



SIMATIC IT Production Suite

V6.4

SIMATIC IT Product News

Answers for industry.

SIEMENS

IA AS MES (Manufacturing Execution System)

Genoa, Italy
April 2009

SIMATIC IT Production Suite V6.4

SIMATIC IT Production Suite V6.4 release is planned for May 2009.

1 SIMATIC IT Production Suite Brief Description

SIMATIC IT Production Suite fills the gap between Business Logistic Systems (typically ERPs) and Control Systems, allowing the conditions for an increase in the efficiency of the overall supply chain.

SIMATIC IT is a collection of highly-integrated components, designed to coordinate the systems within each factory, standardize production across the entire enterprise and keep manufacturing processes aligned with supply chain activity. SIMATIC IT provides a high level Framework-Concept environment that enables the description of the manufacturing processes and the operation procedures, by synchronizing and coordinating the functions provided by the individual components. These functions will properly perform the actions required for managing the production, such as orders management, material management, KPIs calculation and so on.

For more information, please refer to:
<http://www.siemens.com/mes-simaticit>

2 SIMATIC IT Production Suite V6.4 new major features

The new major features are:

1. SIMATIC IT Cluster Manager
2. SIMATIC IT Components: BREAD support
3. SIMATIC IT Components: Web Clients
4. SIMATIC IT Portal enhancements
5. New Material Management functionalities in SIMATIC IT
6. Custom Object Management
7. SIMATIC IT Logbook Service enhancements
8. SIMATIC IT System Monitor enhancements
9. SIMATIC IT Production Modeler enhancements
10. Microsoft Visual Studio .Net support

2.1 SIMATIC IT Cluster Manager

One of the most relevant requirements in Manufacturing Execution System (MES) applications is to provide *high availability* of the system in case of:

- Hardware failure
- Server maintenance operations

In these cases, regardless of what caused the problem, the user is responsible for *short downtime* and implementing a *business* continuity plan.

From the SIMATIC IT product perspective, this objective is satisfied by using the Microsoft Cluster Service (MSCS), a component included in Windows Server 2003 Enterprise whose main feature is to guarantee the continuity of work of an application installed on a set of computers belonging to a *cluster*.

SIMATIC IT supports 'two-node' clusters.

From the MSCS perspective, SIMATIC IT is a unique resource - named SIMATIC IT Cluster Manager - which can be added to one or more MSCS cluster groups in the specific MSCS configuration environment (i.e. the Microsoft Cluster Administrator tool).

Then, the SIMATIC IT configuration environment allows the user to define groups of SIMATIC IT resources that must run on the cluster.

Within a SIMATIC IT group, SIMATIC IT resources refer to the set of resources defined and managed in the SIMATIC IT environment, in particular:

- Any SIMATIC IT component server:
 - Production Order Manager (POM)
 - Material Manager (MM)
 - Shift Calendar (SHC)
 - Personnel Manager (PRM)
 - Data Integration Service (DIS)
 - Product Definition Manager (PDefM, this engineering tool does not provide high availability)
 - Production Modeler (PM)
 - Logbook Server
 - Custom Object (CO) Server
 - Report Manager (RM) User Synchronization
 - Compliance Service (CS)
 - Messaging Manager
 - Business Process Modeler (BPM)
- Plants related to Production Modeler projects.

2.2 SIMATIC IT Components: BREAD support

A set of .NET classes is available to access SIMATIC IT data directly from the SIMATIC IT CAB engineering environment.

These .NET classes are called BREAD, an acronym that refers to the complete set of actions that can be performed on a database: Browse, Read, Edit, Add, Delete.

The user can use these classes in CAB Engineering to build Web forms that can access data on SIMATIC IT components in a quick way (point-and-click).

In particular, these classes implement the interface required by Microsoft in order to be used directly as business objects in Microsoft .NET data sources.

BREAD interfaces solve performance issues related to long-times data loading, using SQL Server side pagination.

BREAD Interfaces are provided for:

- Material Manager (MM)
- Production Order Management (POM)
- Personnel Manager (PRM)
- Business Process Modeler (BPM)
- Shift Calendar (SHC)
- Units of Measure Tool (UOM)

2.3 SIMATIC IT Components: Web Clients

A set of Web pages (to be hosted by SIMATIC IT Portal) is available as a new graphical user interface for the following components:

- Material Manager (MM)
- Production Order Management (POM)
- Personnel Manager (PRM)
- Business Process Modeler (BPM)
- Shift Calendar (SHC)
- Units of Measure Tool (UOM).

Each component display is managed as a SIMATIC IT Portal Package, so that it can be activated or deactivated in the SIMATIC IT Portal Administrative Console.

From the SIMATIC IT Portal Administrative Console, the user can configure a SIMATIC IT Portal application to load the Web pages related to the Production Suite components of interest.

Web Clients access SIMATIC IT data via the new BREAD interface.

2.4 SIMATIC IT Portal enhancements

The SIMATIC IT Portal is the CAB-based application that serves as the Product Portal for SIMATIC IT components.

