



AME Manufacturing Execution in the Cloud

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Sanmina

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Sanmina



SANMINA®



Sanmina Profile

- Founded in 1980 in San Jose, California
- Global footprint: 75 facilities in 25 countries
- \$6.37B revenue, FY'15
- ~43,000 employees

**Global, Leading-edge Technology, Engineering,
Manufacturing and Services Solutions Company**

Argentina • Australia • Brazil • Canada • China • Colombia • Czech Republic • England • Finland • France • Germany • Hungary • India
Indonesia • Ireland • Israel • Japan • Malaysia • Mexico • Scotland • Singapore • South Africa • Sweden • Thailand • United States



Integrated Manufacturing Solutions





Services We Provide: End-to-end Solution

- Advanced Technology Development
- Technology R&D
- Quick Turns
- Integrated Technology Expertise for Key Markets

- Demand Management
- Supplier Localization
- Alternate Suppliers
- Supplier Performance Mgt
- Agility/ Flexibility Planning
- Inbound Logistics

- End Customer Order Management
- Design BTO/CTO models & Process
- Available To Promise Process
- Direct Order Fulfilment
- Outbound Logistics

**DESIGN****TECHNOLOGY****DFM/DFX/NPI****SUPPLY CHAIN****MANUFACTURING****CTO/DOF****REPAIR & REF.**

- Turnkey Product Design
- Joint Product Development
- Component Design
- Component engineering
- Test Development

- Industrialization
- Product Validation
- Environmental & Reliability Stress Tests
- EMC/RFI Design & Qualification
- Custom Tooling

- 75 Locations
- One IT & Quality System
- Broad Product Expertise
- Vertical Integration
- Automation

- Repair/ Upgrade
- Refurbishment
- Component Obsolescence Management
- Sustaining Engineering



Sanmina Global Footprint



North America

- Austin, TX
- Carrollton, TX
- Costa Mesa, CA
- El Paso, TX
- Foothill Ranch, CA
- Fort Mill, SC
- Fremont, CA
- Huntsville, AL
- Kenosha, WI
- Laredo, TX
- Louisville, CO
- Manchester, NH
- Newark, CA
- Ontario, Canada
- Ottawa (Kanata), Canada
- Owego, NY
- Salt Lake City, UT
- San Jose, CA
- Toronto, Canada
- Turtle Lake, WI



Latin America

- Bogota, Colombia
- Buenos Aires, Argentina
- Campinas, Brazil
- Guadalajara, Mexico
- Juárez, Mexico
- Mexico City, Mexico
- Monterrey, Mexico
- Reynosa, Mexico
- São Paulo, Brazil



Europe

- Basingstoke, UK
- Brno, Czech Republic
- Fermoy, Ireland
- Gunzenhausen, Germany
- Haukipudas, Finland
- Ma'alot, Israel
- Miskolc, Hungary
- Örnsköldsvik, Sweden
- Port Glasgow, UK
- Salo, Finland
- Tatabánya, Hungary



Asia

- Batam, Indonesia
- Chai Chee, Singapore
- Chennai, India
- Depot Close, Singapore
- Hong Kong, China
- Johannesburg, S. Africa
- Kunshan, China
- Melbourne, Australia
- Pathum Thani, Thailand
- Penang, Malaysia
- Penjuru, Singapore
- Shenzhen, China
- Suzhou, China
- Wuxi, China
- Yasu, Japan



