Welcome

Where today meets tomorrow.

SIEMENS

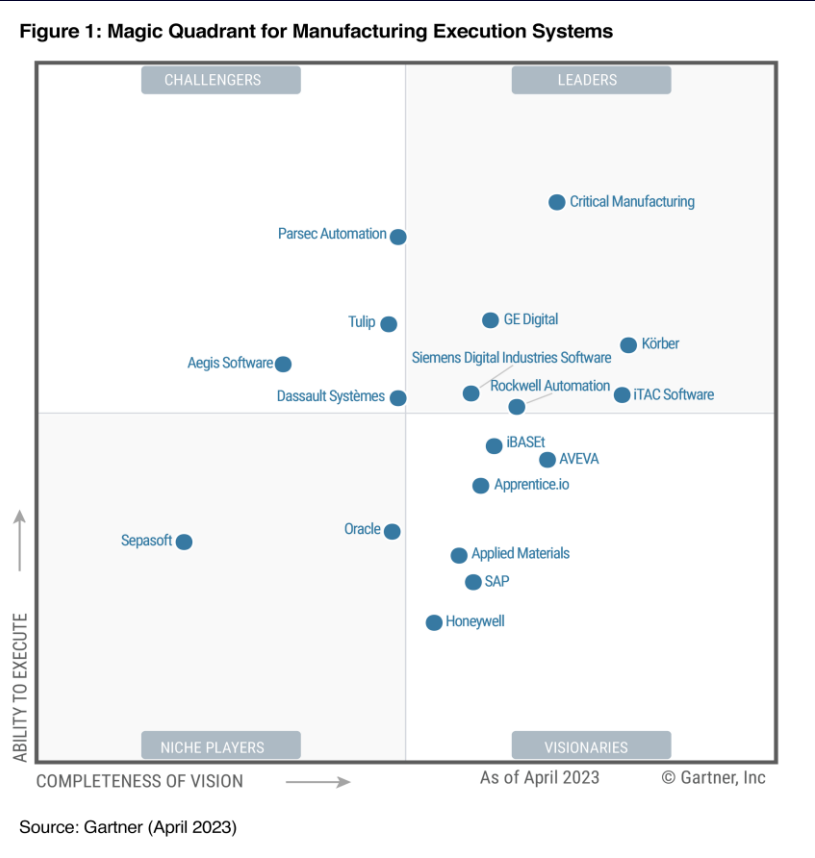# MOM Portfolio Overview

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Vision & Mission

Our Vision is to be the leading provider of **best-in-class Manufacturing Operations Management** Portfolio Applications in our strategic industries that **seamlessly integrate** with **Product Lifecycle Management**, and **Automation technologies** to digitally transform our customers Global Manufacturing Operations.

Our Mission is to **help Manufacturers** make the **highest quality products**, **cost effectively**, faster than their competitors by providing **Industry-rich MOM Portfolio applications** that enable the **Digital Enterprise**.

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Siemens - A Leader again in 2023 Gartner® MQ™ for Manufacturing Execution Systems
A continuous recognition in a highly dynamic and changing environment

Figure 1: Magic Quadrant for Manufacturing Execution Systems

CHALLENGERS | LEADERS

- Critical Manufacturing
- Parsec Automation
- Tulip
- GE Digital
- Körber
- Siemens Digital Industries Software
- Aegis Software
- Dassault Systèmes
- Rockwell Automation
- iTAC Software
- iBASEt
- AVEVA
- Apprentice.io
- Sepasoft
- Oracle
- Applied Materials
- SAP
- Honeywell

ABILITY TO EXECUTE

NICHE PLAYERS | VISIONARIES

COMPLETENESS OF VISION → As of April 2023 © Gartner, Inc
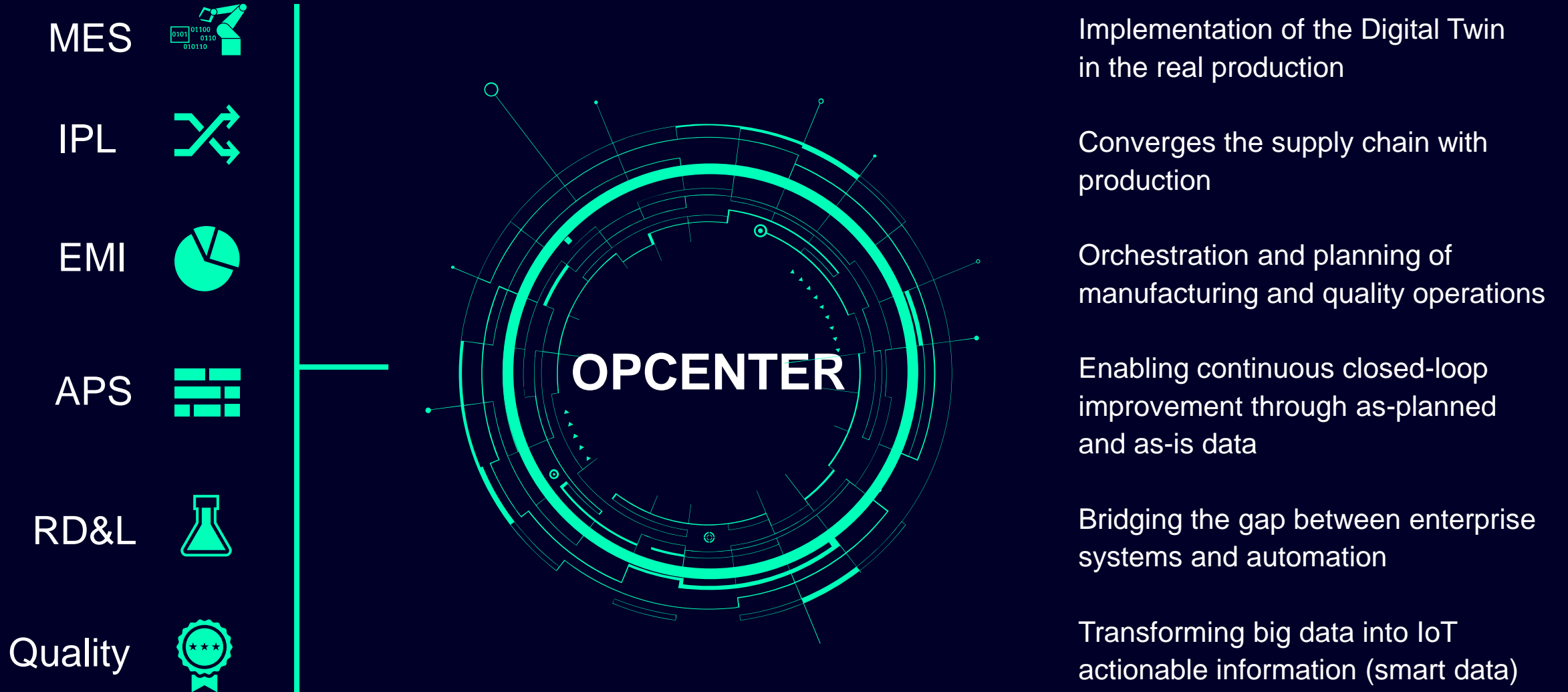
Source: Gartner (April 2023)

Siemens Digital Industries Software is the only vendor to have been recognized as a Leader by Gartner for sixth consecutive time in its Magic Quadrant for Manufacturing Execution Systems.

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Manufacturing Operations Management Portfolio

MES — Complete visibility, control, and optimization of production and processes across the enterprise

IPL — Intralogistics management digitalizes and automates material replenishment flows, orchestrates warehouse tasks and executes material transport in production facilities

EMI — Connects and unifies data sources into one accessible analytical data model providing capabilities to explore and drill down into contextualized data

APS — Detailed production scheduling, capacity planning and graphical master production schedule

RD&L — Drive innovation efficiency in formulated product design through the digitalization of the product development process – fully aligned with manufacturing

Quality — Quality Management enables a sustainable reduction in costs and the development of first class quality products.