The SIMATIC IT Portal Administration Console is a separate web application which allows the user to manage packages that implement Web Displays for different SIMATIC IT components.

2.4.1 SIMATIC IT Portal installation and configuration phases

The user can perform all SIMATIC IT Portal installation and configuration by using the SIMATIC IT Console and SIMATIC IT Setup.

After running the setup, the user can create the CAB Portal Database within the SIMATIC IT MES Options Server Configurator (MOSC).

The actions are the following:

- Install the Application Server with the SIMATIC IT Setup
- Install the Web Server with the SIMATIC IT Setup
- Run the MOSC from the Application Server
 - Create the MES Database in the Database Server
 - Create the CAB Portal Database in the Database Server

2.4.2 SIMATIC IT Portal Administration Console

The Portal Administration Console allows web administrators to manage multiple CAB Portal instances installed on the same web server easy and effectively.

Each individual instance may have its own purpose, such as a test portal, a production environment or a development site.

Applications are customizable through the installation of web contents. These contents are referred to as “packages”.

The Portal Administration Console assists web administrators by displaying available package information, installing/uninstalling packages in various target applications and managing the updating of installed packages to new versions.

2.4.3 SIMATIC IT Portal packages

Several pre-built packages are supplied with SIMATIC IT.

Most of them are associated with SIMATIC IT components to implement advanced data visualization.

They can be installed inside the SIMATIC IT Portal.

Portal Packages are automatically configured to retrieve data from the active SIMATIC IT database via BREAD classes.

Below are the available Portal packages:

- SIT_EQU: Implements the web display for the SIMATIC IT Equipment Library
- PRSWEB_Common: Provides common functionalities (e.g. controls, images and shared pages) to other Production Suite packages.
- PRSWEB_MM: Implements the web display for Material Manager.
- PRSWEB_POM: Implements the web display for Production Order Manager.
- PRSWEB_SHC: Implements the web display for the Shift Calendar.
- PRSWEB_PRM: Implements the web display for Personnel Manager.
- PRSWEB_BPM: Implements the web display for Business Process Modeler.
- PRSWEB_UOM: Implements the web display for the Units of Measure Manager.

2.4.4 SIT-MST (Manager/Spooler Template) and SIT-EQU (Equipment) available in SIMATIC IT Portal

The SIMATIC IT Portal allows the user to manage the SIT-EQU library:

- Configure SIT-EQU parameters: The “Parameter Configuration” page permits configuring the main SIT_EQU parameters.
- Configure Equipment Status changes: The “Manager Configuration” page permits managing the synchronization between equipment status change in control systems and equipment status change in Manufacturing Execution Systems (SIT_EQU library).
All MES and PLC’s statuses and their relationships are contained in the EQU-MANAGER logical cell.
- Configure Spoolers: The “Spooler Configuration” page permits managing the status of the spooler being customized. It is possible to select the preconfigured status and add it to the selected spooler.
- Set the Spooler Status: The “Operator Page” permits performing runtime operations.

2.5 New Material Management functionalities in SIMATIC IT

The following functions are available in SIMATIC IT Material Manager Web Client:

- Lot Searching
- Lot Genealogy
- Lot Traceability
- Lot Genealogy Reporting.

In order to access these functions, the user must configure the Material Manager package from the SIMATIC Portal Administrative Console and navigate on the Web page via Internet Explorer.

The “Lot Searching” page allows filtering the lots/sublots contained in the system in order to select one of them to display genealogy information.

They can be searched according to property values, equipment, history on equipment, materials, creation date, last modification date, deletion status, etc.

The “Lot Genealogy” page allows displaying genealogy information of the selected lot. Genealogy data can be displayed in a tabular or tree view format.

Once a lot has been selected, genealogy data can be filtered to view:

- The roots
- The leaves
- The siblings
- The complete backward genealogy
- The complete forward genealogy
- The parents
- The children
- The nephews
- The grandfathers
- The brothers
- A particular level of the backward/ forward genealogy,
- All the levels of a specific level of the backward/ forward genealogy.

The “Lot Traceability” page allows selecting a piece of equipment, and only the genealogy corresponding to the selected lot that is associated with this piece of equipment will be displayed.

The “Genealogy Report” page displays - in table format - data contained in the “Lot Genealogy” page and allows exporting data in “XLS” or “PDF” format.

2.5.1 MM-GEN functionality

MM-GEN functionality provides a number of methods for modeling all material movements needed by each production phase; it can be used by any kind of industry that needs to trace material movement, including possible material contaminations occurring during the production process.

MM-GEN tracks each material movement that occurs within a plant and when it occurs; it is also possible to trace additional information about the event that invoked the material movement operation, the working order, the related production phase and other fields.

All lots and sublots operations resulting from the material movement are also traced by the MM-GEN functionality and related to the movement operation in order to create a Family Tree that connects a final product with its raw materials.