Sanmina's Manufacturing Journey into the Cloud



WHY

Future Ready

Business Agility



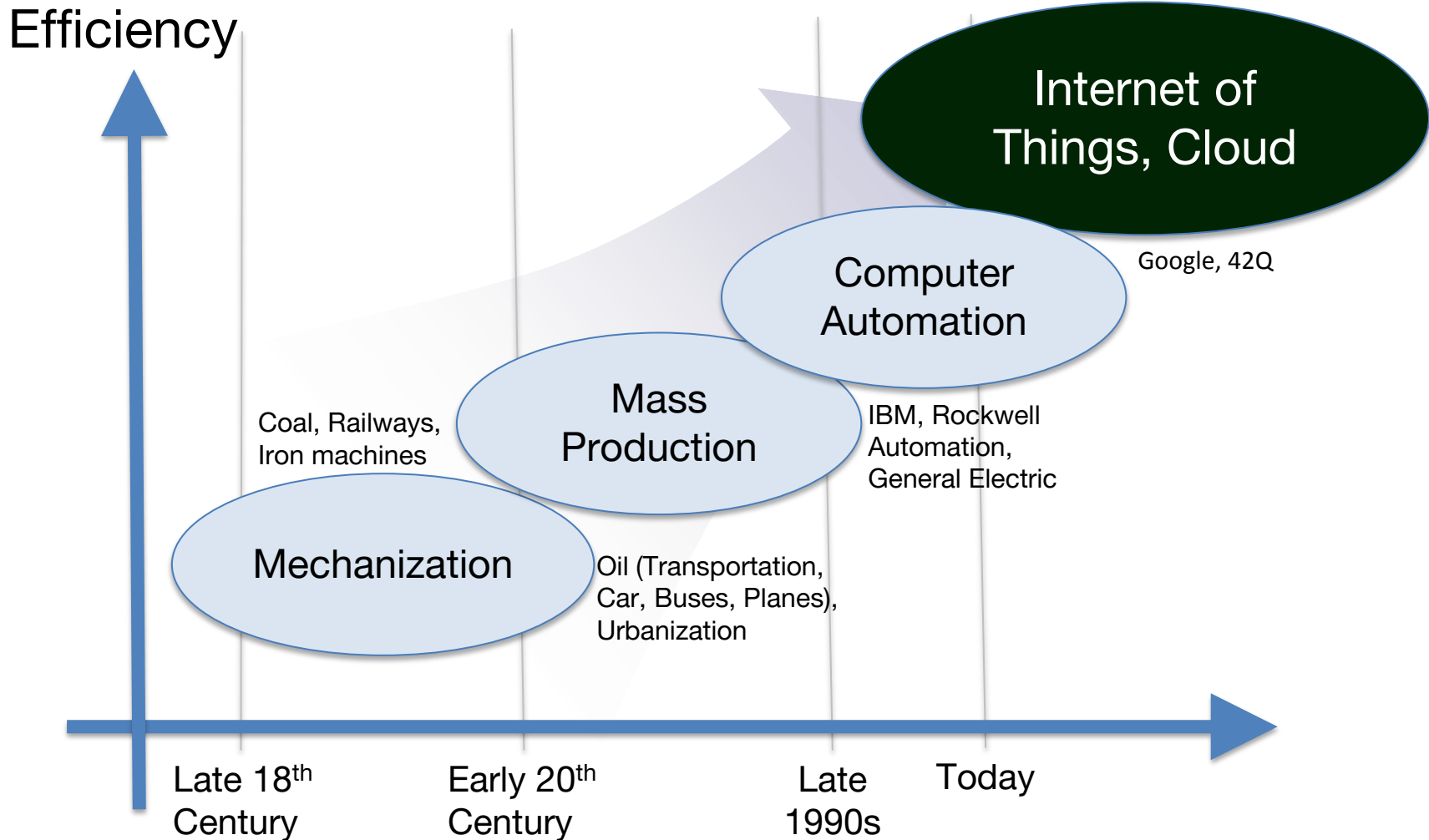
WHY

Future Ready

Business Agility

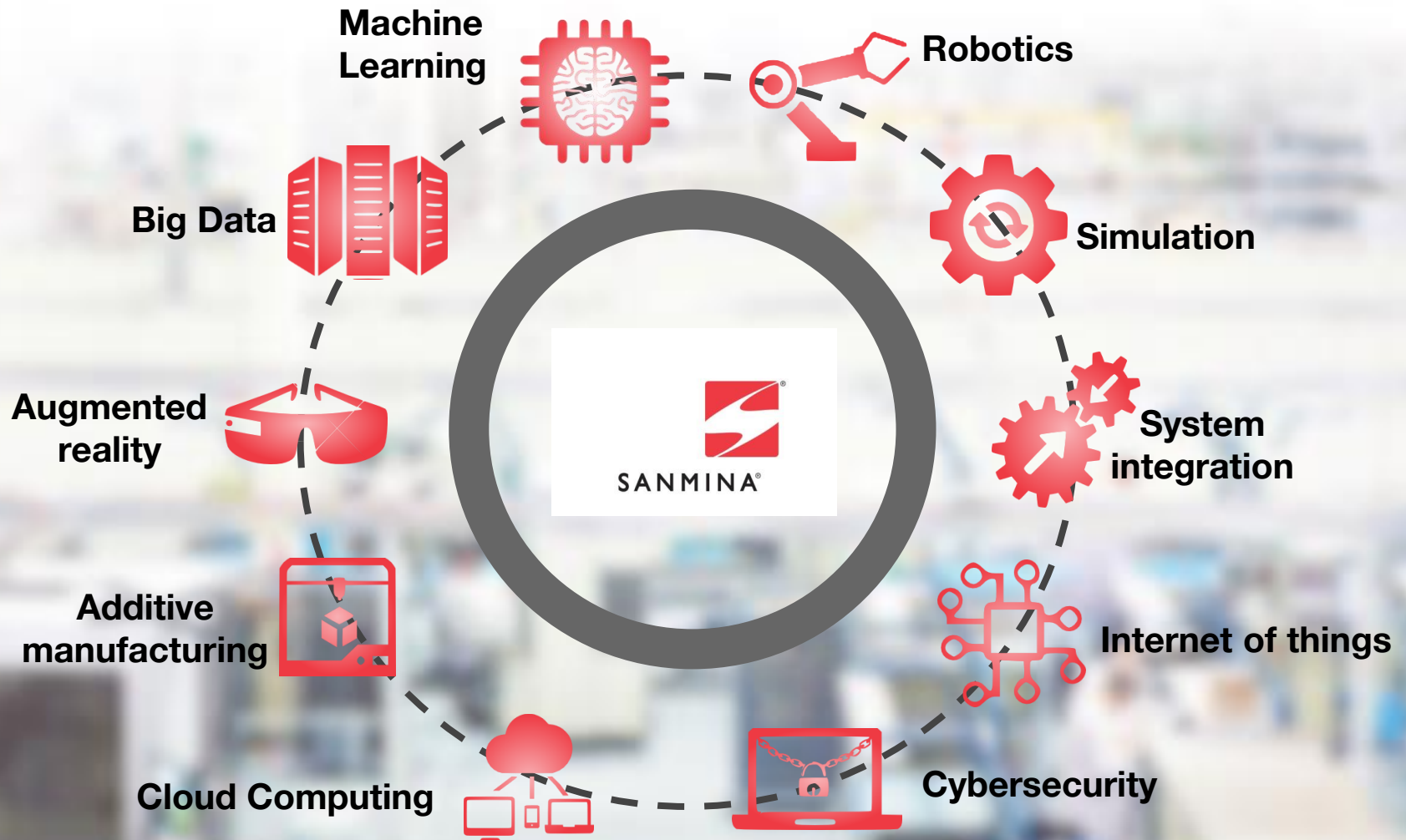


Fourth Industrial Revolution





Future Ready





WHY

Future Ready

Business Agility



A New Trajectory: Focus on Market & Value

Speed

Flexibility

Cost optimized

Security & Compliance

Business



Waste





A New Trajectory: Focus on Innovation

Empower Manufacturing Operations

Automation & Integration

Scalability

Leverage the Cloud ecosystem

**Cloud
MES**



HOW

Plant Engagement

Start small, then scale



HOW

Plant Engagement

Start small, then scale



Plant Engagement

- Plant Management & Plant Staff engagement
- Assess & Strengthen Network Management
- Enforce physical & information security
- Business Alignment
 - Uptime reporting & ROI validation
 - On site support for Go Live