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Manufacturing Operations Management Portfolio

MES

IPL

EMI

APS

RD&L

Quality

OPCENTER

Implementation of the Digital Twin in the real production

Converges the supply chain with production

Orchestration and planning of manufacturing and quality operations

Enabling continuous closed-loop improvement through as-planned and as-is data

Bridging the gap between enterprise systems and automation

Transforming big data into IoT actionable information (smart data)

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Leveraging on the innovative and industry-specific

MES

IPL

EMI

APS

RD&L

Quality
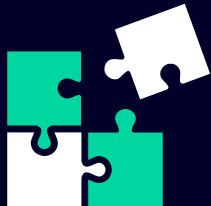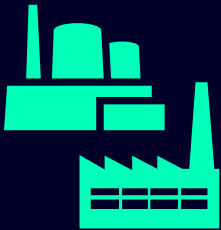
Innovative technologies

Industry Specific OOTB fuctionalities

Enabler of end-to-end digitalization

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Manufacturing Operations Management Portfolio

User Interface
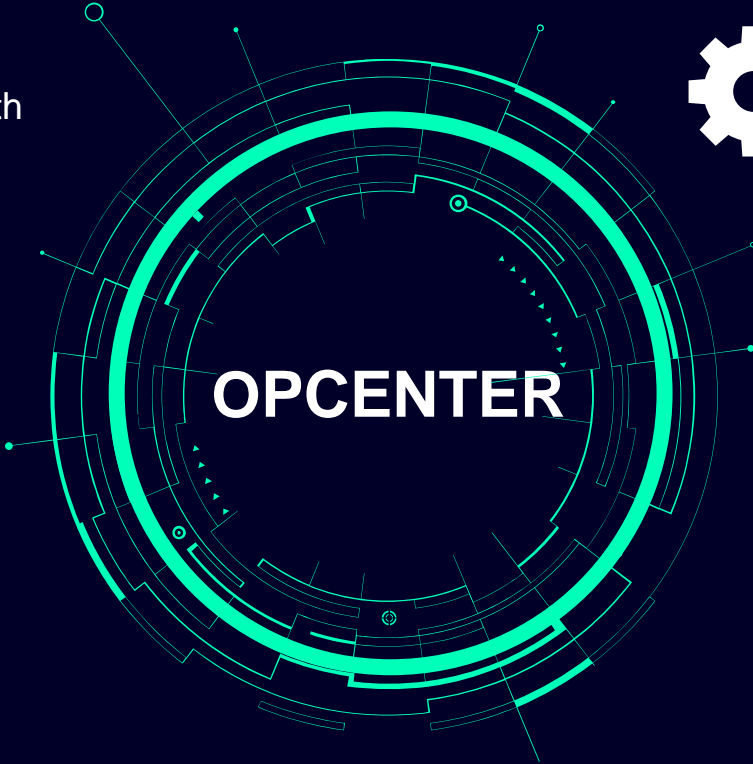Enhancing user experience with smart software interactions

Mobility
Managing operations from anywhere, with any device

Interoperability
Interfacing software solutions efficiently for faster data exchange

OPCENTER

Extensibility
Facilitating software deployment, upgrades and extensions while reducing the TCO

Cloud support
Enhancing global visibility and real-time information for the whole organization

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Portfolio overview

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Opcenter Execution Medical Device & Diagnostics

Main functions

- 5M enforcement and non-conformance management
- Centralized view of quality performance
- Asset utilization monitoring to determine overall equipment effectiveness
- Enforce multi-tiered bills-of-material (BOMs) and configuration options for discrete processes and recipes for batch processes
- Track and trace forward and backward genealogy
- Real-time data collection
- Seamless integration with ERP, PLM and APS systems
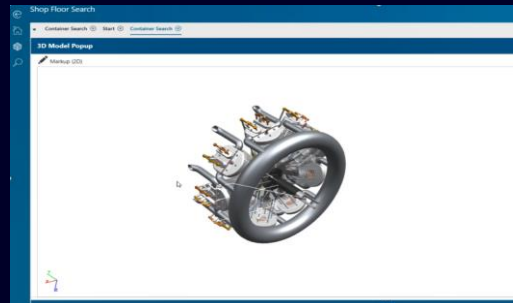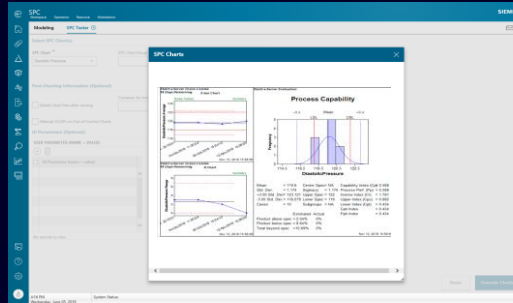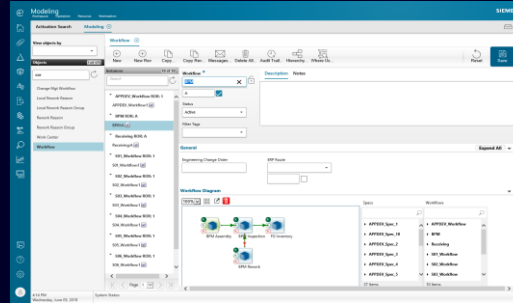
Benefits

- Proactively build quality into the manufacturing process
- Efficient and continuous errors prevention
- In-depth visibility into the performance of all components and tests
- Close the loop on continuous improvements
- Maintain a single as-built record across discrete and batch processes for combination and hybrid products
- Define, distribute and enforce process and engineering changes to any global factory
- Move to a review by inspection product release process

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Opcenter Execution Semiconductor

Main functions

- Visibility and control of work-in-progress
- Automatically enforced dispatching
- Integrated equipment maintenance management
- Statistical process control and non-conformance management
- Manufacturing process change management and quality enforcement
- Comprehensive workflow management
- Operator certification and training
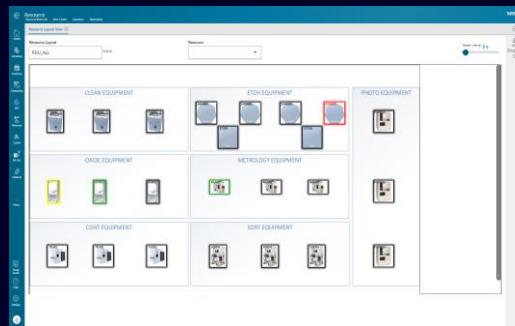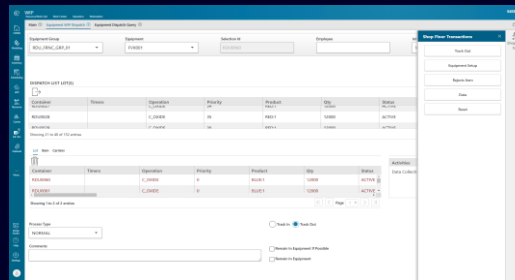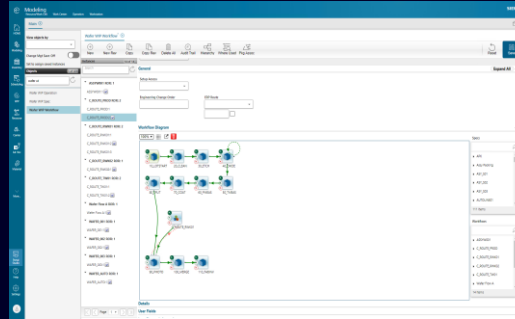
Benefits

- Rapidly implement a manufacturing execution system platform for maximum ROI
- Increase process yields by building quality into processes
- Quickly adapt to changing processes and product designs
- Quickly and accurately deploy manufacturing process changes
- Easily integrate with business systems and shop floor equipment
- Standardize on a single solution for frontend and backend plants
- Eliminate the cost and risk of aging systems

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Opcenter Execution Electronics
MES for electronics PCB and Box Production

