XXV. Nemzeti Minőségügyi Konferencia

2018.09.13.

Lean Quality és IPAR 4.0 megoldások a Jabil gyakorlatában

Jabil Circuit Magyarország Kft.

Heintz Krisztina, Minőségügyi Igazgató

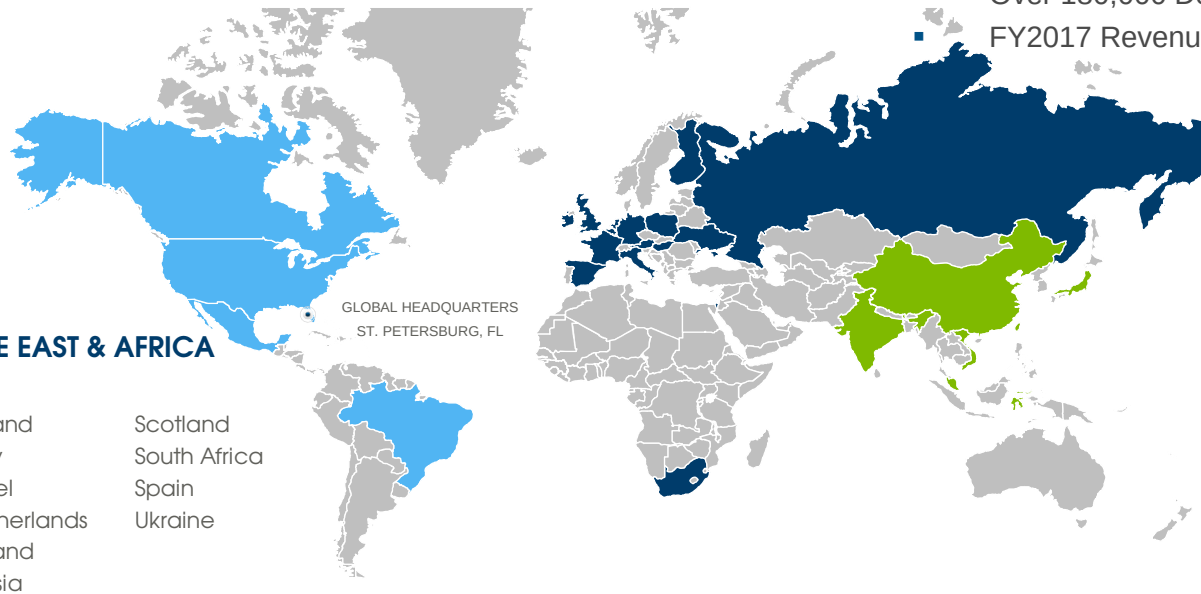
GLOBAL OPERATIONS ENABLE LOCALIZED MANUFACTURING

OVER 100 SITES IN 29 COUNTRIES

- Founded in Michigan, 1966
- 3rd Largest Electronic Manufacturing Services Provider
- Stable & Tenured Management Team
- Over 180,000 Dedicated Employees
- FY2017 Revenue US$19.06 billions

AMERICAS

Canada
Brazil
Mexico
United States



EUROPE, MIDDLE EAST & AFRICA (EMEA)

Austria
Belgium
France
Finland
Germany
Hungary
Ireland
Italy
Israel
Netherlands
Poland
Russia
Scotland
South Africa
Spain
Ukraine

ASIA

China
India
Indonesia
Japan
Malaysia
Singapore
South Korea
Taiwan
Vietnam

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JABIL HUNGARY

- Established in 2000,
- The largest company in the northern region of the country,
- 1st largest site in Europe
- 10th largest site at Jabil
- 3492 employees
- Operating 24 hours a day, seven days a week,

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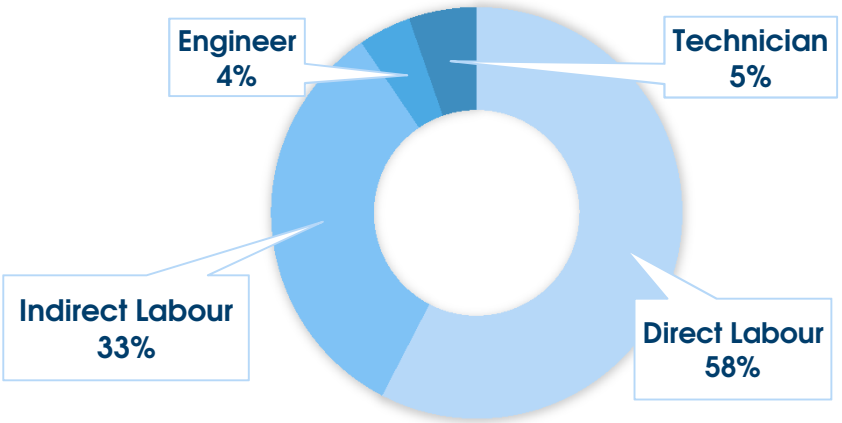
OUR PEOPLE