HOW

Structured Approach

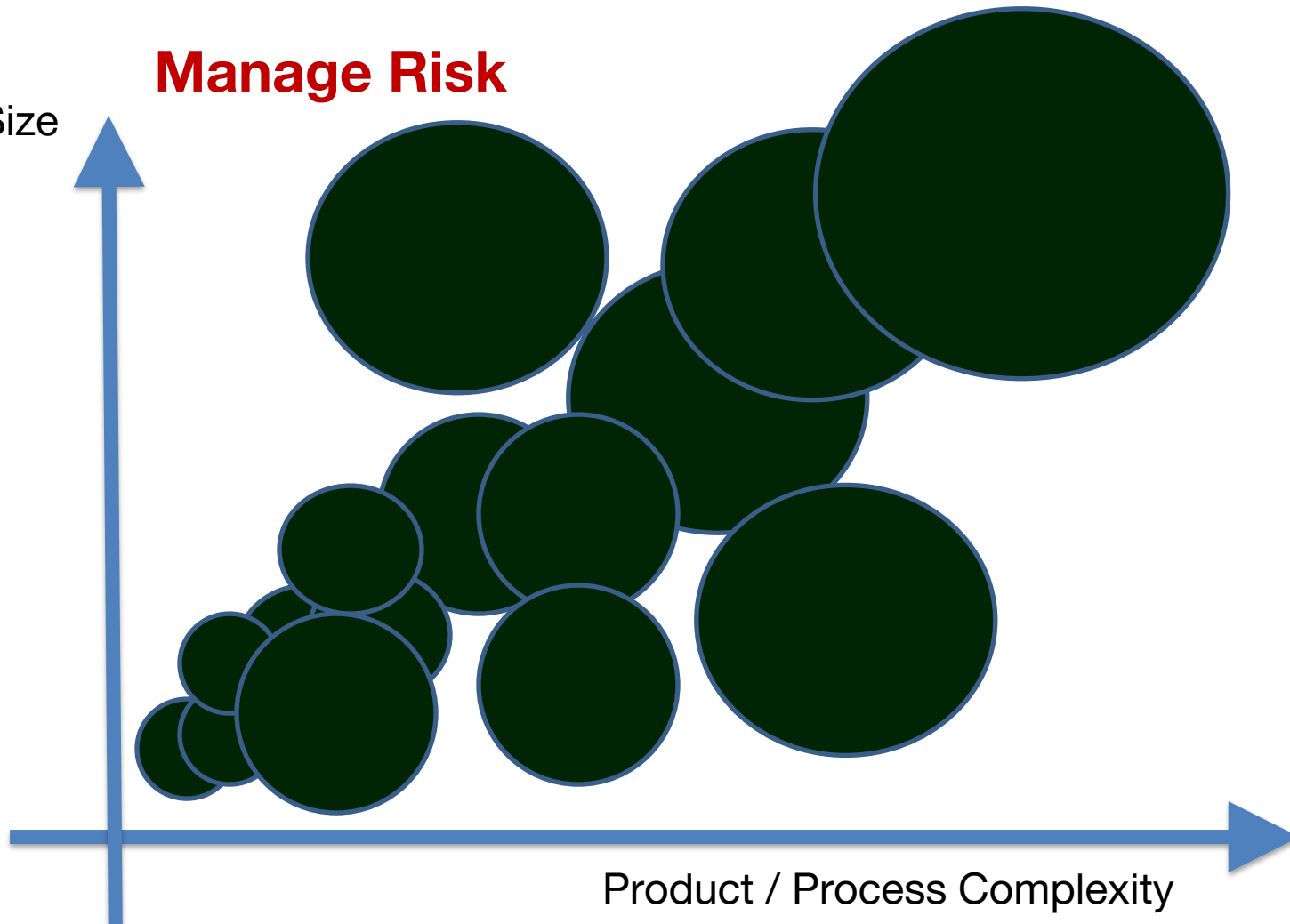
Start small, then scale



Start small, then scale

Manage Risk

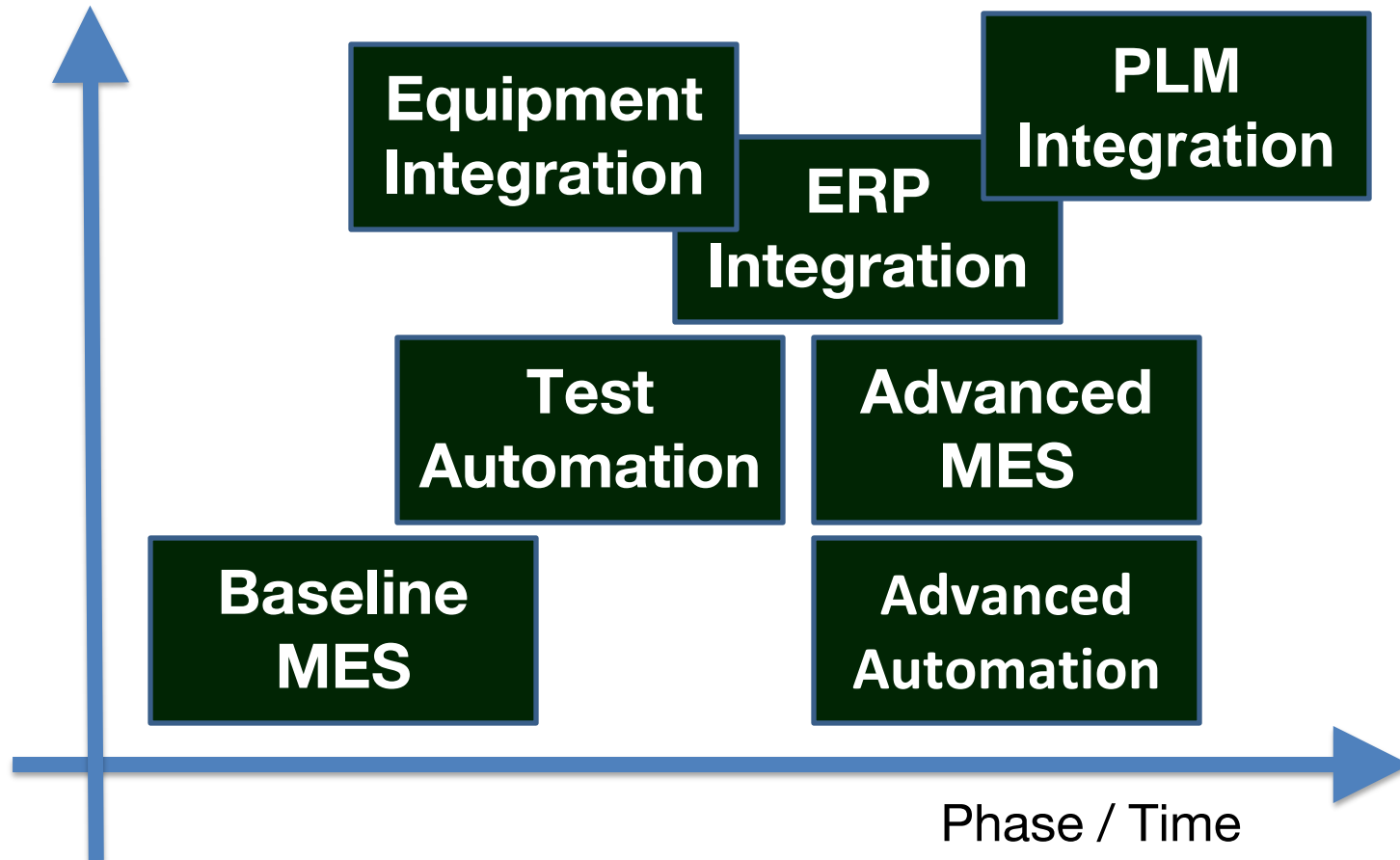
Plant Size





Start small, then scale

Integration





WHAT



Manufacturing in the Cloud

47 Factories across 15 countries in the cloud

Build to Order, Build to Stock, Configure to Order/Lot size of 1

Core capabilities

- Track & Trace, Genealogy management
- Yield & Throughput management
- On Demand Labeling / Machine Integration
- Statistical Process Control
- Preventative Maintenance
- Compliance (21 CFR Part 11 / FDA Registered Factories, AS 9100 Factories & TS 16949 Factories)

