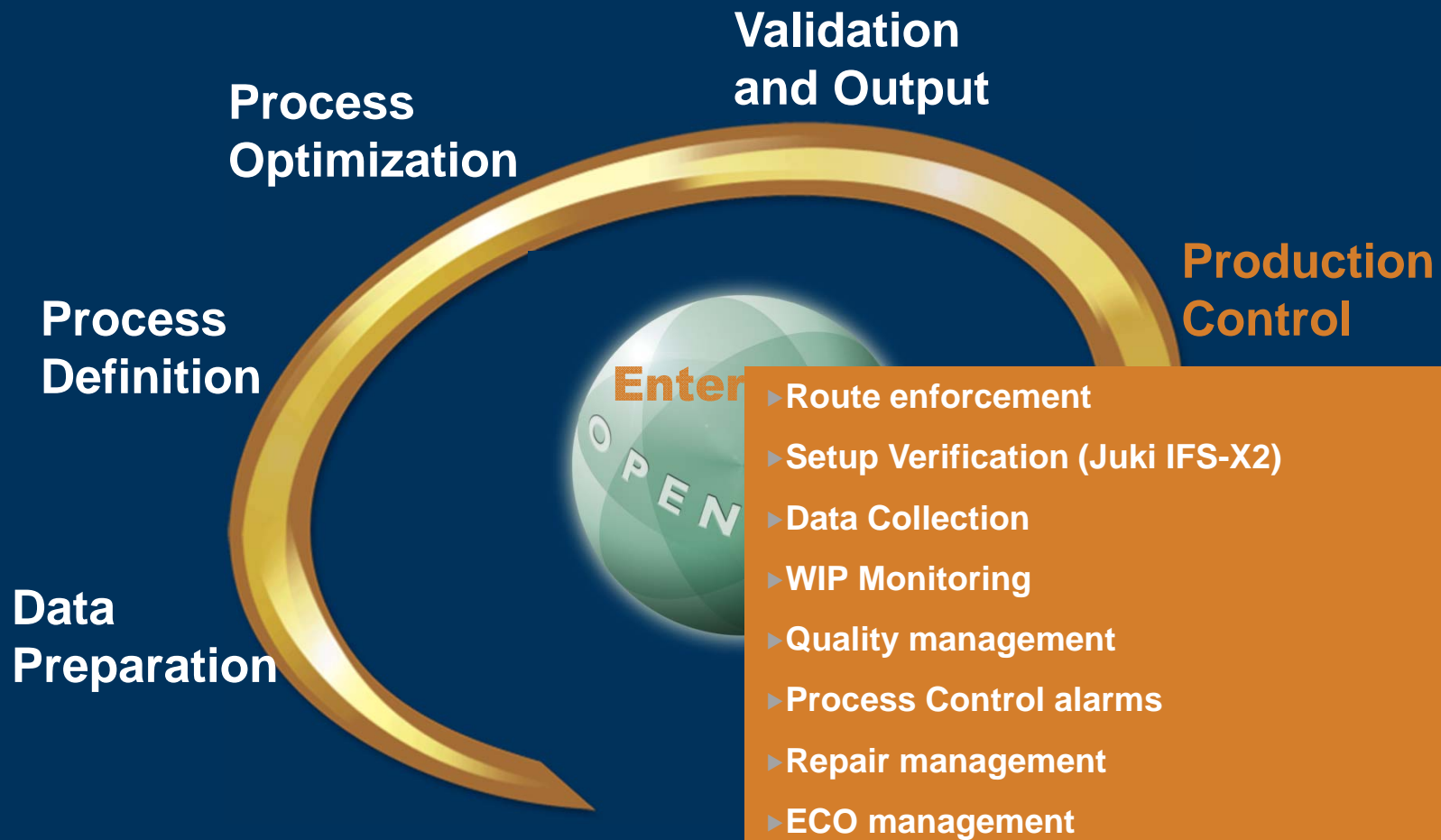
Solutions for Electronic Industry

The Manufacturing Process



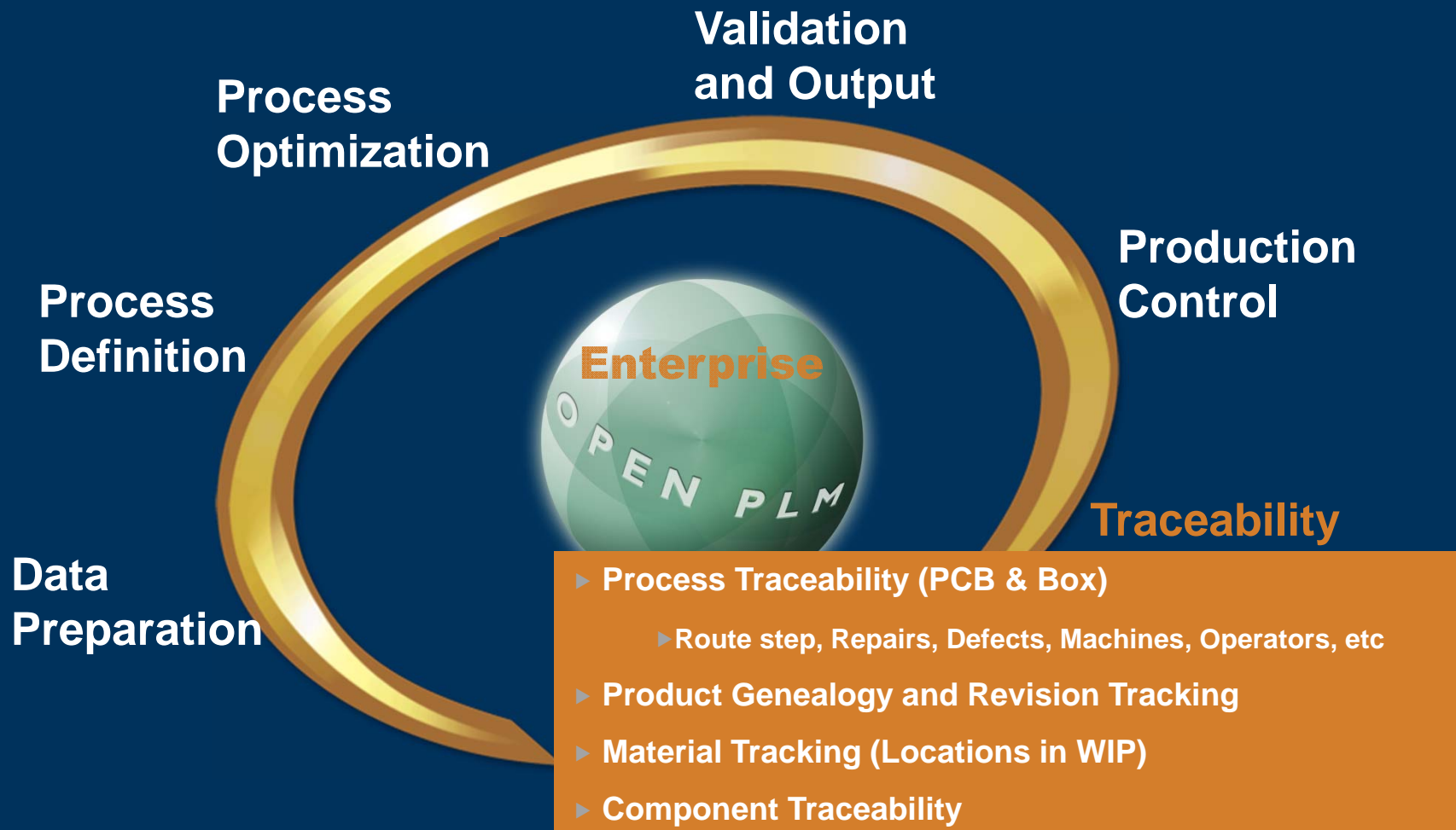
Solutions for Electronic Industry

The Manufacturing Process



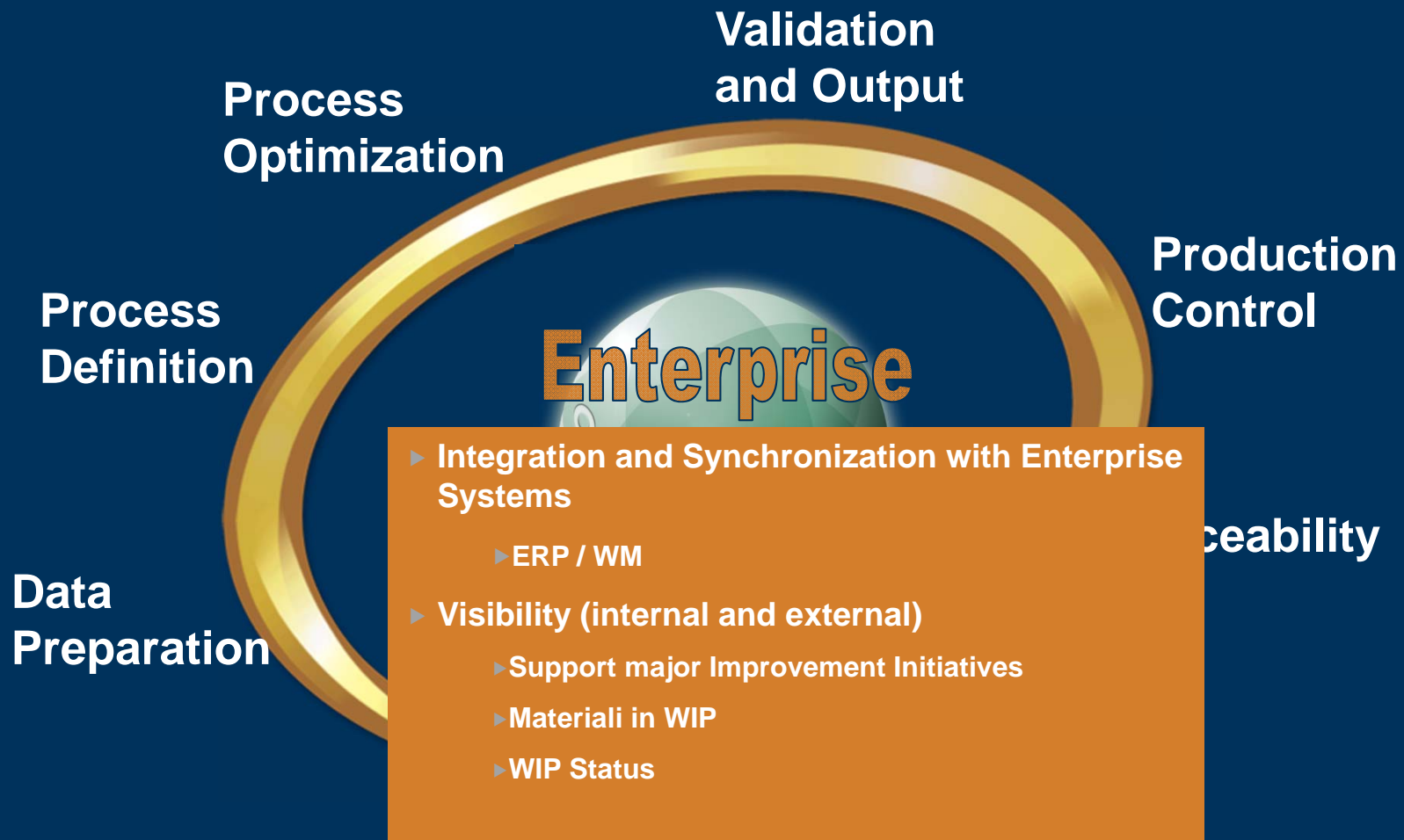
Solutions for Electronic Industry

The Manufacturing Process

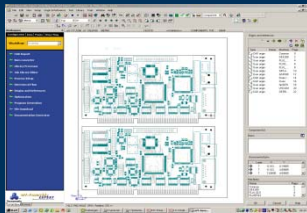