Main functions

- Manages production processes by controlling and monitoring work orders, production schedules and material requirement
- Provides real-time quality control by managing defects and identifying areas for improvement
- Enables tracking of products and components throughout the entire production process
- Collects, analyzes, and reports process, performance and material data
- Supports seamless and integrated data flows as part of the entire product lifecycle
- Provide OOTB machine connectivity
- Delivers an advanced integration to engineering data
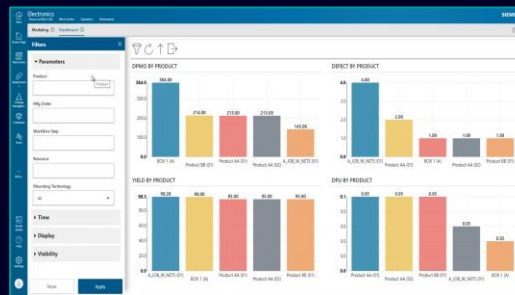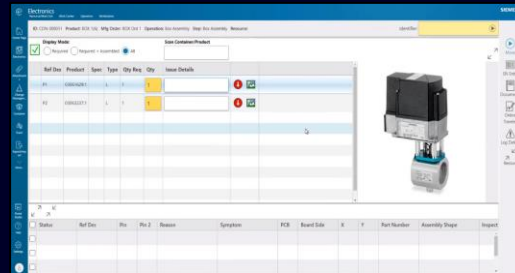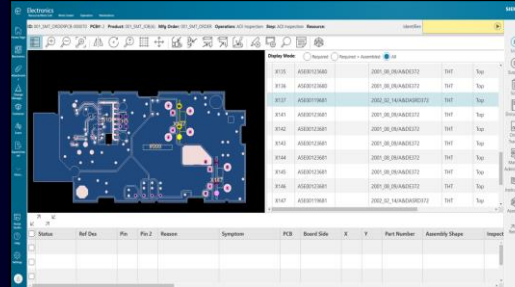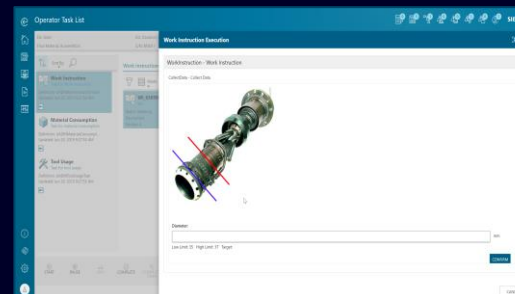

Benefits

- Improved efficiency due to optimized production processes, reduced downtime and increased throughput.
- Manage production complexity through automated and guided operations
- Real time monitoring and control results in faster response time and better decision making.
- Secured compliance and regulatory requirements due to detailed traceability.
- Identified and addressed quality issues.
- Data driven insights enable increased profitability.

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Opcenter Execution Discrete

Main functions

- Order Processing and Execution
- Production Tracking and Monitoring
- Material and Tool Management
- Electronic Work Instructions
- Non Conformance Management and Redlining
- Quality Sentencing and Escalation
- As-Built Generation
- Support of Powder-bed Additive Manufacturing
- ERP Integration
- Automation Integration
- Industry specific Operator Terminal
- Multiplant support
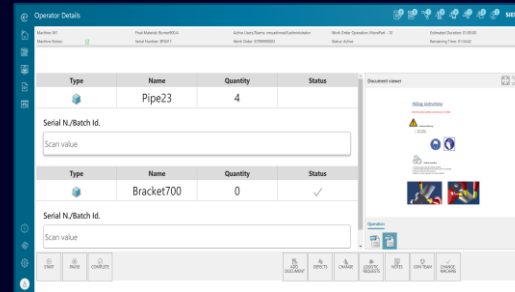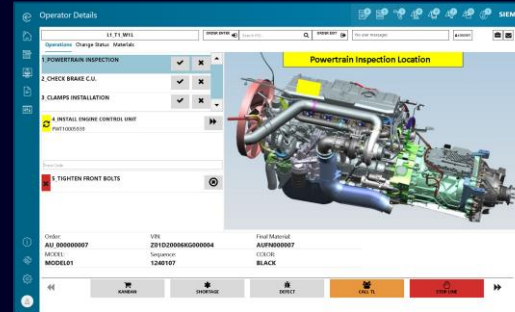
Benefits

- User-friendly UI providing compelling state-of-the-art experience
- Scrap and waste reduction through shop-floor operators walk-through
- Enforced audit and certification management
- Improved cost of production calculation
- Visibility of WIP, full product traceability and genealogy
- Efficient plant resources usage thanks to collaboration with scheduling module
- Reduction of Total Cost of Ownership thanks to Multiplant architecture support

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Opcenter Execution Process

Main functions

- BPMN modeling and execution of manufacturing processes
- Material Genealogy and Material Inventory
- Flexible Recipe Management, through a configurable hierarchy of Operations and Tasks
- ERP Integration
- Production Order Management, Execution and Realtime Tracking
- Seamless integration with SIMATIC BATCH and SISTAR / Braumat
- Shopfloor Integration based on OPC-UA
- Synchronization of automation tasks with Manual Operator Tasks and Quality Tasks
- Extensibility through LowCode UI
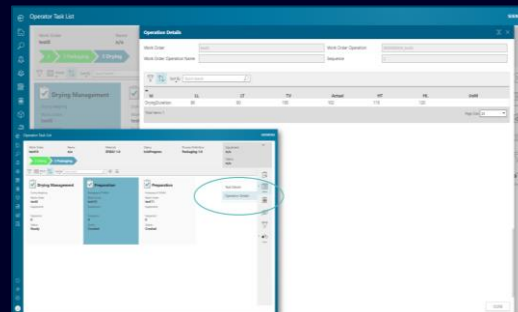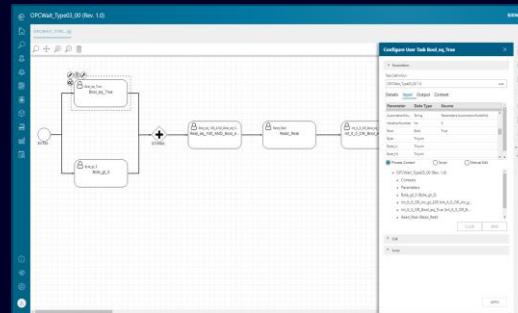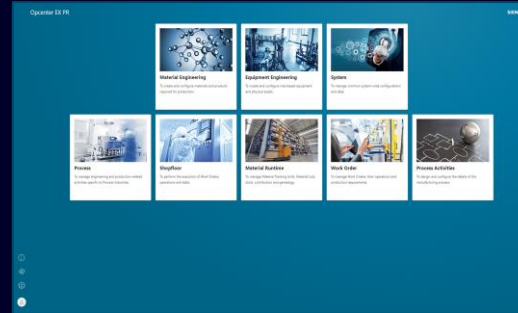
Benefits

- Synchronize all manufacturing operations
- Facilitate native orchestration of heterogeneous activities
- Material Tracking to enable Product Recall
- Detailed process recording and tracking
- Integrate manufacturing and quality
- Offer a One-Stop-Shop solution between Siemens MES and Siemens Batch Systems
- Allow integration with Third Party Automation or SCADA
- Provide a scalable solution, extending from MES to a full MOM system:
  - Native Integration with OC Scheduler, OC Intelligence, OC RDL Laboratory, OC FND-OEE
- Offer an Innovative User Experience