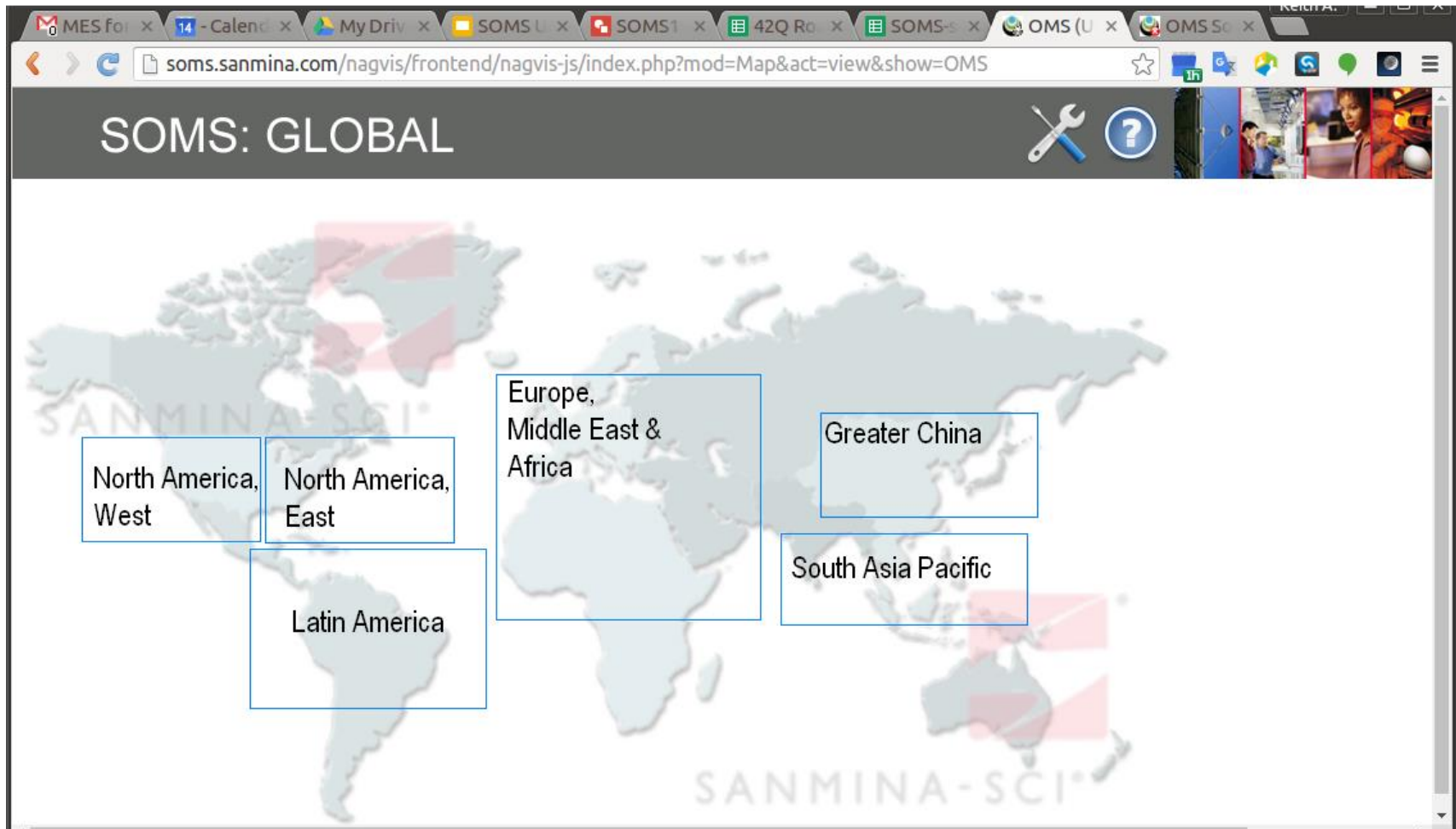


Cloud Deployment Architecture





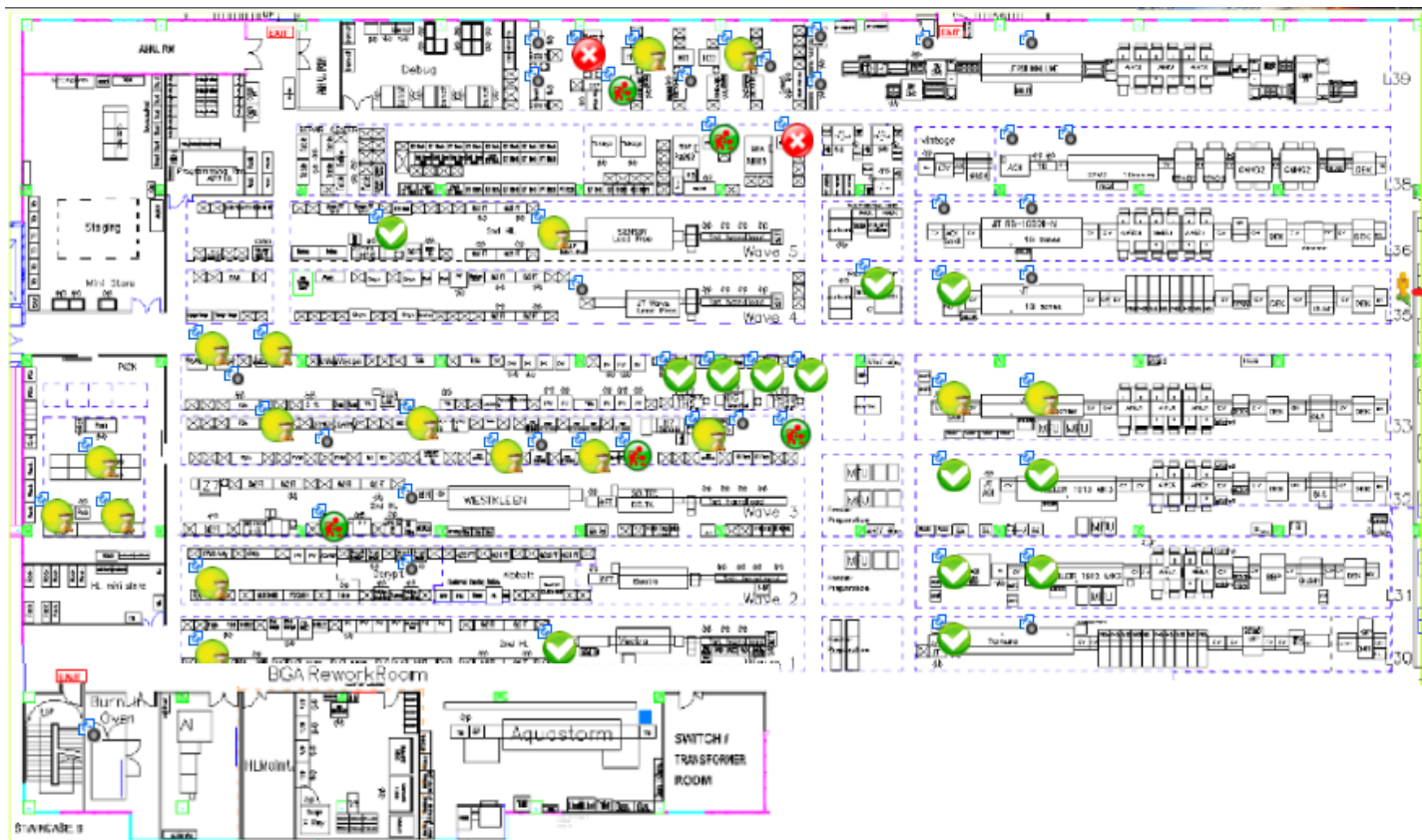
Global View of Operations





Global View of Operations

← SOMS: SAP, SINGAPORE, E90 CC L3



Zoom through regional view and plant view to a shop floor view. Then hover over trouble spots to see what is affecting production anywhere in the plant.