Solutions for Electronic Industry

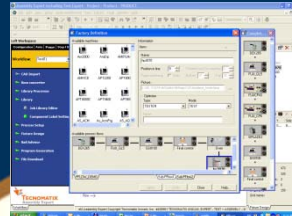
The Manufacturing Process



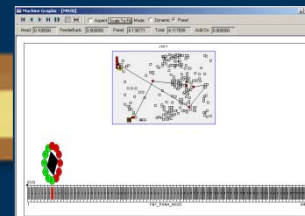
**Panel Definition
Origin & Fiducial**



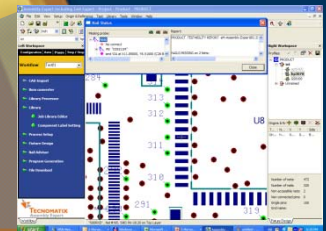
**Process Definition
Assembly & Test**



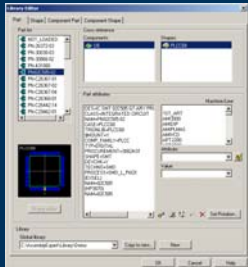
**SMT Assembly Area
Programs**



**DFT
Fixture Design
Programs: ICT
AOI, X-Ray, ...**



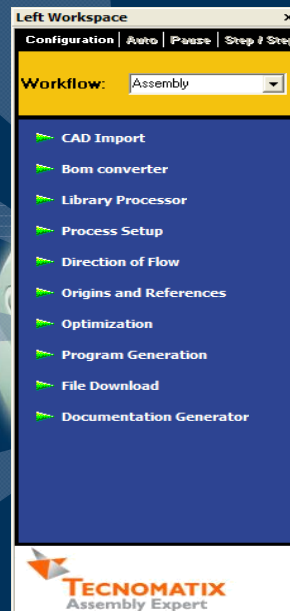
**Library
Management
P/N & Shape**



**Import CAD & BOM
Link to Schematics**



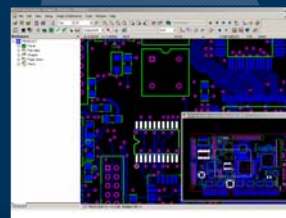
**Configurable
Workflow**



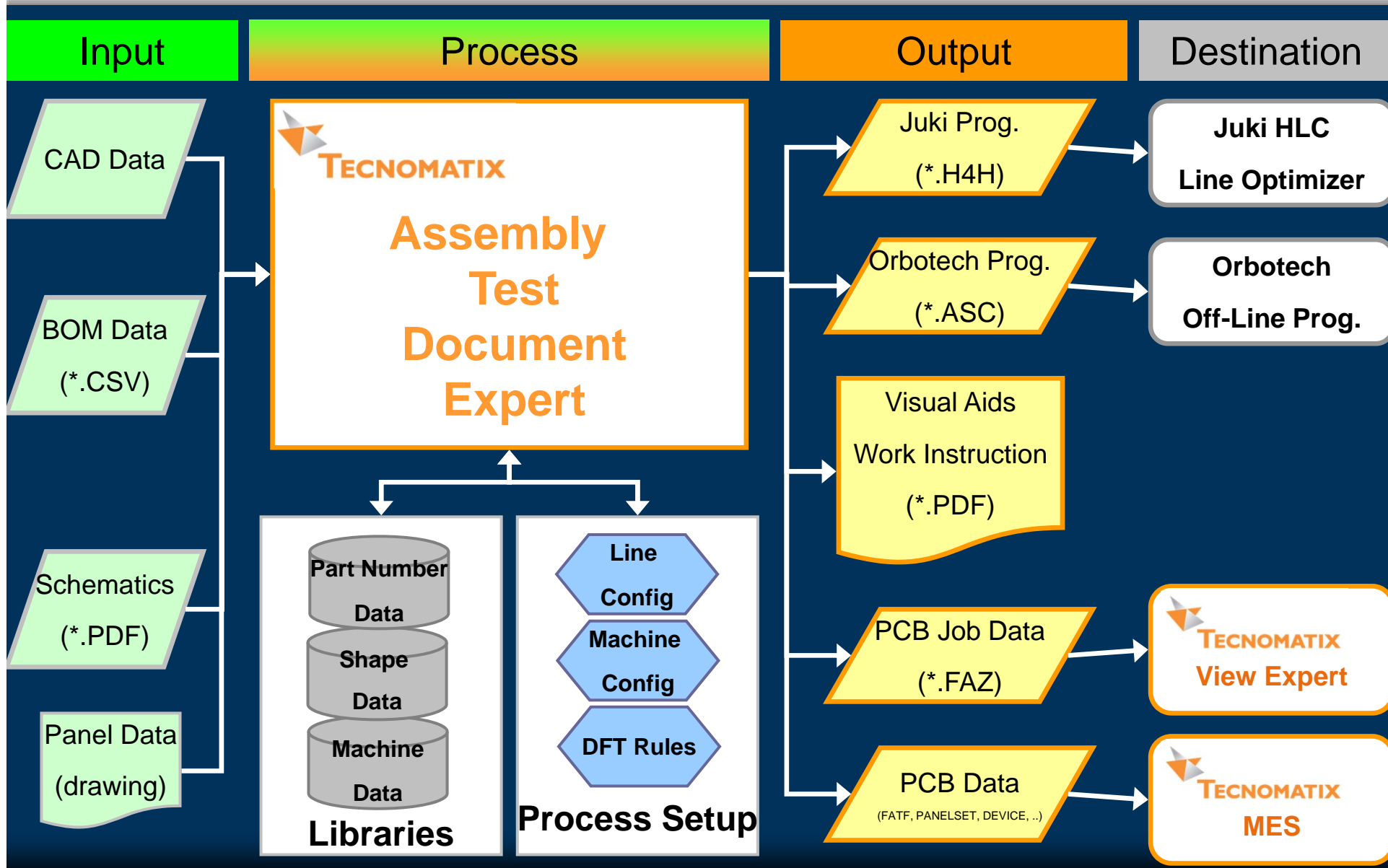
**Visual Aids
Shop Floor Doc.**



**View, Navigate
& Distribute**