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Opcenter Execution Pharma

Main functions

- Process management including Work Flow and Work Instructions
- Weighing and Dispensing and Compounding
- Equipment Management
- Formula Management
- Material Flow Management
- Native integration to PCS7/SIMATIC Batch
- Paperless manufacturing with review by exception
- Compliant with Pharmaceutical regulations (CFR21, GHS …)
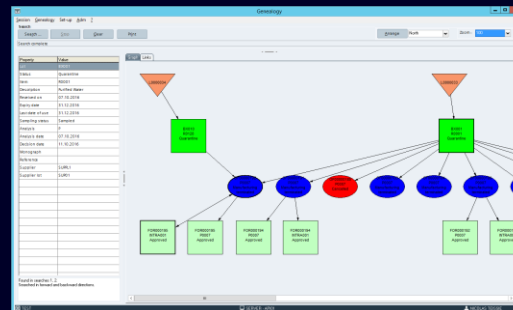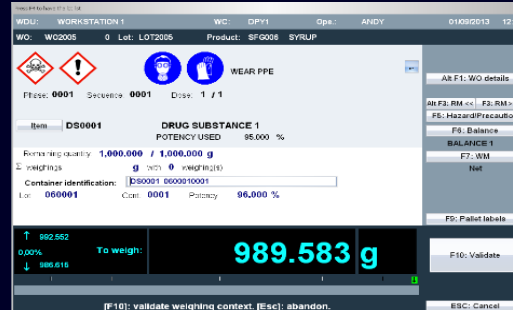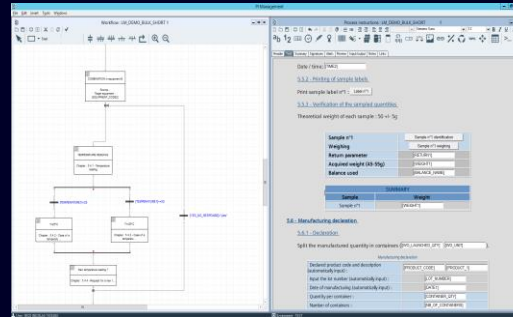
Benefits

- Reduces paper use until all processes can be performed electronically
- Reduces development effort and risk by integrating your MES and DCS in order to simplify the architecture, reduce configuration effort and lower ownership cost
- Standardizes libraries of process operations, re-use functional blocks and parametric MBR to enable standardization and harmonization processes
- Delivers single point of review for batch-relevant information, making reviews faster and safer

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Opcenter Intelligence - Performance

Main functions

- Central configuration of OEE entities
- Data ingestion from different data sources enriched with manufacturing contexts
- Dashboard for real-time monitoring and performance analysis
- Manual input for downtime justification, production counters via standard screen and REST API
- Machine Learning for data correlation and automatic root cause identification
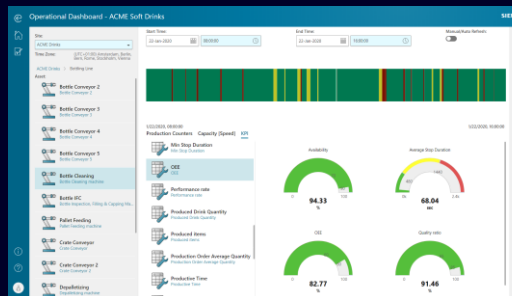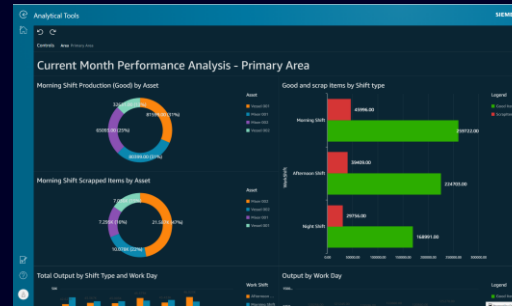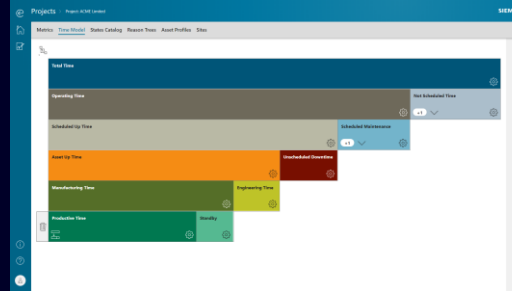
Benefits

- Collect, visualize and analyze equipment utilization and efficiency data
- Improve plant performance and asset utilization through manual and automatic data collection and analysis
- Standardize continuous improvement and best practices through advanced reporting and analysis
- Provide operators with intuitive KPI dashboards and real-time visibility into current downtime causes, empowering users to take immediate corrective action

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Opcenter Intelligence – Analytics

Main functions

- Uniform data platform for operational and enterprise data provides a common vision across the company
- Governance and data integration for MOM ecosystem
- Self-service data management to fulfill new business needs and third-party data
- Self-service analytics allows everyone to analyze and discover new business values
- Scalable solution from plant to enterprise
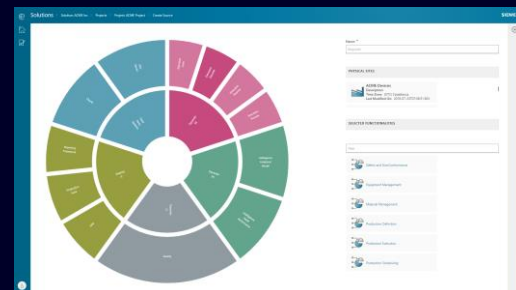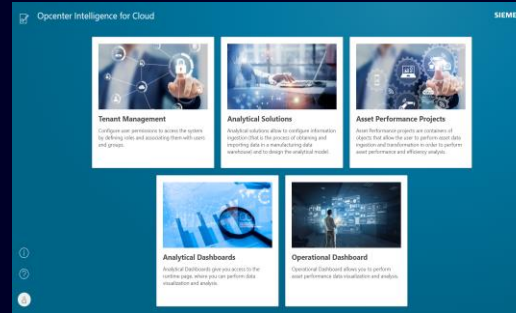
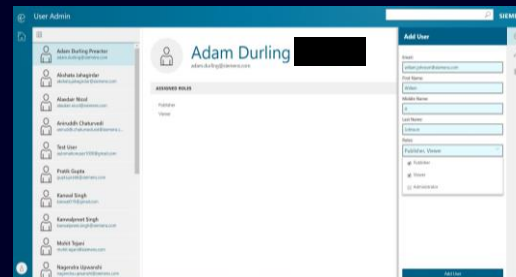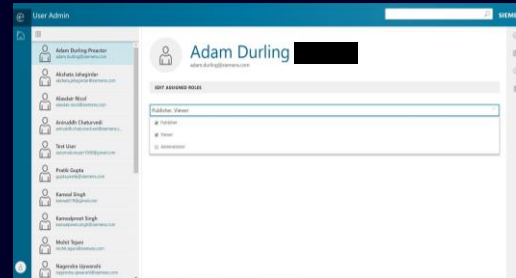## Benefits

- Enhance collaboration and visibility across company silos
- Unique platform for data analytics for all manufacturing-related data, always updated
- Increase efficiency and productivity
- Improve decision making
- Ability to better decide upon make versus buy issues
- Ability to more accurately predict delivery times
- Ability to reduce the risk of product failure or delay

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Opcenter APS

Main functions

- Long and mid-term planning

- Detailed scheduling

- Predicts effects of change
  in production, interruptions, machine
  breakdown, scrap

- Reacts to real time
  production efficiency

- Supports decisions
  - Overtime
  - Order prioritization
  - Split production batches
  - Due Date Negotiation
  - Order Promising (CTP/ATP)
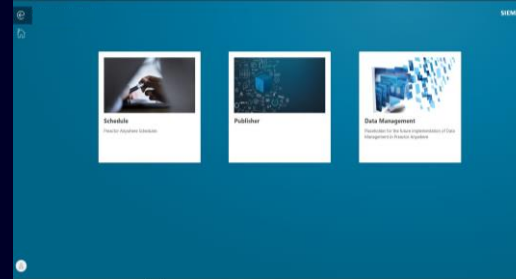
Benefits

- Enhances order inquiry capabilities for accurately
  promising orders

- Improves modeling of additional constraint groups

- Enhances integration with Opcenter Execution

- Improves integration with third-party products and
  shift data

- Provides powerful new data visualization tools

- Creates feature-rich visual reports and dashboards

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Opcenter Quality

Main functions

- Provide the tools for applying **Advanced Product Quality Planning** best practices (APQP), including Control Plan definition
- Create a reliable **Failure Mode and Effects Analysis** (FMEA)
- Monitor quality in the shopfloor with the execution of quality inspections and **statistical process control** (SPC)
- Defect acquisition and evaluation for accurate **complaint management** and resolution (customer/supplier/internal)
- Enhance the **audit and assessment** procedures
- Safeguard the **supplier quality management** (incoming goods inspection supplier assessment / supplier audit / complaints)
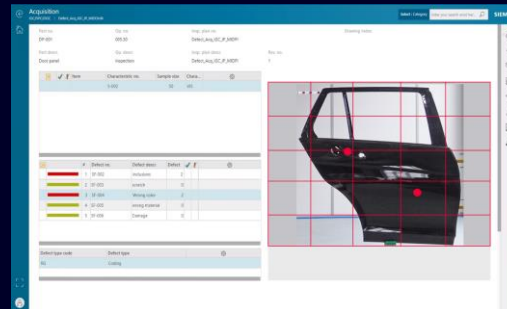
Benefits

- Manage the complexities for planning, controlling, monitoring of production processes and corporate quality.