- Technical schools and Universities within 70 km range
- Direct Labour pool within 80 km range
- Internal and external training programs at every level of the organization
- Strong Lean Culture: all Indirect Labor employees passed Lean Bronze exam

Headcount: 3492



OUR SECTORS

- 5 Sectors
- 18 Customers
- 5500 + part numbers

Automotive

Healthcare

Industrial

Storage

Telecom

CERTIFICATIONS AND AWARDS

Quality is a core Jabil strategic business element. We have zero tolerance for defects, and strive to remove root causes at their source.

Management Systems

Global

ISO 9001 -2001

ISO 14001 - 2002

Site specific

IATF 16949 – 2003 (automotive)

ISO 13485 –2006 (medical)

TL 9000 – 2011 (telecommunication)

Safety Energy and ESD Certifications

OHSAS 18001 – 2007

ISO 50001 – 2016

ESD IEC 61340-5 - 2008

Customs

AEO Certification – 2011

Known Consignor – 2014

Quality Awards

SHIBA Award – 2009

National Quality Award – 2009

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Industry 4.0

JABIL

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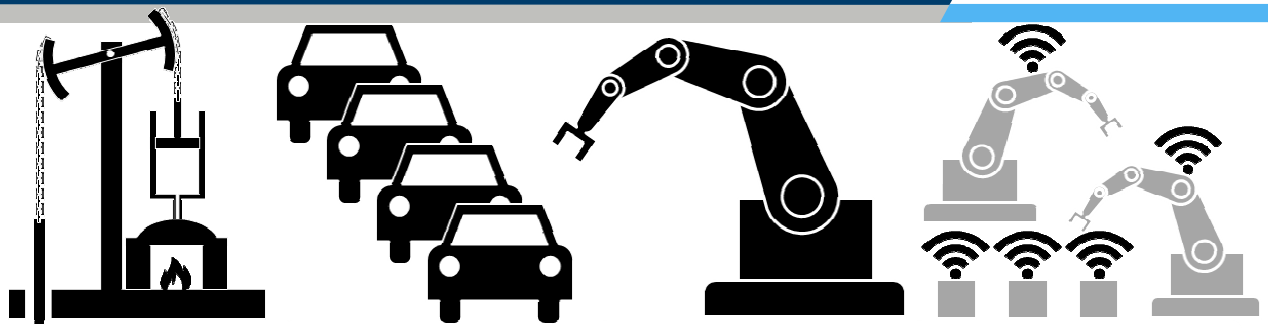
SMART FACTORY

What is Smart Factory?



1.0	2.0	3.0	4.0
Mechanization, water power, steam power	Mass production, assembly line, elecricity	Computer and automation	Cyber Phisical Systems*

Behind Industry 4.0 and intellingent factory there is a huge challenge. We need to enhance competitiveness to keep up with constant changes in the market, and individualized needs more and more come to the front.

Cyber-physical systems became necessary as well as introduction of flexible and intelligent software solutions to create completely resistant network connections, self-organizing systems manufacturers so this way we can ensure future viability of the industrial production as well.

**Intrconnecting virtual objects, informations and processes with data processing through information networks.*

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VISION

JABIL

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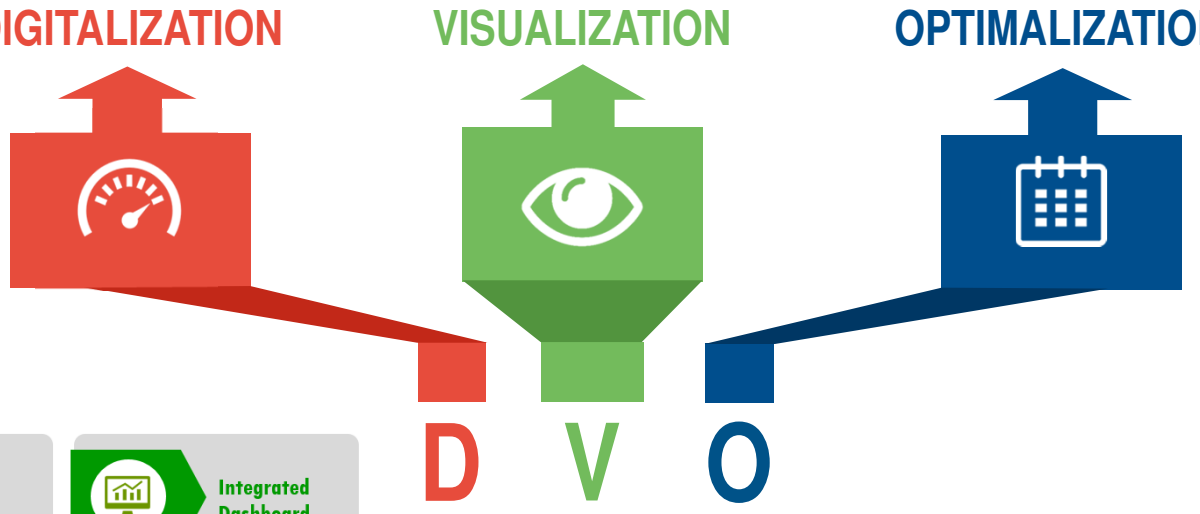
SMART FACTORY

