

# SIMATIC Plant Intelligence

The more intelligent solution for greater transparency



## SIMATIC HMI

Answers for industry.

**SIEMENS**

# SIMATIC Plant Intelligence

Greater transparency from the machine to the enterprise level

Increasing quality requirements coupled with rapid product changes and frequent modifications are making production processes more complex. Other factors such as fluctuating plant utilization and unavoidable quality differences in deliveries can negatively impact system productivity. To meet these challenges, prompt decisions need to be made with respect to process optimization at all levels in a business enterprise.

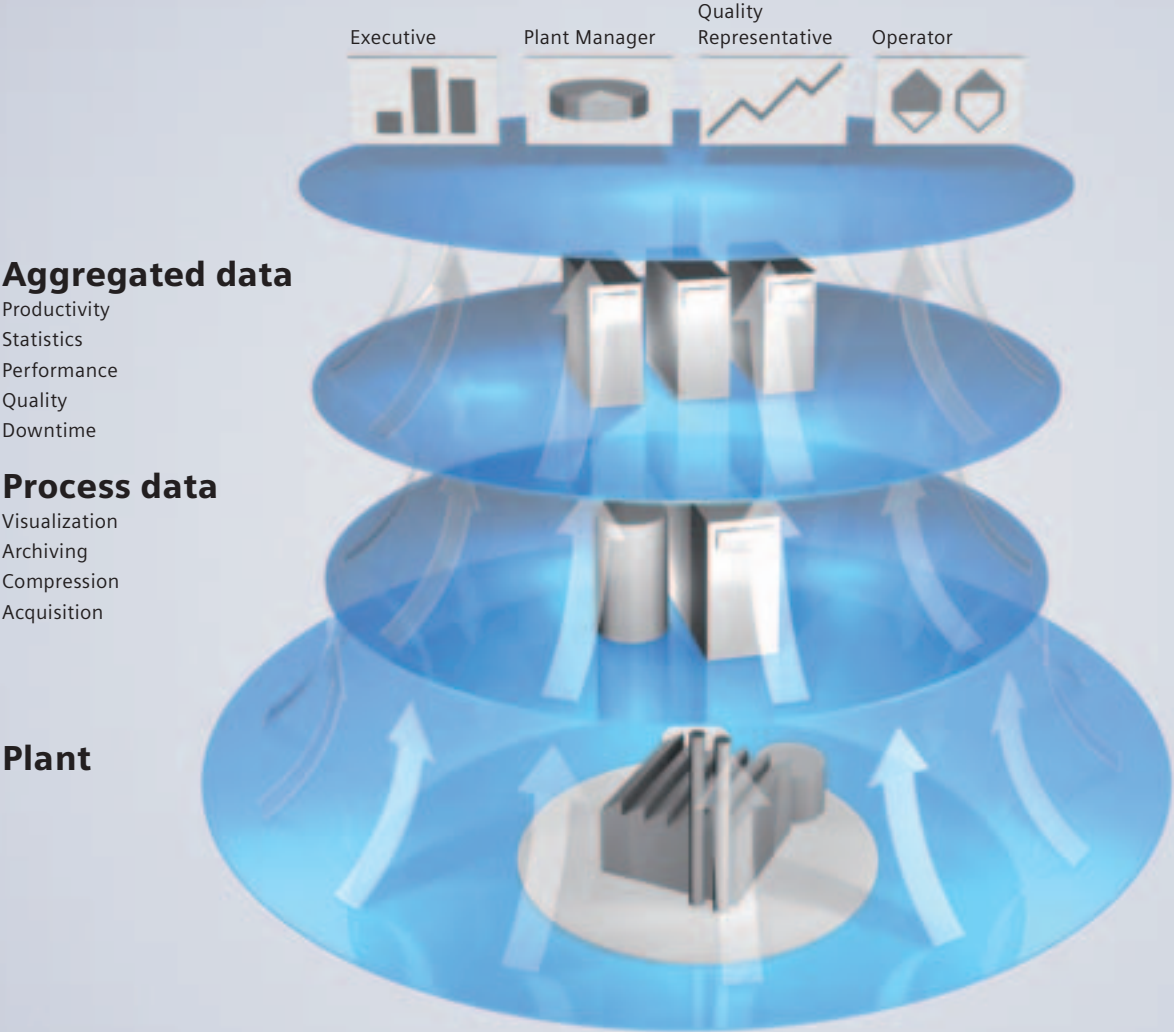
SIMATIC Plant Intelligence allows these decision-making processes to be optimized. Plant Intelligence stands for the intelligent use of information generated in the entire production environment. Siemens is the first supplier to provide transparency from the machine up to the enterprise level with a fully integrated software solution.