- Profit from complete quality system and centralized data source with effectively measured quality metrics

- Meet regulatory standards and support compliance

- Boost a digital quality process in a manufacturing environment mainly characterized by manual, paper-based processes or homegrown systems

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Opcenter Research Development and Laboratory

Main functions

- Specification Management: enables speed, flexibility & transparency

- R&D Data Management: capture all experimental data in context of the R&D project

- Formula Workbench: digital formula design workspace

- Regulatory Compliance: real-time regulatory assessment of the product during development

- Supplier Collaboration: efficient interaction with suppliers on product development

- LIMS: efficient lab management, test execution and quality control
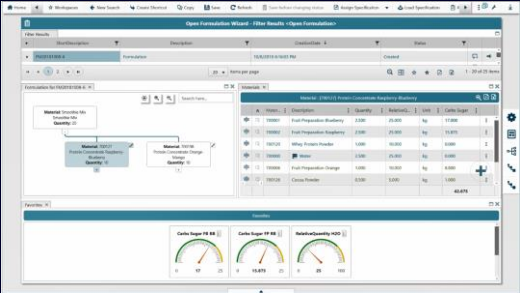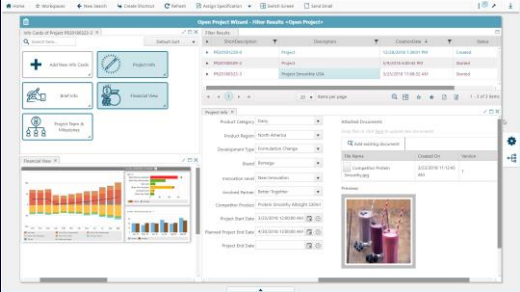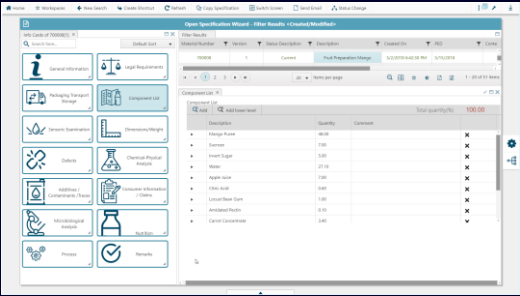
Benefits

- Faster Time to Market

- Lower costs due to structural savings in collaboration, process optimization, quality testing and product recalls

- Increased flexibility, transparency and control, with reduced complexity

- Regulatory compliance

- Company-wide product data consistency

- Closed-loop quality, from inbound to outbound

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Overview technological pillars

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The MOM evolution towards Cloud

01 Cloud Ready – Lift and Shift
- All major MOM platforms are ready to install on a cloud environment
- R&D Suite ready for Managed Services, more portfolio elements to follow

02 First Cloud Offerings – Cloud Native Apps
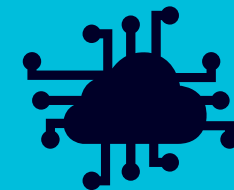- Enterprise Manufacturing Intelligence ready as a self-hosted MindApp and as AWS native SaaS offering
- Compliance and Advanced Planning and Scheduling will be developed as native SaaS offering next
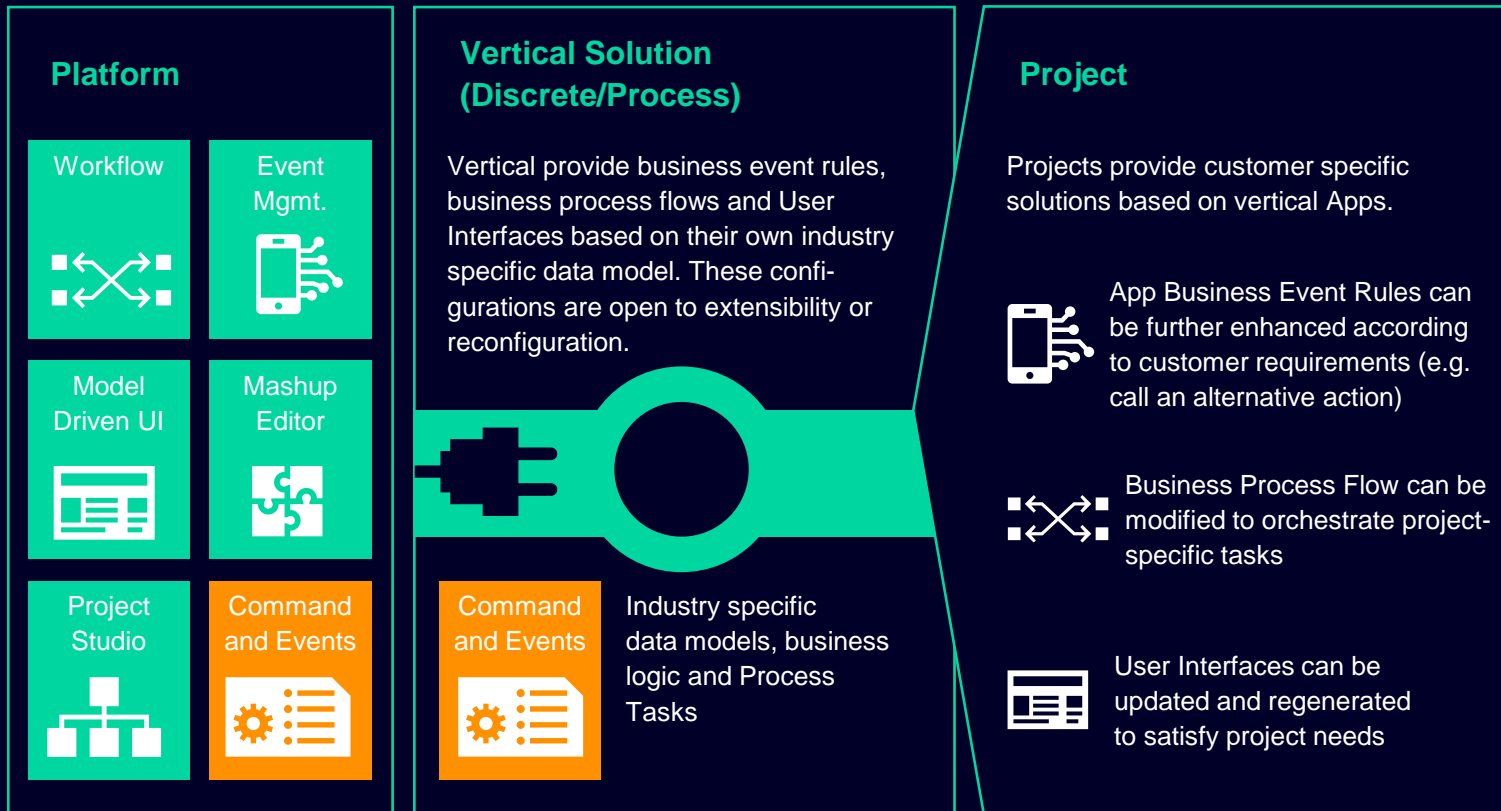
03 One MOM cloud platform – Initiate Cloud Native MES
- True cloud native application Multi-tenant micro-services
- MOM applicable deployment models Hybrid/cloud
- SaaS offering
- Targeting SMB first

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Code-less Extensibility

Platform

Workflow	Event Mgmt.
Model Driven UI	Mashup Editor
Project Studio	Command and Events

Vertical Solution (Discrete/Process)

Vertical provide business event rules, business process flows and User Interfaces based on their own industry specific data model. These configurations are open to extensibility or reconfiguration.