What is Smart Factory?

The purpose – Why?

Connecting and digitalizing all machines, human and material movements to allow analytics and visualizations enabling self-correction, self-learning and self-optimization.



30+ heads area dedicated for Smart Factory from the Global team

THE PURPOSE – WHY?

Operations Optimization

- Efficiency & Productivity
- Automation
- Rapid problem solving
- Sustained operational performance

Analytics

- Equipment & Maintenance cycle
- Quality Performance
- Process Improvement
- Simulation

Integrated Dashboard

- Build & Machine Status
- Quality & Productivity
- Pareto & suggested interventions

COST + INNOVATION + SPEED

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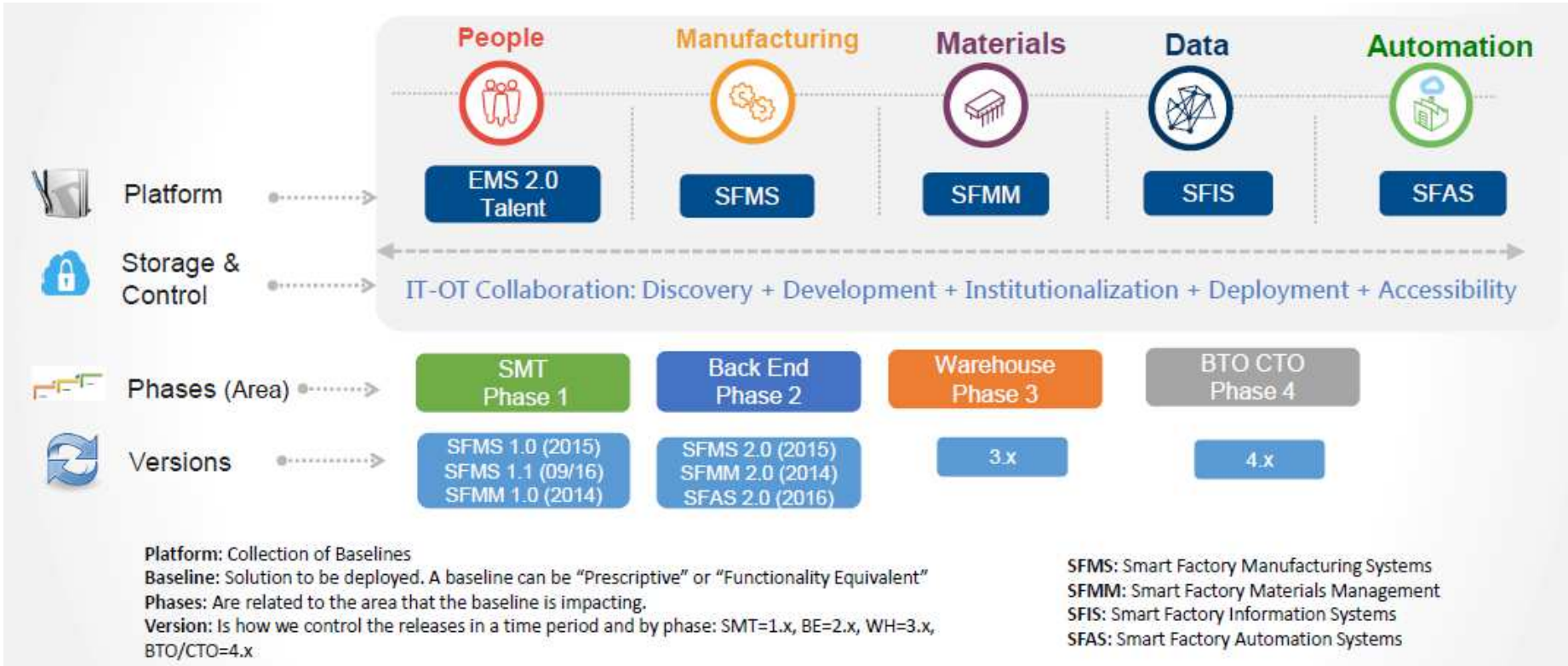
SMART FACTORY – Integrated View