Phd – Assembly Expert NPI Process



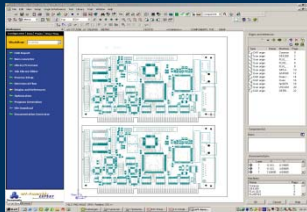
NPI – Optimization and Line Balancing Machine Interfaces

- ▶ **150+** Machine Models supported
- ▶ Parametric Optimizers for top SMT machine models
- ▶ ICT Tester (bed-of-nails / Flying Prober) interface, AOI, X-Ray, etc.

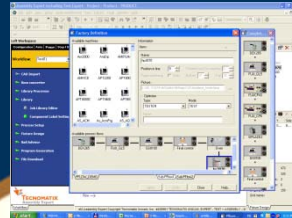


NPI - DFT & ICT Testing

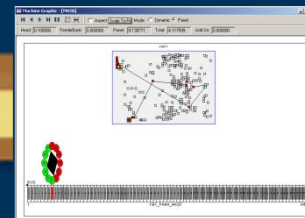
**Panel Definition
Origin & Fiducial**



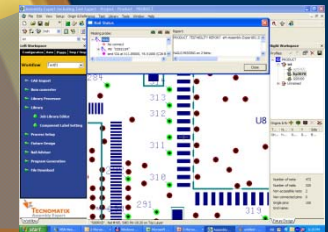
**Process Definition
Assembly & Test**



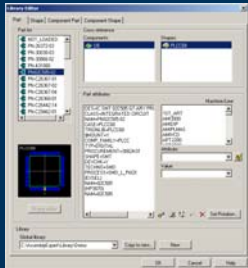
**SMT Assembly Area
Programs**



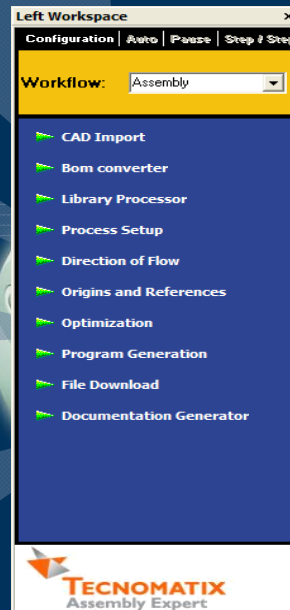
**DFT
Fixture Design
Programs: ICT
AOI, X-Ray, ...**