Command and Events

Industry specific data models, business logic and Process Tasks

Project

Projects provide customer specific solutions based on vertical Apps.

App Business Event Rules can be further enhanced according to customer requirements (e.g. call an alternative action)

Business Process Flow can be modified to orchestrate project-specific tasks

User Interfaces can be updated and regenerated to satisfy project needs
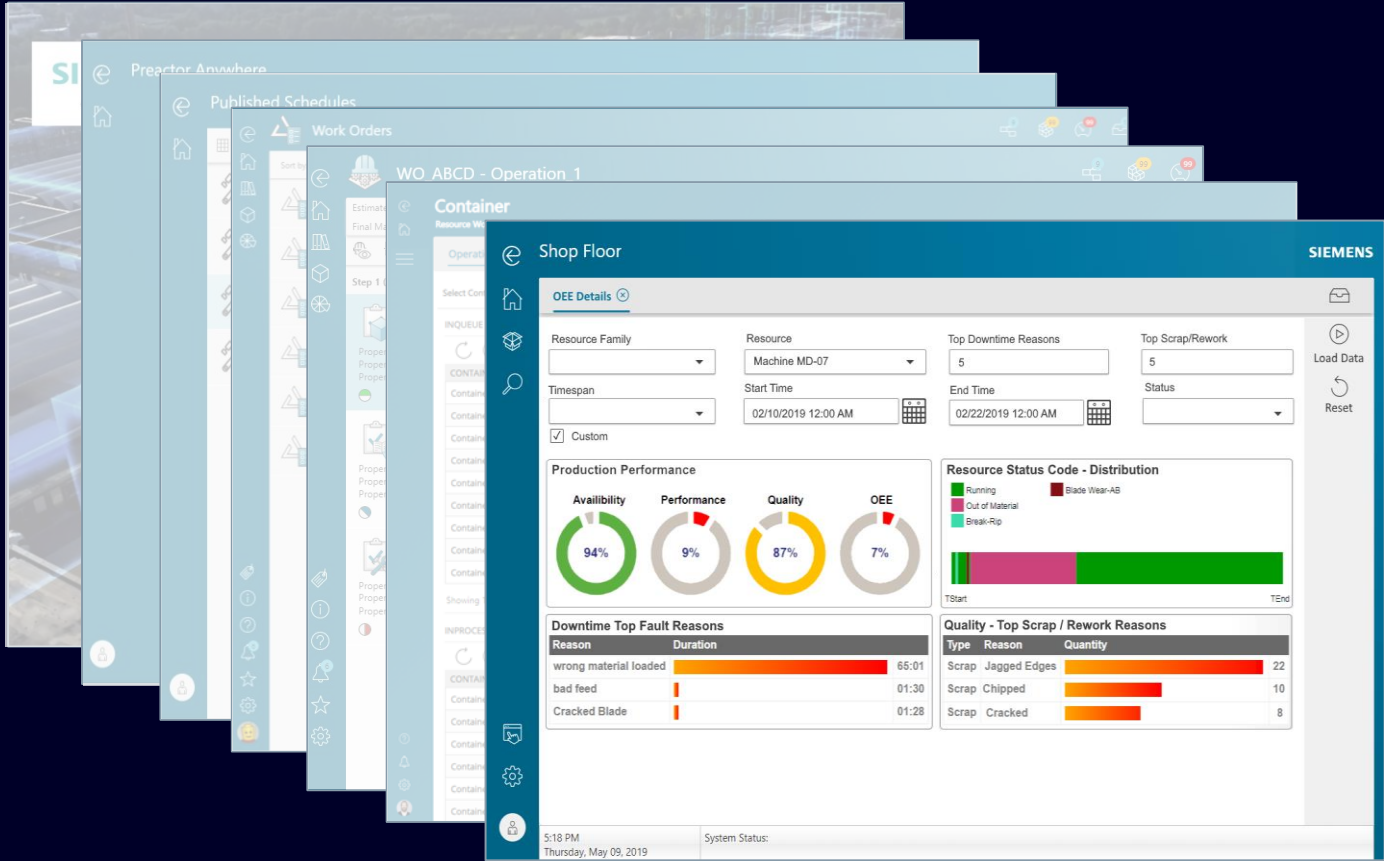
Benefits

- **Faster time to value**

- **Granular Apps** for a customizable MES Solution

- **Rich set of widgets**, layout and style guide to easily build custom application
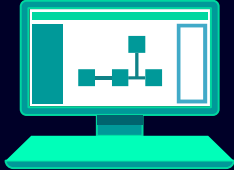
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Harmonize our user experience while differentiating capabilities
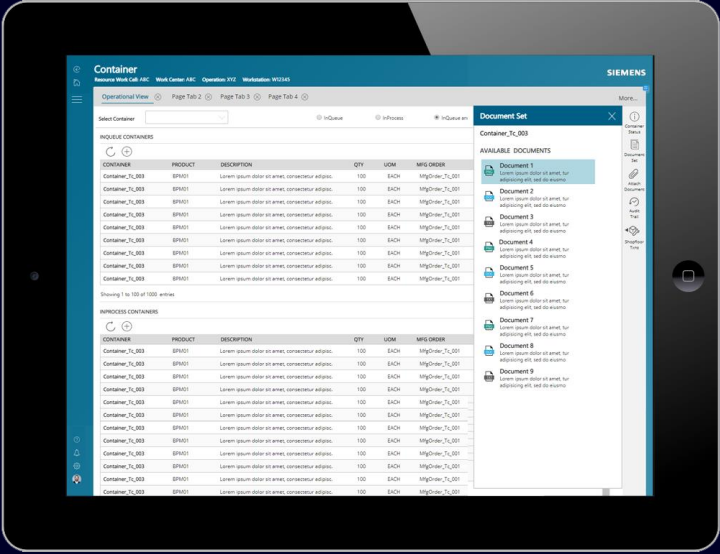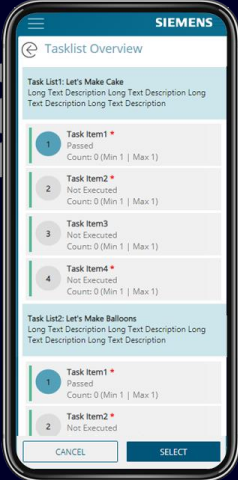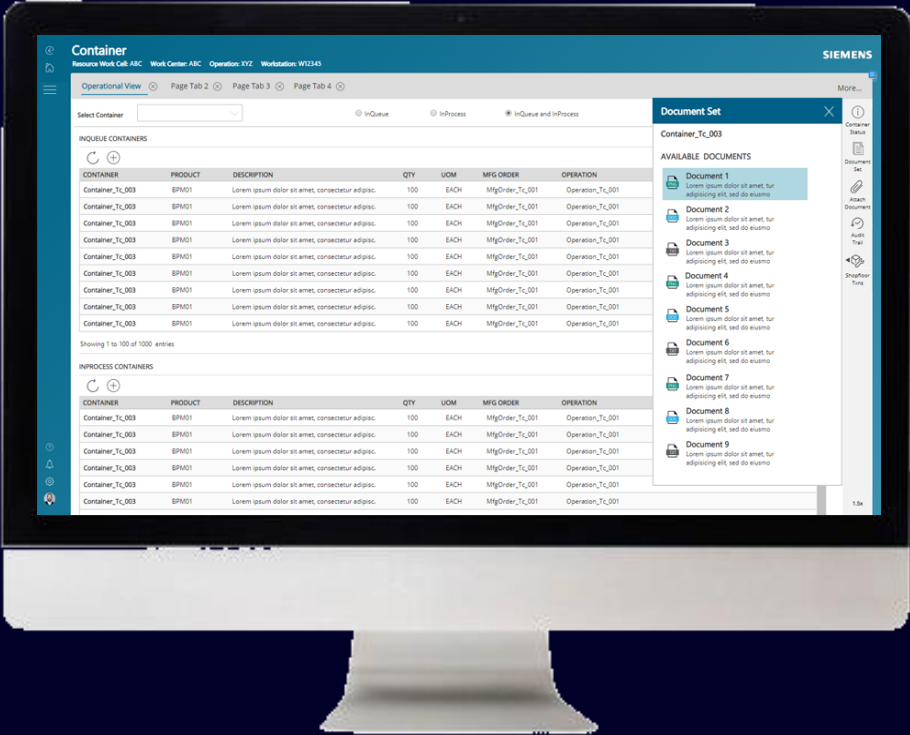