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SMART FACTORY

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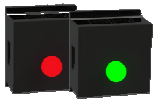
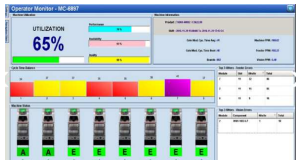
Manufacturing
43 Baselines

Connected Station 1.0 (PTL), Temp/Humidity controls, Alerts system for program changes, Off-Line Feeder Set up, PFC – Overview & Setup Instruction and SFM Configuration.





Materials
25 Baselines

e-Dashboard+, MSD / KTE Control, Traceability of Part Scanning via SFMM, Setup sheets from MES exported to SAP, Full Component Traceability (link serial number with GRN through all BOM levels).

Dashboard+

Automation
1 Baseline

SIM Cell

IT
1 Baseline

PCC. Production Control Center

Factory of the Future
Total Baselines = 70

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FACTORY OF THE FUTURE
BUILDING BLOCKS + DIGITAL FACTORY

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Building Blocks

- Material Velocity Business Processes + Supply Chain
- Industrialization
- Automation
- Quality
- Advanced Manufacturing
- IT
- Lean

Digital Factory

- Digital Technology
- Factory Applications
- Manufacturing Execution System
- Analytics
- Visualization
- Connectivity (Cyber/Physical)
- Application Governance
- Deployment of Digital Solutions

Factory of the Future

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TRANSFORMATIONAL BUILDING BLOCKS

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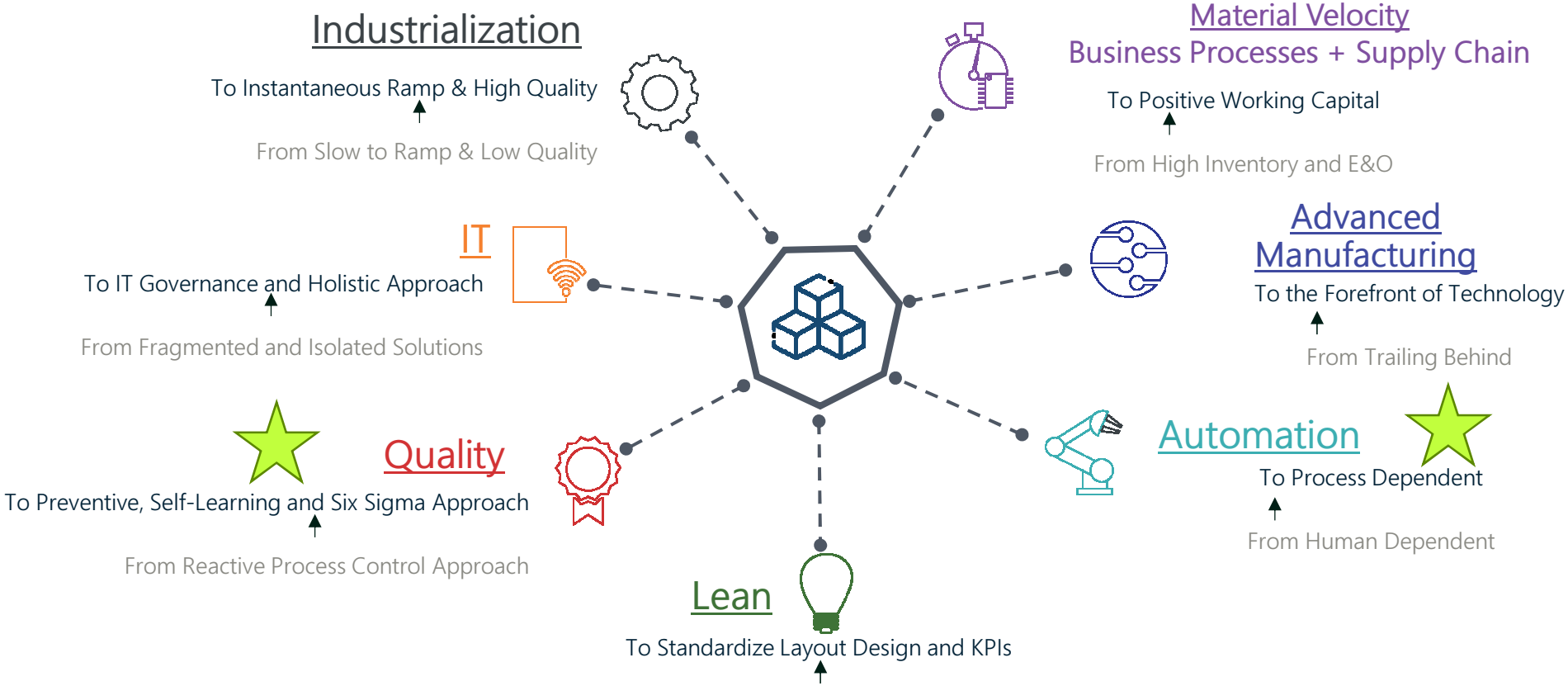