This integrated and scalable software solution integrates the SCADA system (Supervisory Control and Data Acquisition) and the MES solution (Manufacturing Execution System). The SCADA system prepares production data. The MES system supplies planning and job data from the enterprise level when required. The user defines the desired information depth and can easily upgrade and expand it by degrees – ranging from the machine view up to data integration from the enterprise level.

Both tools work together and use common data management. This means that there are no interface issues. Regardless of the sector or the application, with SIMATIC Plant Intelligence you benefit from the integration of the SCADA system and the MES solution repeatedly through:

- Reduction of sources of error by avoiding double data entries
- Reliable basis for decisions due to an exceptionally high degree of data consistency
- Quick upgrade with new functions: The same engineering makes this possible
- More effective advice from the same project manager for both systems
- Global service for global players, as Siemens has locations all over the world

Plant Intelligence generates critical information for decision-makers at all levels in a company in real time. This speeds up the decision-making processes and optimizes productivity in the production process.



# SIMATIC Plant Intelligence

The intelligent solution for more effective decisions

Getting started with SIMATIC Plant Intelligence is easy: You can choose from the SIMATIC WinCC process visualization system or the SIMATIC IT MES system. The Siemens solution allows you to upgrade easily from process visualization to a comprehensive optimization solution at the MES level.

## ① The basis for optimizing information quality – SIMATIC WinCC

Plant Intelligence starts at the automation level. Recording machine and operating data forms the basis for optimum information quality and is thus a prerequisite for preparing decision-making processes. Many types of information can be derived from data generated on the shopfloor – assuming this data has been compressed and processed. This is exactly what the SIMATIC WinCC process visualization system does with its options for Plant Intelligence, that is, it records, archives, analyzes and distributes production data.

## ② Improved decision-making authority with the SIMATIC IT MES system

ERP systems at the enterprise level manage a myriad of other data, which impact the production process and, thus, the decision-making process. MES systems act as a link between production automation and ERP systems. This generates work orders from customer orders. Going in the opposite direction, they compress production data in real time and build practical information units that are up to date and precisely adapted to the information needs of the specific target group. SIMATIC IT, the modular Siemens MES system, is better suited than SIMATIC WinCC to applications where a specific



number of systems is exceeded or other production data, for example, from the material management system, need to be integrated. SIMATIC IT allows you to obtain the interrelationships between parameters such as key performance indicators (KPIs) from a number of systems, and at the same time access other data sources in order to analyze production data, such as job orders and batch data. Complex and large-scale systems can give rise to a large number of theoretically possible plant conditions and states. To be on the safe side, responses to such foreseeable events should be automated. The SIMATIC IT production control system smoothes out productivity variations and increases operational reliability.



- 2 Getting started with SIMATIC IT Plant Intelligence

Manufacturing Efficiency

- 1 Getting started with SIMATIC WinCC Plant Intelligence

Equipment and Line Efficiency

**SIMATIC WinCC**  
Data from production

**SIMATIC IT**  
Production and enterprise data

Upgrade

### Step by step – from SCADA to a complete MES system

In Totally Integrated Automation, Plant Intelligence, SCADA and MES complement each other. You can upgrade an installed SCADA solution that already incorporates SIMATIC WinCC with Plant Intelligence simply by adding on options. We recommend Plant Intelligence based on SIMATIC IT for more demanding requirements. You are guaranteed maximum return on investment by simply upgrading from SIMATIC WinCC to SIMATIC IT. Both systems have a uniform user interface and common interfaces since they are both developed by the same company. Data management is the same in both systems. This means that projects created in WinCC can be used in SIMATIC IT. Standard designs reduce the learning phase for the upgrade.

The Siemens SIMATIC Plant Intelligence solution allows you to optimize your company – regardless of the sector you are in. You simply raise Plant Intelligence to a higher level, e.g. to the MES level, or even to the enterprise level. SIMATIC IT allows you to define processes that can be triggered by specific states or events. Thus, quality variations and safety risks can be eliminated. SIMATIC IT also allows you to foresee imminent downtimes in good time and instigate pre-emptive measures. SIMATIC IT maintains productivity continually at a maximum level.

# Enhanced overall equipment effectiveness

thanks to SIMATIC Plant Intelligence

Regardless of whether you opt for the WinCC SCADA system or the multi-plant variant based on SIMATIC IT – the primary targets of SIMATIC Plant Intelligence are always the continuous improvement of the overall equipment effectiveness OEE.

## Overall equipment effectiveness OEE

Overall equipment effectiveness OEE is a metric defined by the Japanese Institute of Plant Maintenance. The OEE is composed of three factors:

- **Availability**
- **Performance rate**
- **Quality rate**

The availability is 100 % when the time that a machine is actually in operation equals the planned production time. The planned production time is calculated from the sum total of the shift times in one month. Breakdowns, rigging and set-up procedures typically lead to a 100 % deviation in availability.