Information: The SOMS setup was last updated on Thu Jul 28 13:36:31 CDT 2016



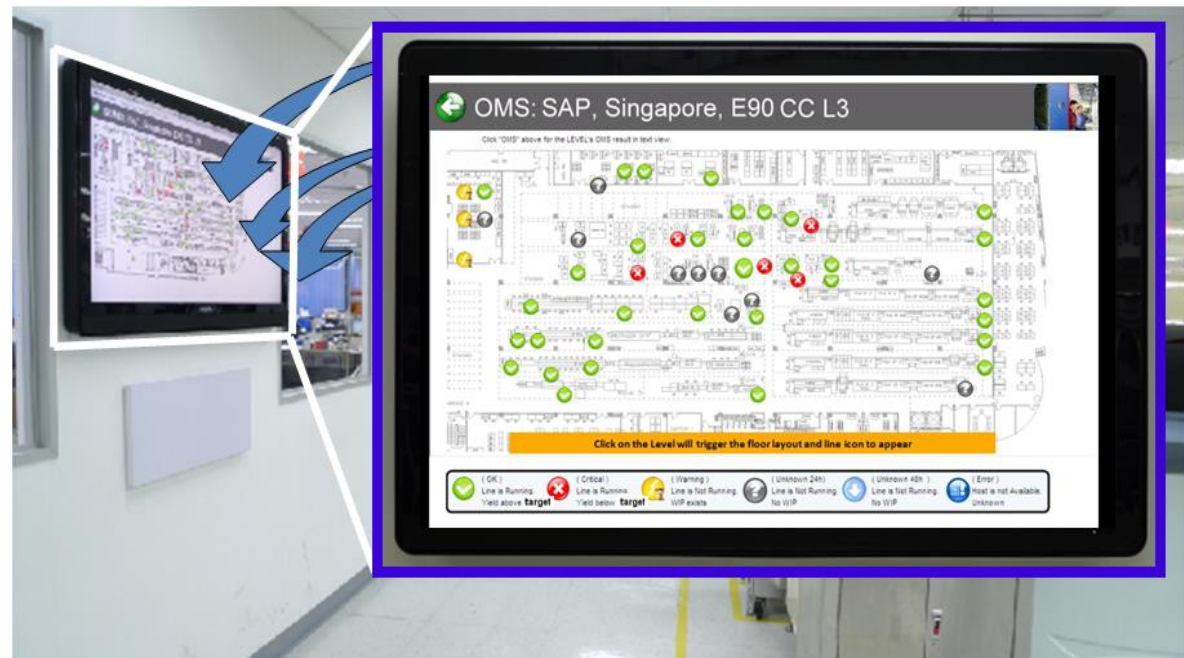
Operations Management

Live demonstration - Sanmina Singapore



Operations Management

- Real Time Visibility → **Anywhere, Anytime**
- Drill Down to Unit Detail **Identify Root Issues**
- Real time alerts **Responsiveness, Escalations**

