Opcenter Execution Electronics IoT

Smart machine connectivity for shop floor data and process control

Benefits

- Provides manufacturing insights by facilitating access to shop floor data from all machines and processes

- Maximizes data flow efficiency via automatic normalization of all shop floor data

- Increases machine utilization by automatically identifying bottlenecks based on predefined KPIs

- Helps to meet industry standards and customer compliance requirements by collecting accurate, real-time data at the machine level

- Provides immediate insight into factory performance with its real-time PCBA performance dashboards

- Automatically supports all SMT machines, as well as other assembly systems and processes

Summary

Opcenter™ Execution Electronics IoT software gathers live data from every process or machine on the shop floor by combining data acquisition and normalization in a unified, modular, software/hardware hybrid solution. The collected data is enriched and normalized to the ODB++™ Manufacturing standard specification

and can also be converted to Connected Factory Exchange (CFX).

Opcenter Execution Electronics IoT includes software with interfaces to a wide array of surface-mount technology (SMT), test, and inspection machines – providing smart connectivity with every machine on the shop floor, regardless of the machine type, vendor, or protocol. The system can be deployed on a server with edge devices if a direct connection is required (such as to comply with the Surface Mount Equipment Manufacturers Association standard).

Opcenter Execution Electronics IoT

Opcenter Execution Electronics IoT is part of the Xcelerator™ portfolio, a comprehensive and integrated portfolio
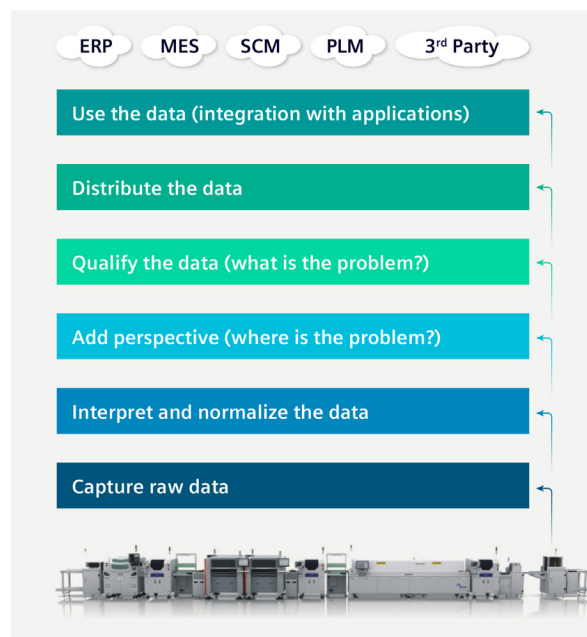
Challenges of shop floor data collection

Figure 1: Opcenter Execution Electronics IoT leverages the ODB++ Manufacturing data normalization to enable full data flow between the shop floor and in-house applications in a simple unified manner, reducing time and effort.

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Opcenter Execution Electronics IoT

of software and services from Siemens Digital Industries Software. It provides an informative view of the equipment, lines and manufacturing sites, including identification of bottlenecks, based on predefined key performance indicators (KPIs). Using the ODB++ Manufacturing software development kit (SDK) provided with the Opcenter Execution Electronics IoT manufacturing solution, real-time manufacturing data in ODB++ Manufacturing format can be used by in-house applications and third-party solutions to create a full data flow between the shop floor and enterprise systems.

Enabling an IoT network
Opcenter Execution Electronics IoT is an easy solution to replace the complex PC-based systems on the shop floor. With the new hybrid architecture, the Internet of Things (IoT) platform can run on a server, with edge devices connected wherever they are needed. The server monitors and controls factory machines and processes and analyzes manufacturing data in real time or during post-production for full process traceability. The hybrid solution can run on a server and connect to the machines over the network. It can also connect to edge devices if needed (as is common with older machines that require a direct hardware connection).

Two types of units are used in the system:

- The Data Acquisition Unit (DAU) connects to any of the machine's control interfaces. Data is collected and normalized into ODB++ Manufacturing

- The System Processing Unit (SPU) connects to all the DAU servers and processes on a specific line. It identifies bottleneck machines that are causing production delays and applies routing rules and chain traces