The performance rate is the ratio of the pieces actually produced per time unit and the maximum possible number of pieces as specified by the machine supplier.

The quality rate is the number of good pieces as a ratio of the total number of pieces produced per time unit.

The OEE is defined as the product of availability, performance rate and quality rate. It is a measure of the proportion of the planned production time taken to actually produce good pieces.

An OEE of 85 % is recognized as world-class.

The OEE is a complex metric composed of availability, performance rate and quality rate. Sophisticated software tools are needed to calculate and analyze it. The WinCC/DowntimeMonitor, a SIMATIC WinCC option, is one such tool. On very large plants, SIMATIC IT OEE-DTM allows you to detect which plant components make what

contribution to the OEE, and where the weak points are that have a negative impact on the OEE. The information provided by SIMATIC IT OEE-DTM helps maintenance personnel decide which measures will have the maximum short-term effect, and enables operations scheduling to take this information into account when allocating job orders to specific lines or subsystems. SIMATIC IT goes further and combines this data with other information – for example from the company management level – to optimize processes across the entire enterprise.



# Practical examples

## SIMATIC Plant Intelligence at a bottling plant



### Plant Intelligence with SIMATIC WinCC

A bottling plant consists of different components: a cleaning station is connected upstream of the actual drinks filling process, with a test station downstream. Bottles are sealed, labeled and leave the system in six-packs. The WinCC/DowntimeMonitor helps determine which component, due to which technical fault, makes what contribution to the overall equipment effectiveness OEE. To this end, the WinCC/DowntimeMonitor processes KPIs which are time-dependent. Where it is of use, you may supplement or replace the WinCC/DowntimeMonitor with another software option, the WinCC/ProcessMonitor. The WinCC/ProcessMonitor records process data from which it can generate and display freely definable KPIs. Significantly increased productivity levels can be achieved on large plants by using the information provided. (Please refer to page 10 for more information on WinCC options.)

### Plant Intelligence with SIMATIC IT

If, for example, a labeler fails in the bottling plant at irregular intervals because the glue feed is blocked, the reason for

the failure cannot be found in the information which the SCADA system plant diagnostics produces. In this case, an analysis of the information on the raw materials can be of use. This type of information is available at the company management level, and may be called up via the MES system. Plant Intelligence means: link key data together to obtain decision-relevant information. In this case, it may become apparent that the glue feed always gets blocked when glue from a particular supplier is used. This is the critical information that enables the decision to be taken to change suppliers. Information of a considerably better quality is generated by merging production data and data from the company management level. Decision-makers in the specific department would not have this type of information, even if they were very experienced. Plant Intelligence with SIMATIC IT raises decision-making authority at all levels in a company to a higher level and thus leverages considerably better productivity potentials.