**Library
Management
P/N & Shape**



**Configurable
Workflow**



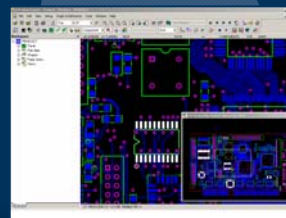
**Visual Aids
Shop Floor Doc.**



**Import CAD & BOM
Link to Schematics**



**View, Navigate
& Distribute**

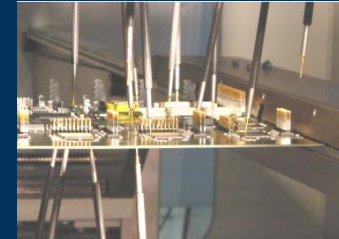


NPI - DFT & ICT Testing

ICT Tester Interfaces

- ▶ Automatic generation of **Input List (recipes)**
- ▶ **Wide range of Interfaces** available for most used **ICT Testers**
- ▶ **Development** of new interfaces

**Flying
Probe Test**



**ICT
MD**



BSL RISLANG Bare Board
BSL RISLANG Loaded Board
CONCORD TECHNOLOGY
FACTRON BDL
FAIRCHILD CATGEN
GENRAD ADSF
GENRAD CKT
GENRAD SHORT WIRE
GENRAD UIP
Agilent HP3065
Agilent HP3070
HUNTRON
IFR (ex Marconi) CB
INNOVATE 9000
INTEGRI-TEST



ITA Scorpion PBA
JET
KTS 2005i
MARCONI INCITE
MTS 10
OKANO
OKANO FA931
PHILIPS MDA
POLAR
RHODE & SCHWARZ
SCHLUMBERGER BDL
SEICA
SHINDENSHI EXSEL
SPEA
SPEA v2



SYNOR 3500F
TAKAYA APT2200
TAKAYA APT 8000
TAKAYA APT 8000C
TAKAYA Bare Board
TECNOST 8000
TECNOST ICT84
TECNOST WPV 680
TERADYNE L200/300
TERADYNE Z1800
TERADYNE Z8000
TESCON Flying Prober
TRI
WAYNE KERR
ZEHNTel Z800



NPI - DFT & ICT Testing

AOI AXI API Testers Interfaces

- ▶ Automatic generation of **Input List (recipes)**
- ▶ **Wide range of Interfaces** available for most used **AOI, API AXI Testers**
- ▶ **Development** of new interfaces

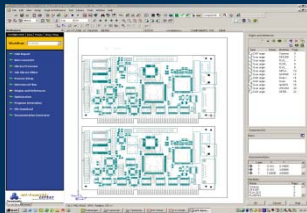


- CXI-3600
- GS Luminonics
- HP 5DX
- IRSI
- MVP
- MVT

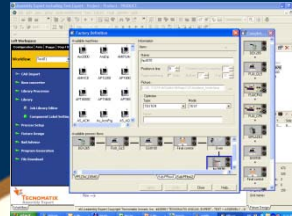
- Omron
- Schuh/Orbotech
- VI Technology
- Viscom
- Teradyne Optima 7200
- Teradyne Optima 7300

NPI – Shop Floor Documentation

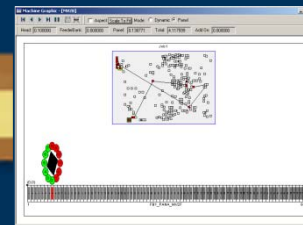
**Panel Definition
Origin & Fiducial**



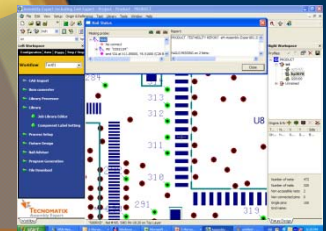
**Process Definition
Assembly & Test**



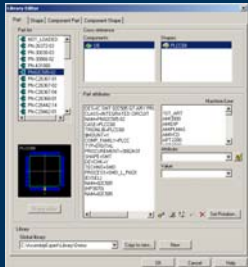
**SMT Assembly Area
Programs**



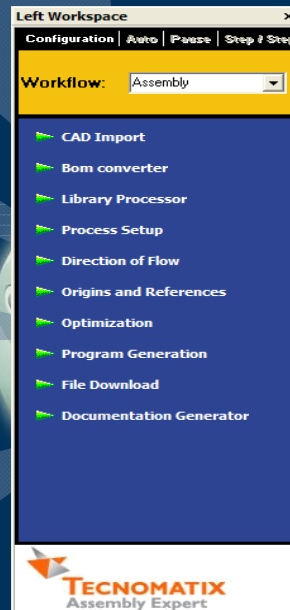
**DFT
Fixture Design
Programs: ICT
AOI, X-Ray, ...**