Valor IoT manufacturing	System processing unit (SPU)	Data acquisition unit (DAU)
Appearance		
Color	Black	Grey
Dimensions (W × D × H)	215 × 140 × 79 (mm)	200 × 140 × 85 (mm)
Weight	2.2 kg	2.1 kg
CPU	Intel® Celeron® J1900 on-board SoC (2GHz, quad-core, 2 MB cache, TDP =10 W)	Intel® Celeron® N2807 on-board SoC (1.58 GHz, dual-core, 2 MB cache, TDP = 4.3 W)
System memory	Support 204-pin 1066/1333 MHz DDR3 SO-DIMM slot × 1 Default RAM 8 GB pre-installed	Support 204-pin 1066/1333 MHz DDR3 SO-DIMM slot × 1 Default RAM 4 GB pre-installed (up to 4 GB)
Storage	Default 32 GB mSATA pre-installed in mini-PCIe slot + 1 mini-PCIe slot reserved	
LAN	6x (10/100 Base-T), 3x PoE SE	2x (10/100 Base-T); 2x PoE SE
COM	No	x2 RS-232 optically isolated with independent 12-V power for peripherals
USB	X2, 1 USB3	2 USB , 1 USB3
Inputs/outputs	No	6 in/6 out, optically isolated
System status indicators (Front)	Programmable OLED display	HDD LED green Error LED red Status LED blue
Regulatory approvals	EMC: CE (EN55022 Class A, EN55024) FCC (Part 15 Subpart A) Conducted EMI CISPR/FCC Class B ROHS II directive (2011/65/EC)	

Figure 2: Specifications for the two types of network servers used by Opcenter Execution Electronics IoT: The data acquisition unit (DAU) and the system processing unit (SPU).

Capabilities

Automatic, seamless data collection

Opcenter Execution Electronics IoT supports a wide array of machines and processes, including SMTs, printers, and test and inspection machines – enabling the efficient collection and transformation of manufacturing data to business and management systems, and most importantly, to manufacturing analytics. The collected data is normalized into ODB++ Manufacturing to simplify the data-acquisition flow, enabling more efficient delivery and usage of the data. Using the DAU servers, data can be collected – regardless of the machine's vendor and its communication protocol – to provide deep insights into factory performance.

Intuitive performance-focused dashboards

Opcenter Execution Electronics IoT includes a for do it yourself (DIY) driver development that provides insights at the process, line and factory levels. The process-level data includes real-time information on the number of components placed per hour and on pickup errors.

Work-in-process (WIP) data collected by the Opcenter Execution Electronics IoT servers can also be displayed on a personal digital assistant (PDA) or over any third-party web interface. WIP data includes work orders and data on operations, machines, programs and processes, including the number of units produced.

The line-level dashboard displays information on line performance, which machines are causing bottlenecks, pickup information by line, and WIP by line, all while supporting multiple work orders. The factory-line dashboard acts as a global WIP performance monitor. By identifying the machines creating bottlenecks that cause production delays, the operator can make corrections when necessary and adjustments when possible to reduce cycle time.

Infrastructure and supported drivers

Both the SPU and the DAU run on a platform consisting of a Linux operating system, drivers and software components. The units are hybrid and can run on a server and/or edge devices.

Opcenter Execution Electronics IoT includes support for critical operations in the SMT manufacturing process – supporting printed circuit board (PCB) registration, screen printing, solder paste inspection (SPI), glue dispensing, automated optical inspection (AOI), axial/radial PTH, ODD form placement, in-circuit test (ICT), flying probe test (FPT), functional testing and coating.

Opcenter Execution Electronics IoT provides the flexibility for DIY driver development using the software development kit (SDK).

Easy-to-use SDK

The Opcenter Execution Electronics IoT manufacturing solution's binary SDK can be used to access information from the factory gateway, using .net DLL or Java JAR. This simple method allows for the development of in-house communication protocols to achieve machine-to-machine communications and to create drivers that will communicate with external applications such as enterprise resource planning (ERP) and supply chain management (SCM) – facilitating complete data flow from the shop floor to enterprise systems.
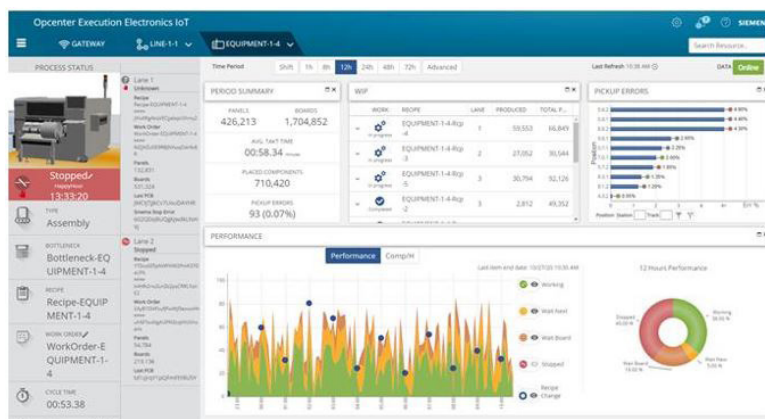

Figure 3: Performance-based dashboards showing information per machine, line, or factory level, including period summary, amount of pick-and-place errors and general machine information.

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