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FACTORY OF THE FUTURE– OPTIMIZATION LOOP / ECOSYSTEM

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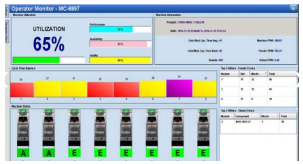
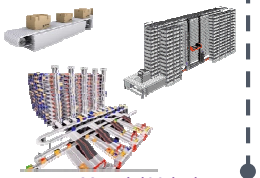
Digitalization



Standardization

Warehouse



Material Velocity

Industrialization

OLFS/ RTS

IT

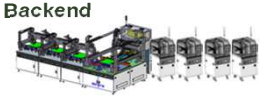
ERP + iFactory + Visualization (PCC)

Advanced Manufacturing

SMT Assembly line

Automation

HLA Backend



Material Velocity

- Business Processes

Lean

Quality

Pack out

Shipping

Material Velocity

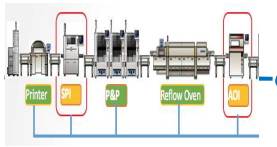
- Supply Chain

SME's

Visualization

(D2) Diagnostic: Why did it happen?

(D1) Descriptive: What is happening?



M2M + Analytics

Optimization

(P1) Predictive: What will happen?

(P2) Prescriptive: Rules & guidelines

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QUALITY (PROCESS CONTROL)

Quality Optimization thru 6σ Capability & Predictive Analytics to Reduce Reliance on Test & Inspection