Benefits

Common Siemens look & feel

Harmonized user interface

Easy-to-use user experience

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Responsive UI for smart devices

Siemens MOM solutions are smart devices ready

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The interoperability hub of Siemens MOM

Comprehensive MOM solutions require rich product portfolio and seamless interoperability.
The MOM portfolio consists of multiple products with different platforms and technological standards.

Direct MOM-MOM product interfacing can lead to:

⬇ Complex interfacing net

⬇ Partial MOM-MOM integration

⬇ Version compatibility limits

⬇ Excessive data exchange

⬇ Limited supportability

RD&L

QMS

MES

Opcenter Connect

APS

EMI

3rd party
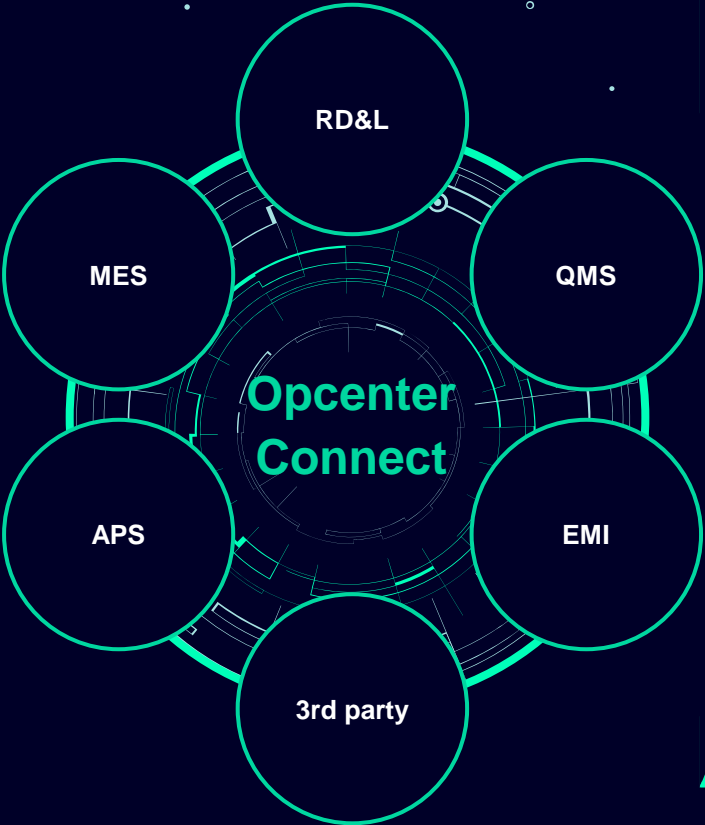
As a shared integration solution Opcenter Connect enables efficient data exchange
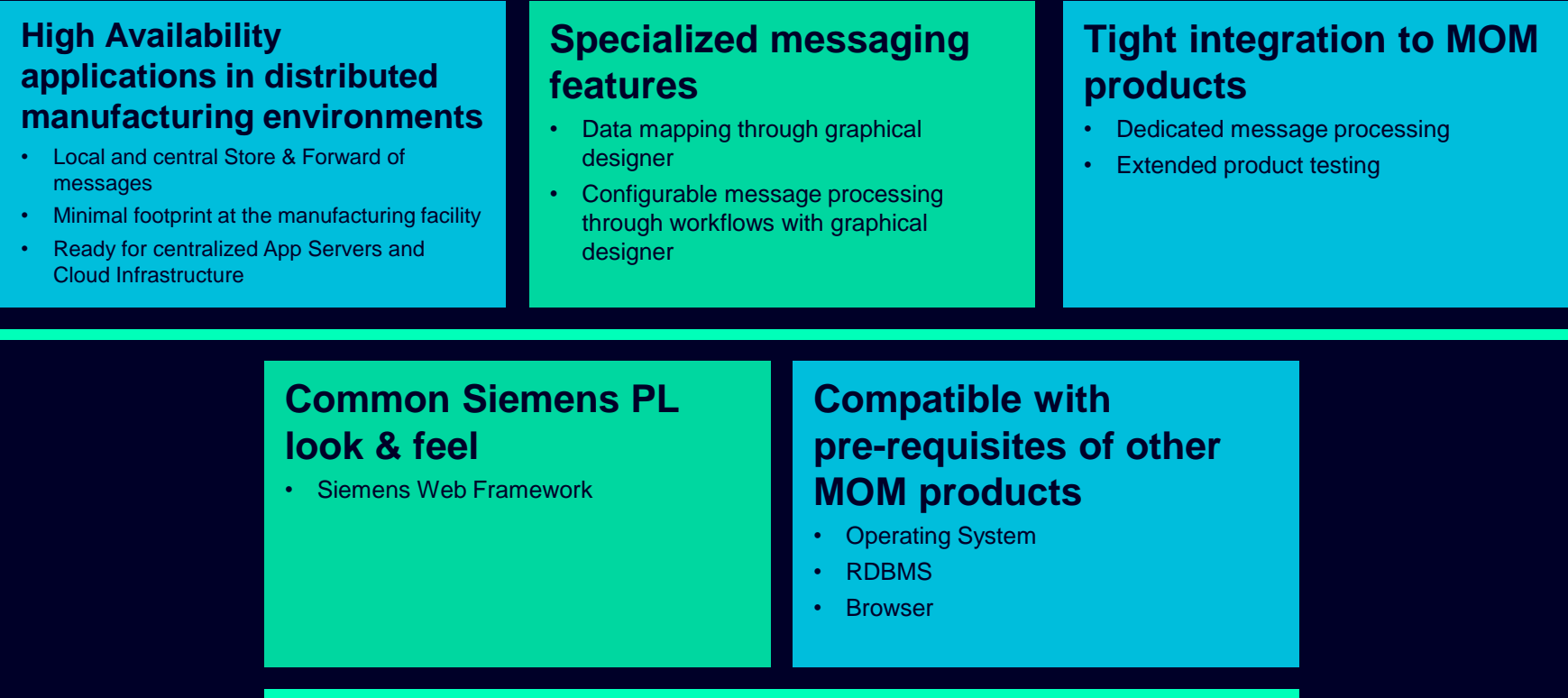
Interfacing greatly simplified ⬆