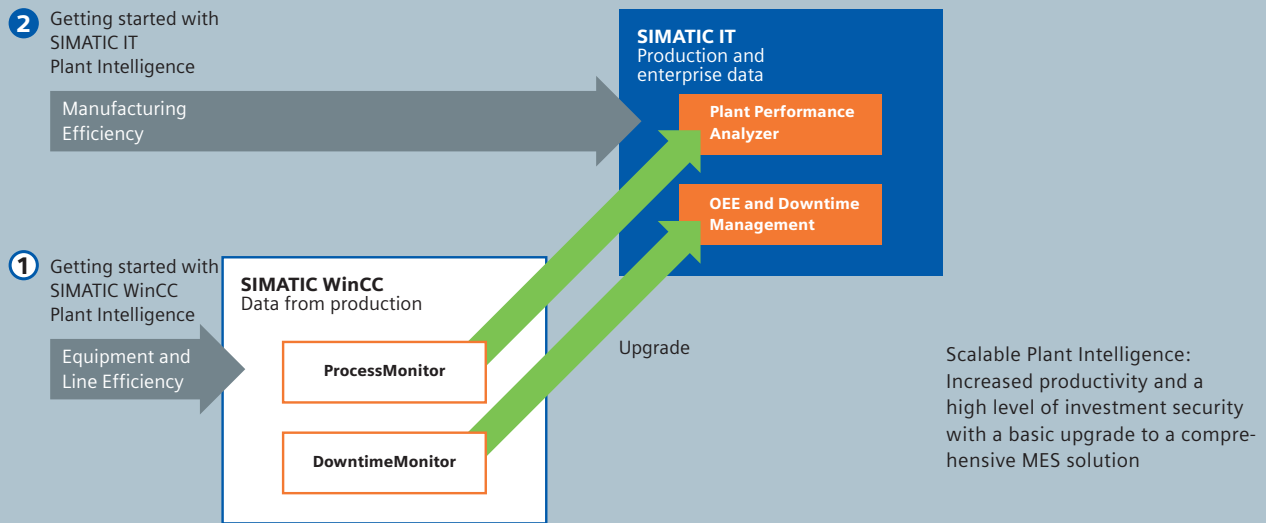
## Another practical example

SIMATIC IT makes positive exceptions to the rule

If the overall equipment effectiveness OEE for a plant for a given period is measured and documented in a company, the analysis always shows that on some days the value obtained is much higher than the average. Downtime management does not always show up the reason for this improved performance. Very difficult and time-consuming investigations are needed in the production process to detect and explain the causes and to draw the right conclusions. If the intervals between the positive hiccups are sufficiently long, it is not possible to completely reconstruct the relevant influence quantities, for example, the people involved or the condition of tools. If the interdependencies and relationships cannot be identified, the

desired and theoretically possible results remain the exception rather than the rule. Plant Intelligence with SIMATIC IT compiles data from all departments and uncovers even those types of unintuitive interdependencies and relationships nobody had expected. MES system components can be added on to allow optimal production conditions to be the norm: machine settings, maintenance conditions, capacity utilizations, application of resources and personnel, and material flow are scheduled and controlled accordingly. Consequently, overall equipment effectiveness is maintained at a constant high level.

## Modules for SIMATIC Plant Intelligence



### □ WinCC/DowntimeMonitor – process optimization and quality analysis with machine data management

This machine data management software renders WinCC the central recording and evaluation station for machine and process data. It determines time-dependent identification metrics for plant units, machines or production lines. Examples are mean time to repair (MTTR), mean time between failure (MTBF) or overall equipment effectiveness (OEE). Production shifts can also be analyzed via a shift schedule.

### □ WinCC/ProcessMonitor – process optimization and quality analysis with machine data management

WinCC/ProcessMonitor collects, manipulates, analyzes, and stores process data. It allows freely definable enterprise-specific metrics to be determined and compared. Additionally, the volume of disturbances and faults is analyzed, whereby bottlenecks in the production process are flagged.

### □ WinCC/DataMonitor – monitoring and analyzing via the Web

WinCC/DataMonitor allows back-office data to be processed and posted to the Web. Thus the production process can be efficiently monitored and analyzed. Reports are up to date and available globally, and may be issued time- or event-driven in different formats.

### WinCC/IndustrialDataBridge – connection to databases and IT systems

WinCC/IndustrialDataBridge allows systems from different manufacturers to be integrated. A variety of interfaces are available for this purpose, e.g. OPC, SQL, ODBC, OLE-DB and office formats.

### WinCC/ConnectivityPack – access to WinCC via OPC and WinCC OLE-DB

WinCC/ConnectivityPack allows straightforward IT and business integration and access to up-to-date and historical data from any type of computer system via standard interfaces such as OPC XML DA, OPC HDA, OPC A&E, OPC historical A&E and WinCC OLE-DB.

### ■ SIMATIC IT OEE-DTM – overall equipment effectiveness and downtime management

The SIMATIC IT OEE-DTM monitors machine efficiency and offers information for decision-making based on cost-efficiency indicators. SIMATIC IT OEE-DTM allows detailed specification, recording and analysis of downtimes, leverages improvement potentials and allows continuous implementation.

Upgrade possible

### ■ SIMATIC IT PPA – plant performance analyzer

The plant performance analyzer has the following key tasks: data collection from a host of repositories, data aggregation and validation, KPI calculation (cyclically and when data changes) and long-term storage as per FDA requirements (Food and Drug Administration).

Upgrade possible

# Always the right solution

for every customer, for every application



Sector-specific automation solutions that are matched to individual customer requirements and based on Totally Integrated Automation can be implemented, enabling the productivity of an enterprise to be enhanced along with a high degree of investment security. Totally Integrated Automation is an outstanding feature of Siemens automation solutions. This totally integrated concept has been on the automation market for many years and has now been extended to Plant Intelligence. Consequently, a scalable software solution with common interfaces, common data management and common engineering has originated out of the joint development of SCADA and MES system

by a single company. The open system architecture and scalability of SIMATIC Plant Intelligence allows excellent adaptation to the requirements and needs of specific customers and the specific application.

Have we captured your interest? For additional information, go to [www.siemens.com/plant-intelligence](http://www.siemens.com/plant-intelligence). Or arrange a meeting with one of our project managers – we are sure we can find the ideal solution for your application.

## More information:

[www.siemens.com/plant-intelligence](http://www.siemens.com/plant-intelligence)

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