Define

Quality Engineering

Methods:
- CTQ-PFlow-FMEA-CP

Goals:
- Quality-Cost-Time

Procedures:
- SPC - Reaction Plans

Problem Solve:
- 8D-DoE-Fishbone

Measure
Analyze

Lean / Six Sigma

DMAIC, ANOVA

Evaluate Stability:
- Cpk

Validate Measurement:
- MSA, GR&R

Improve

Kaizen

Reduce Errors:
- Mistake Proofing

Improve Stability:
- Cpk & GR&R

Reduce Variation:
- DoE, ANOVA

Control

Process Control

Key Characteristics

Verify Stability: Ppk

Tighten Process Limits

Reduce Test/Inspect:
- Focused test on OOC Alerts

Predict
Prescribe

Predictive Analytics

Capture Data

Create Models

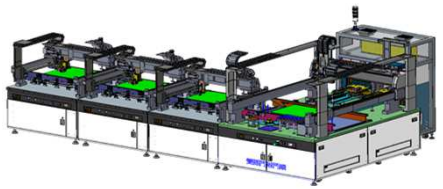
Correlation between Variables

Trigger Alerts & Signals

Prescriptive Instructions

SMT Print-Place-Reflow-Assembly-Solder-Test

Back End & HLA



Drive capability and process control in order to reduce test and inspection

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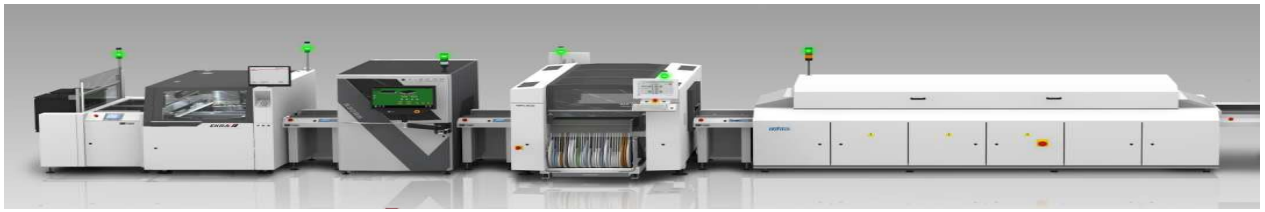
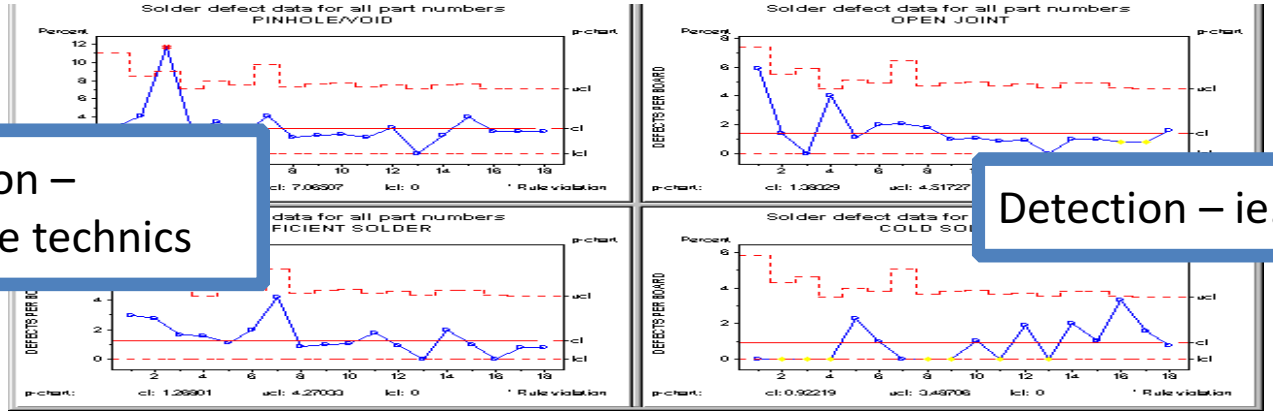
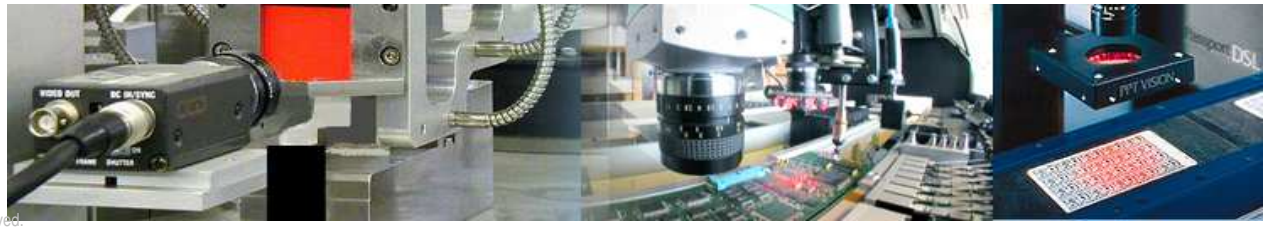
Process Controls and Predictive Analytics







Prevention –
Predictive technics

Detection – ie. SPC

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Process Controls and Predictive Analytics

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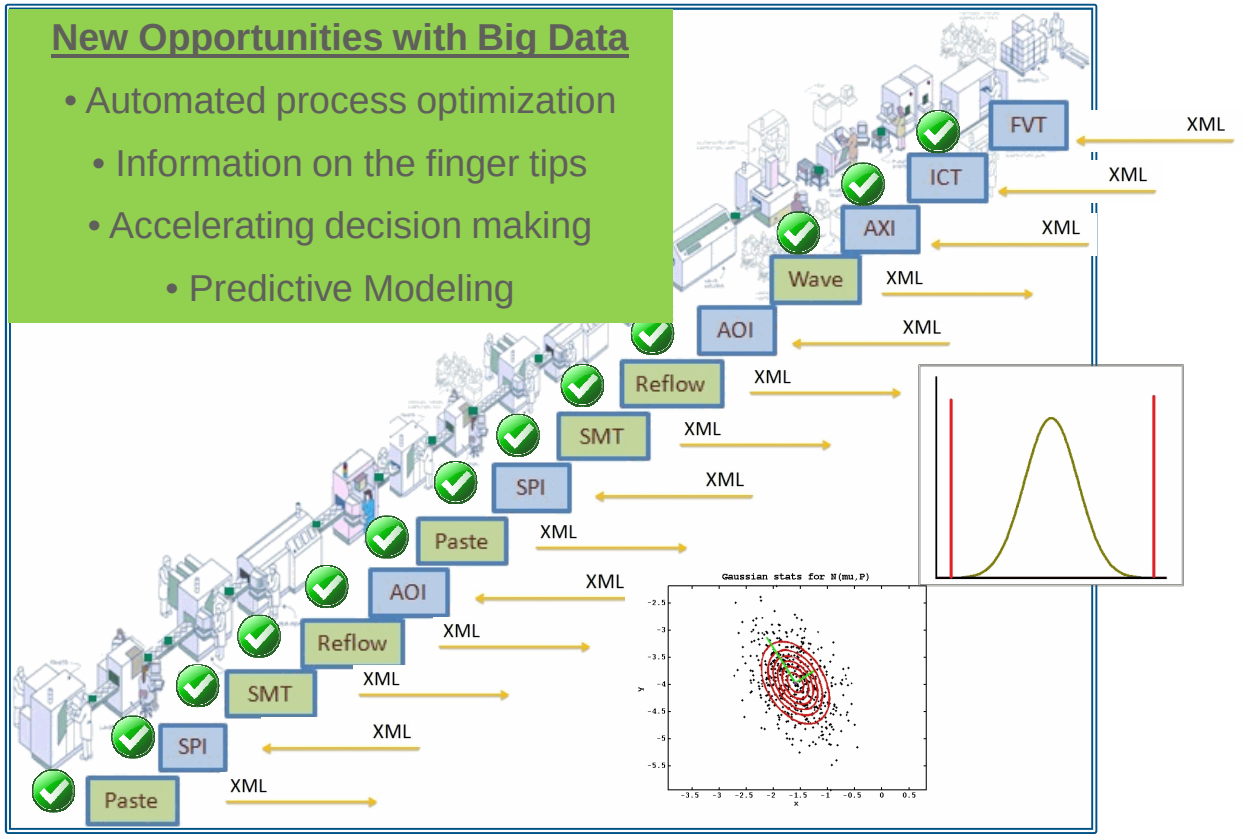
Factory of the Future