Full MOM coverage ⬆

Minimal version dependency ⬆

Data shared globally ⬆

Standardization of messages ⬆

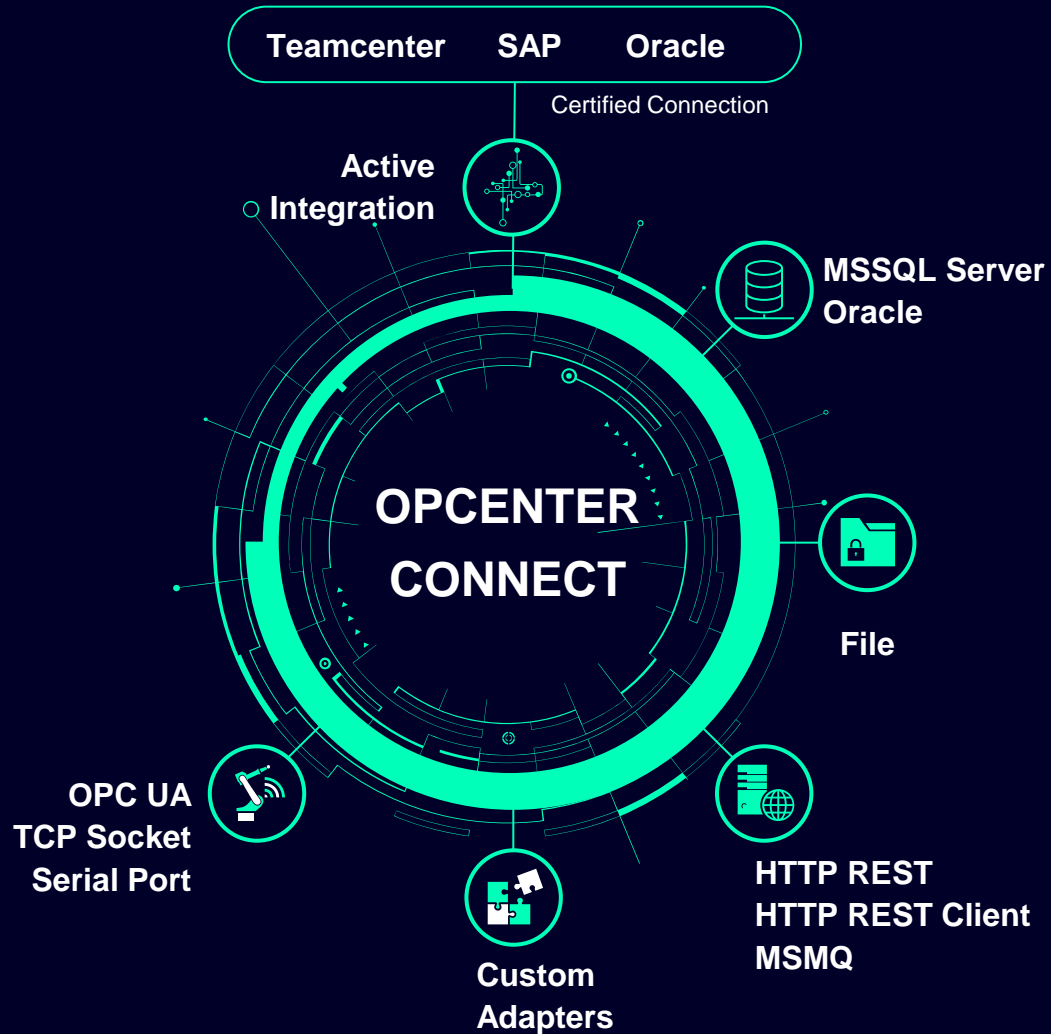1 1 0 0 1 1 0 0 1 1 0 0 1 1 0 0 1 1 0 0 1 1 0
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Opcenter Connect
Interoperability made for MOM

Opcenter Connect aims at the specific needs and use cases of MOM applications:

High Availability applications in distributed manufacturing environments

- Local and central Store & Forward of messages
- Minimal footprint at the manufacturing facility
- Ready for centralized App Servers and Cloud Infrastructure

Specialized messaging features

- Data mapping through graphical designer
- Configurable message processing through workflows with graphical designer

Tight integration to MOM products

- Dedicated message processing
- Extended product testing

Common Siemens PL look & feel

- Siemens Web Framework

Compatible with pre-requisites of other MOM products

- Operating System
- RDBMS
- Browser

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Opcenter Connect provides a rich collection of interfaces and features

Teamcenter   SAP   Oracle

Certified Connection

Active Integration

MSSQL Server
Oracle

OPCENTER CONNECT

File

OPC UA
TCP Socket
Serial Port

Custom
Adapters

HTTP REST
HTTP REST Client
MSMQ

Features overview

- Message delivery guarantee with store & forward

- Scalable servers & adapters w/ redundancy for HA

- Data mapping service

- Message processing service w/ graphical workflow

- Express mode for low latency messages

- Logging service for monitoring & diagnostics

- Highly configurable and extensible

- Fully compliant with Siemens security standards

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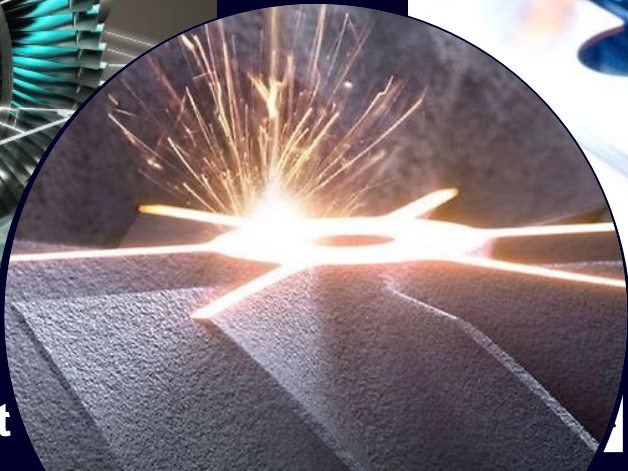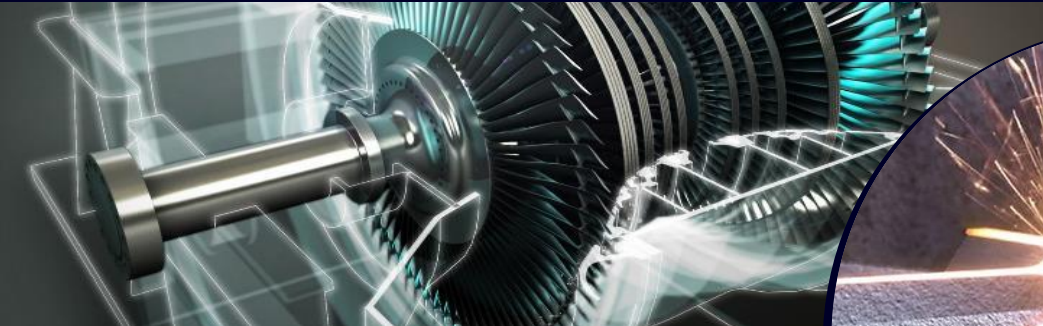# Supporting digital transformation in all the industries

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Supporting digital transformation in all the industries
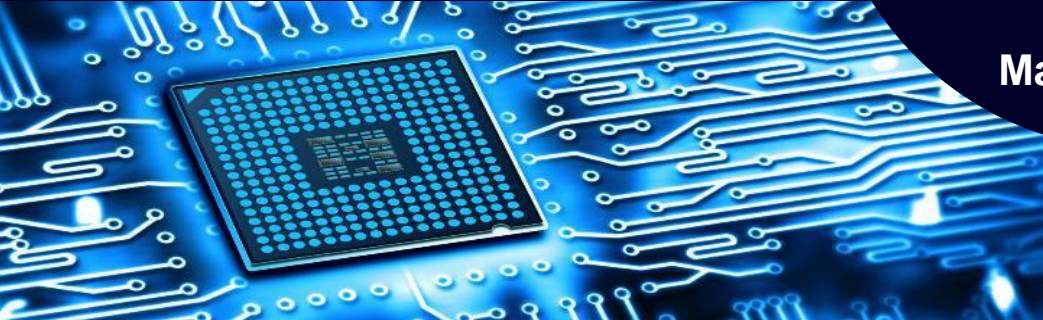
Complex Manufacturing

Process/Chem. Industries

Repetitive Manufact

Additive Manufacturing

Automotive and Transportation Assembly

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Thank you!

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