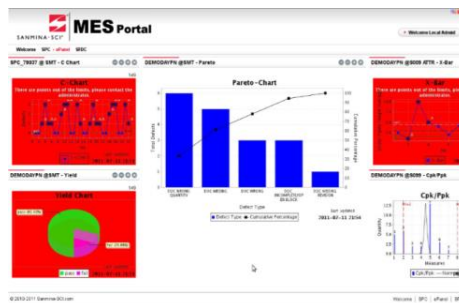




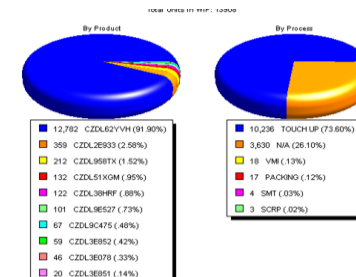
Production Yield

- [illegible]

- Real-time SPC

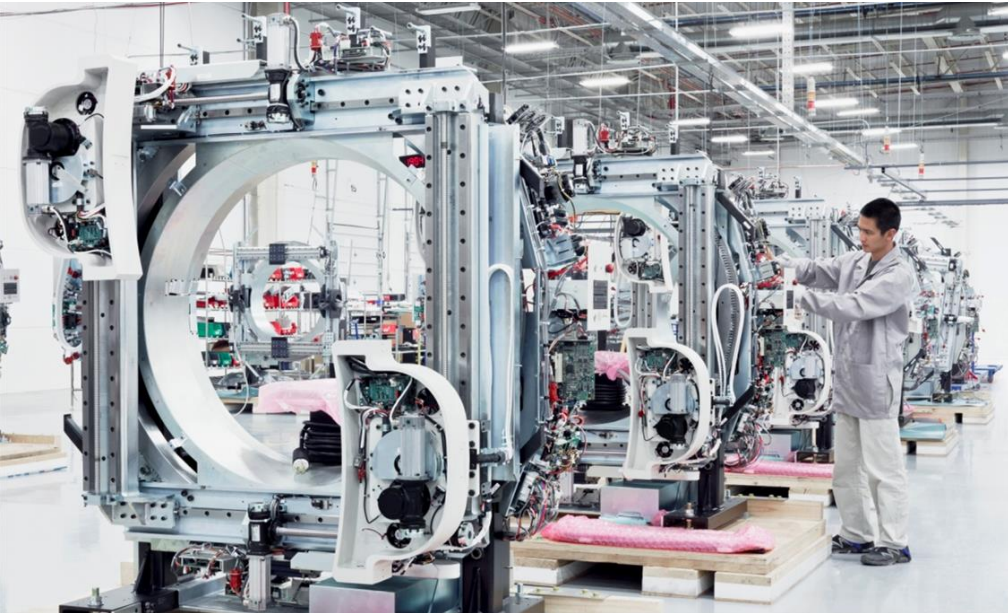


- Detailed parametric and traceability data





Current Deployments



Medical Manufacturing



- Manufacturer of Record with FDA – Ships to Field
- All Electronic DHR's, Intuitive Traceability Links
- Training Records & Operator Lock-out
- Multi-plant Traceability & Multi-plant Genealogy



Printed Circuit Board Fabrication





Complex Finished System Mfg



Kiosks & Vending



*Electric Car Charging
Stations*



*Battery Packs for Grid & Electric
Vehicles*

Diverse Finished Industrial System Production:

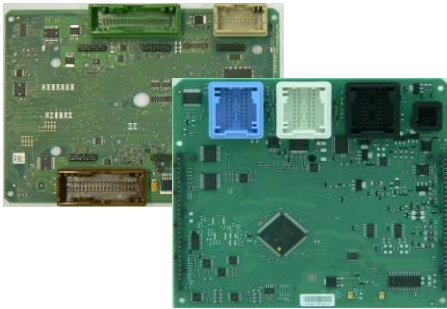
- Complex Semiconductor Vacuum Equipment
- ATM Machines, Cash Sorters/Counters
- Large Industrial Printers



Building Controls, Smart Meters



Automotive Systems Manufacturing



Body Controllers



Meter Clusters



*Climate Control Systems
Fully Automated Line*



LED Lighting Systems



Climate Control Systems



*Fully Automated Line
Blower Assembly*



Datacenter Hardware Production

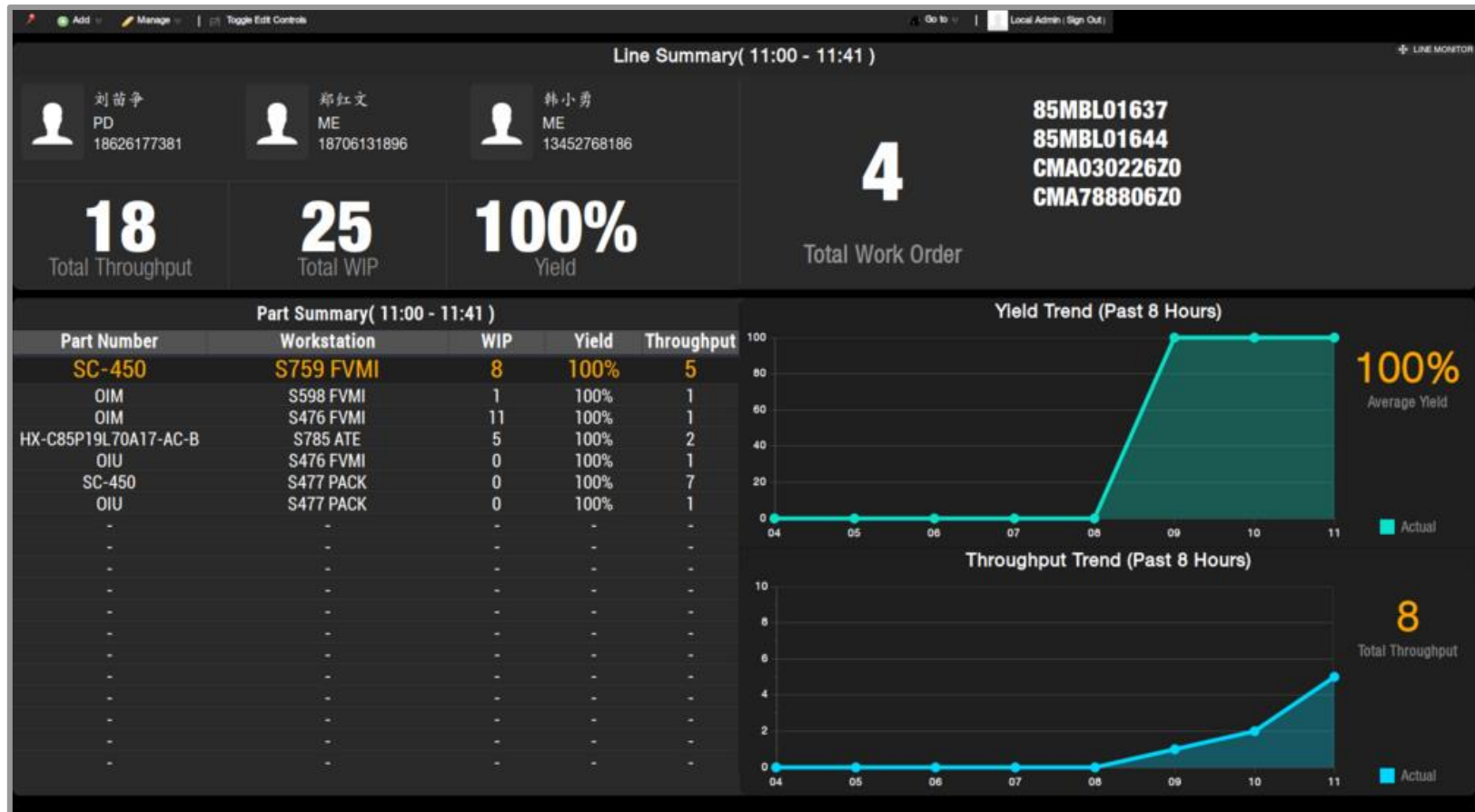
Requirements:

- Production for large datacenter in Europe
- Quarterly Volumes: 300+ racks per quarter
- Full build, CTO at a rack level
 - Configure & verify hardware & firmware
 - Complete system test and burn-in

*Production facility in Europe
High volume rack integration,
test and burn-in*



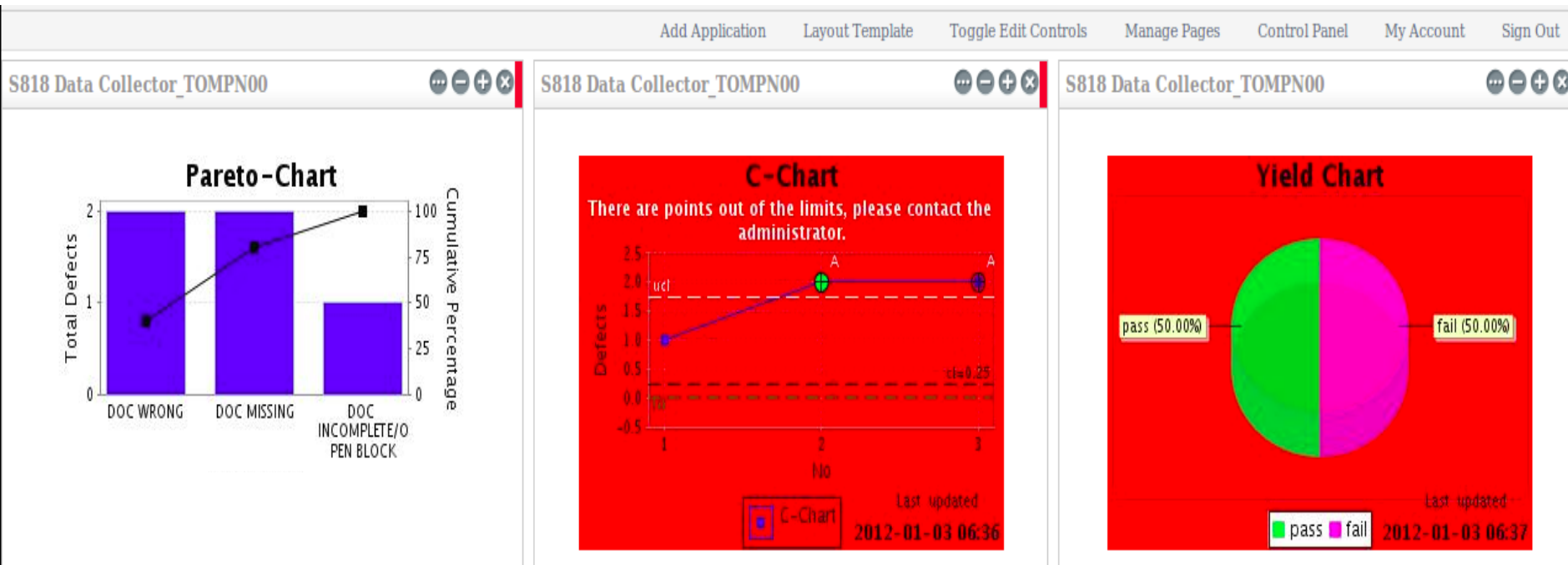
performance





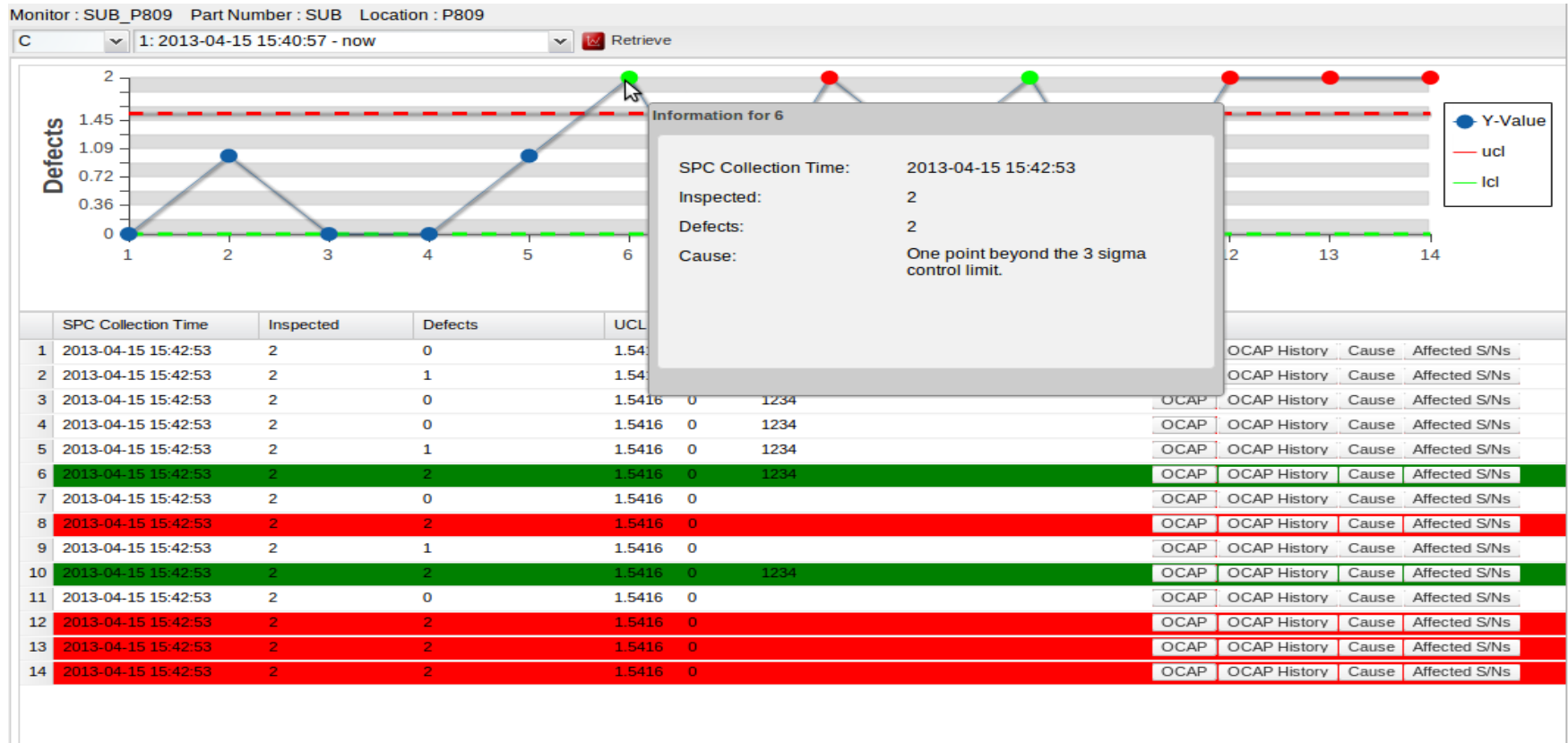
Statistical process control

Various statistical tools provide visibility to issues that may cause quality problems if left unaddressed. Early detection and correction of quality issues leads to leaner manufacturing and better customer satisfaction.





Statistical process control charts assure quality





Preventative maintenance

Planned (no need Confirmation) Planned (need Confirmation) Rescheduled(Confirmed) WO Generated Canceled							
Day Week Month							
	Sun	Mon	Tue	Wed	Thu	Fri	Sat
39	Sep 25, 2016 7:00pm 2016 Monthly PM Plan f... +4 more...	26 7:00pm 2016 Monthly PM Plan f... +7 more...	27 3:00am 2016 Half Year GR&R fo... +14 more...	28 3:00am 2016 Half Year GR&R fo... +13 more...	29 3:00am 2016 Half Year GR&R fo... +17 more...	30 +10 more...	Oct 1
40	2	3	4 7:00pm 2016 Monthly PM Plan f...	5 7:00pm 2016 Monthly PM Plan f...	6	7 7:00pm 2016 Monthly PM Plan f... +10 more...	8 +10 more...
41	9 7:00pm 2016 Monthly PM Plan for RS4 +23 more...	10 +19 more...	11 7:00pm 2016 Monthly PM Plan f... +15 more...	12 7:00pm 2016 Monthly PM Plan f... +11 more...	13 7:00pm 2016 Monthly PM Plan f... +12 more...	14 7:00pm 2016 Monthly PM Plan f... +10 more...	15 +4 more...
42	16 7:00pm 2016 Monthly PM Plan f... +9 more...	17 7:00pm 2016 Monthly PM Plan f... +17 more...	18 7:00pm 2016 INS Machine CMK for 3F-H1 +14 more...	19 +13 more...	20 7:00pm 2016 Monthly PM for RS9 +10 more...	21 7:00pm 2016 Monthly PM for RS7 +9 more...	22 +4 more...