- Live Dashboard, Metrics and Controls
- Real Time Analysis and Feedback
- Automatic M2H, M2M interaction

Real Time Data Framework: The Evolution



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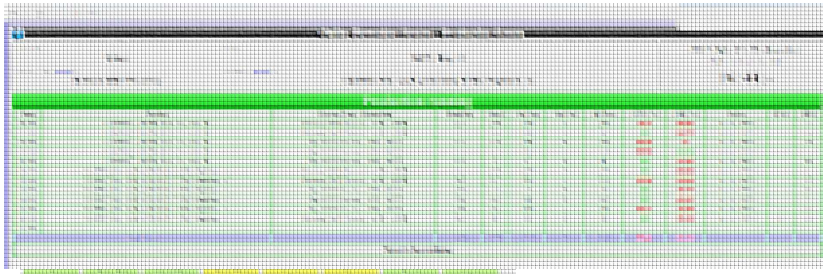
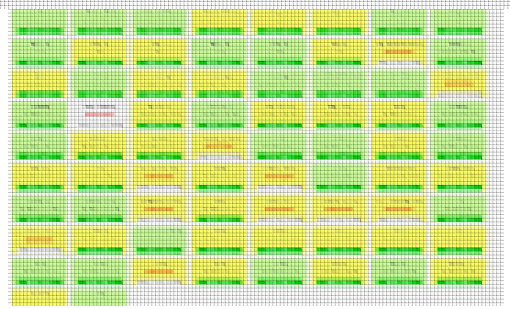
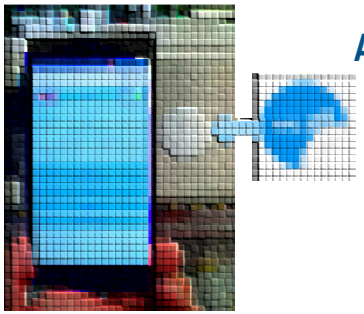
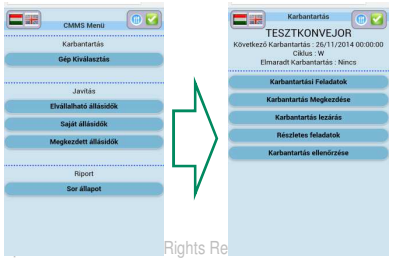
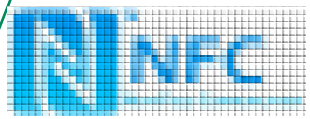
Smart factory solutions: ODS & eQRQC











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ODS

- Cell/Line: realtime e-white board based on MES data (Route/Product/Qty/Yield/DownTime)
- Factory/Cell/Line: Dashboard, 4Q report, Change Over, Prekit alert and more
- ODS records all Downtime in MES MM module, and gets all info from MES

eQRQC

- The line stop criteria are defined line-by-line for each defect type based on analysis of historical DPMO data (MES)
- Actual data (MES) are real time compared to the limits. Line is stopped before Reflow oven and action to be started in JOS