**Library
Management
P/N & Shape**



**Configurable
Workflow**



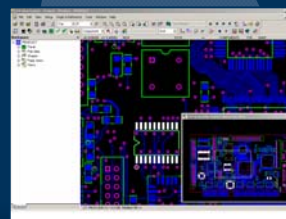
**Visual Aids
Shop Floor Doc.**



**Import CAD & BOM
Link to Schematics**



**View, Navigate
& Distribute**



Technological capabilities

- ▶ Components:
 - ▶ Passives from 0201
 - ▶ CSP
 - ▶ QFN
 - ▶ uBGA
 - ▶ THT
 - ▶ Mechanical custom
 - ▶ ...
- ▶ Feeders
 - ▶ Tape and reel
 - ▶ Jedec trays
 - ▶ Sticks
 - ▶ Bulk
- ▶ Lead-free soldering in inert atmosphere ($O_2 < 100$ ppm)
- ▶ Conformal coating
- ▶ Panels automatic routing (CNC router)
- ▶ Ultrasonic plastic welding system



Technological capabilities

Manufacturer	Model	Type	Q.ty
JUKI	FX-1R	chip shooter pick and place machine	5
JUKI	KE2050RL	flex mouter pick and place machine	2
JUKI	KE2060RL	flex mouter pick and place machine with vision recognition system	3
DEK	HORIZON 03	solder paste printing machine	3
ORBOTECH	S22 VANTAGE	Post reflow 3d aoi system	2
ORBOTECH	S36	Post reflow 3d aoi system	1
IPTE	BAT LASER CELL	laser marking system	1
ORBOTECH	P36	2D and 3D POST-PASTE AOI SYSTEM	1
X-TEK	REVOLUTION	X-Ray Insplection system	1
VITRONICS-SOLTEC	MYREFLOW 820	10 zones reflow soldering oven	2
VITRONICS-SOLTEC	MYREFLOW 1020	12 zones reflow soldering oven	1
ZEVATECH	Onyx 29	Off-line rework station	1
DIMA SMT SYSTEMS	HC200	4-axis conformal coating system	1
TMS	HS 04-3000	Lead free wave soldering system	1

Technological capabilities

Manufacturer	Model	Type	Q.ty
VISION ENGINEERING	LYNX	Stereo Zoom Microscope with Patented Eyepieceless Optics	1
VISION ENGINEERING	MANTIS ELITE	Mid Magnification Stereo Microscope	3
VISION ENGINEERING	VS7	SMT inspection Dynascope system	
BRANSON	2000X	Customized ultrasonic plastic welding system	1
BERTELLO	VERTIMAG H	Automated vertical warehousing system with thermal and humidity control system	2
BERTELLO	VERTIMAG L3	Automated vertical warehousing system	1
BT SR INTERNATIONAL	AFD2000	Solder paste refrigeration system	1
ANGELOANTONI	CHALLENGE 340	Climatic chamber for msl	1
THERMOTRON	SM-32S	Climatic chamber	1

Technological capabilities

Manufacturer	Model	Type	Q.ty
Agilent	8960 Series 10 E5515C	Wireless Communications Test Set	2
Rohde & Schwarz	CMD55	Digital Radiocommunication Tester	5
Rohde & Schwarz	CMU-Z10	Antenna coupler/RF Shielding cover 900 MHz/1700 MHz to 2200 MHz	1
Hewlett Packard	33120	15 MHz Arbitrary Waveform Generator	1
Rohde & Schwarz	AFGU	Function generator in the frequency range	1
Hewlett Packard & Agilent	Various models	DC power supply	10
Hewlett Packard & Agilent	Various models	Digital Multimeter	10

IFS - Intelligent Feeder System

- ▶ IFS-X system uses RFID technology
- ▶ Traceability is conducted by intelligent feeders system, which store component data such as part number, quantity, and lot number
- ▶ Through automated part recognition, closed-loop system minimizes setup time and prevents human errors



FREELINK *Italia*
a CROW Company

***...Realizing Your
Manufacturing Vision***

...Built for your DR wishes...