43	23 7:00pm 2016 Monthly PM Plan f... +10 more...	Today 10:36 am 12:00am 2016 Monthly PM Plan... +16 more...	25 7:00pm 2016 Monthly PM Plan f... +12 more...	26 8:00pm 2016 Monthly PM Plan for 2F-H5 +7 more...	27 +9 more...	28 8:00pm 2016 Monthly PM Plan on Line3F-3 +9 more...	29 +4 more...
44	30 8:00pm 2016 Monthly PM Plan on Line3F-5	31 +7 more...	Nov 1 7:00pm 2016 Monthly PM Plan for GR-02 +13 more...	2 +11 more...	3 7:00pm 2016 Monthly PM Plan for GR-08 +9 more...	4 +6 more...	5 +3 more...

Visibility to maintenance schedules aids planning




Maintenance Analytics





Equipment dashboards

CMMS Work Order Dashboard							SANMINA 
Line1A	P-L1A	SPI-L1A	NXTI-B1	NXTI-B2	NXTI-B3	NXTI-B4	O-L1A
	AOI-L1A	Conveyor-1A	Quality-L1A	System-L1A	Material-L1A		
H3	压件机	波峰焊	Touch up皮带线	Ins线			
H5	选择焊	Touch up皮带线	Ins线				
1Line1A	Loader-1L1A	Laser-1L1A	Clear-1L1A	P-1L1A	SPI-1L1A	AIMEXCK-B1	AIMEXCK-B2
	AOI-1F1A	O-1L1A (603min)	3D-AOI-1L1A	X-Ray-1L1A	Conveyor-1L1A	Quality_1L1A	System-1L1A
	Maternal_1L1A						

Visibility to machine status promotes efficiency



What's Next – “Building on the Foundation”

Complete cloud MES deployment

Develop Machine Learning Capabilities

Wearable devices / Hands Free operation

Connect cloud services - data analytics, IIoT, etc.



Takeaways

Industry 4.0 is a journey

Foundation of manufacturing in the cloud

- Empower manufacturing operations
- Start small, then scale
- Realize operational agility, speed and improved TCO

Start the journey now !!



Thank You!

Your opinion is important to us!

Please take a moment to complete the survey using the conference mobile app.

Session: ThP/51

Manufacturing Execution in the Cloud

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