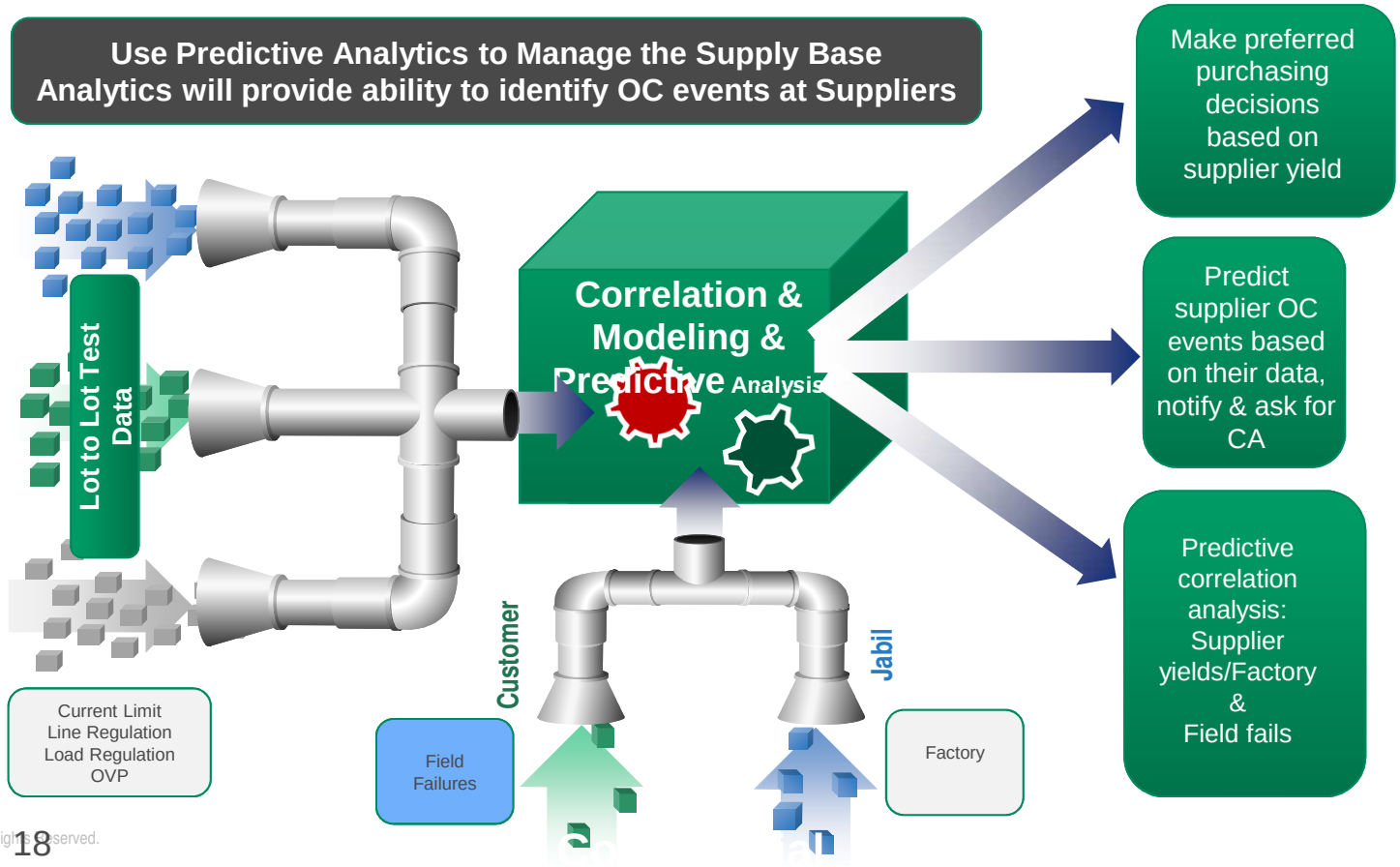
All2One

Maintenance Sofware connects to MES MM module and so ODS

It schedules and records maintenance for all manufacturing and test equipment, including SMT carriers, Wave pallets, jigs and fixtures. It is linked to the maintenance instructions and the task list is generated by using special characters in WI in Master Control (#W, #M, #Q,..)

- Line is stopped in case of Maintenance is not completed in time. This function can be extended by calibration period ellapsed, or CPK expired.
- Application for mobile devices developed with NFC Equipment scanning

End to End Supply Chain - FUTURE



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Simple Automation -PokaYoke LEAN Program

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PokaYoke Training Program

PokaYoke Training Program

To ensure Sustainability two supplementary Activities have been commenced

- Real Life examples **Training**
- Incentive **Competition** (rewarding solutions implemented)

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