2.5.2 SIT-MM Library

SIT-MM is the Production Modeler library that provides high level interface to material movement and genealogy operations of Material Manager.

The SIT-MM Library includes:

- MM-MANAGER and MM-SPOOLER
- MM-SPOOLER-RTDS
- MM-SWITCH-GEN

The SIT-MM Library can be used for:

- Switching Equipment Connections: switch actions can be performed on connections of equipment units configured with MM-SWITCH spooler.
- Moving Materials: Material movement actions can be performed when the plant equipment is configured with MM-MANAGER and MM-SPOOLER (or MM-SPOOLER-RTDS).
- Routing Materials: routing of materials from one unit to another through switch actions can be performed configuring the plant equipment with MM-MANAGER, MM-SPOOLER (or MM-SPOOLER-RTDS) and MM-SWITCH-GEN.
- Customizing Operations: material movement operations (such as those described in Routing Materials and in Moving Materials) can be customized through user exit rules.

MM-MANAGER and MM-SPOOLER

MM-MANAGER and MM-SPOOLER are the base classes of genealogy functionality.

- MM-SPOOLER sets the behavior of a specific equipment object. At runtime, behavior of the operations is based on the configuration of the MM-SPOOLER instance of the units involved.
- MM-MANAGER sets some general attribute of genealogy in the entire plant model and provides the business rules for performing genealogy operations. At runtime, MM-MANAGER rules input configuration (when provided) overrides configuration of the MM-SPOOLER instances involved.

MM-SPOOLER-RTDS

MM-SPOOLER-RTDS is a logical unit that allows managing the material genealogy information associated with an equipment object via Production Modeler (PM) rules and Real Time Data Server tags (RTDS).

MM-SPOOLER-RTDS integrates functionality of MM-SPOOLER with Real Time Data Server by implementing specific Cube-Variable attributes.

These attributes are used to specify material information during cleaning and creation operations. Operations (e.g. clean or move material), managed from RTDS, are performed according to the data specified by tags in Cube-Variable attributes.

MM-SWITCH-GEN

This class is a logical unit used to manage equipment units connections and material movement operations via Production Modeler rules and Real Time Data Server tags.

MM-SWITCH-GEN allows mapping the routes between equipment units. Each route is defined by an input unit and an output unit, that is, by one connection.

2.6 Custom Object Management

2.6.1 Managing Editing Sessions

To optimize online data structure editing, it is possible to execute a sequence of changes on all the data structures belonging to a specific Custom Objects Application by creating *editing sessions*.

An editing session allows a single Custom Object Configuration Client to perform operations on custom data structures belonging to a specified application and data structure type (engineering or runtime).

Opening an Editing Session

An editing session can be opened from the Custom Object Configurator, or, alternatively, by using the “InitEditingSession” method available for both the GSI and COM interfaces. Only one editing session at a time can be opened on the same application and data structure type.

Besides the Custom Object Configuration clients, there are also clients that access Custom Objects instances, but do not have rights for modifying the data structures. These client types are named “Custom Object clients”.

An editing session can be opened in two different modes:

- **Locked** – This mode gives the Configuration client exclusive rights to access Custom Objects configuration belonging to the selected application and data type. Therefore, no other Custom Object Clients can be connected to the same application while the session is active. If any Custom Object Client is connected, it is automatically disconnected if the editing session is opened by means of the COM and GSI programmatic interfaces. If the editing session has been opened via the Custom Object Configurator, the user is prompted to specify whether to force the disconnection or not to open the session.
- **Unlocked** – This mode is supported only by the Custom Object Configurator. It permits to open an editing session without disconnecting any Custom Object Client already connected to the same application and data type. The user is not notified about the connections already established.

Unlocked mode is not supported by COM and GSI interfaces.

Closing an Editing Session

Similarly, it is possible to close a previously-opened editing session from the Custom Object Configurator or via COM and GSI interfaces, using the “EndEditingSession” method.

It is possible to close an editing session in three different ways:

- **Save** – If this option is selected, all changes will be applied. If the session was opened in Unlocked mode and one or more client is connected, clients will be forced to disconnect. The save operation is *transactional*, which means that if an error occurs while saving, the editing session remains unsaved and the current version of the data structure outside the editing session remains unchanged.
In unlocked mode, the save operation may fail in case of constraint violations caused by operations performed during the editing session by connected clients.
- **Suspend** – if this option is selected, the session will be put into suspended state and it will be possible to re-open the editing session to save changes later on.
If the session is re-opened in Locked mode, an error may occur when saving, if another configuration client modified the same data after the session was suspended.
- **Quit** – If this option is selected, all changes performed during the editing session will be discarded.

If the connection is closed by the user or due to an error before the editing session was closed, the editing session is put into suspended state automatically.

2.7 SIMATIC IT Logbook Service enhancements

2.7.1 Backing up Logbook Databases

Logbook Configurator provides a set of commands for configuring automatic backup operations to backup, archive or purge old Logbook messages.

In particular, it is possible to configure:

- Different backup frequencies for different logbook classes of messages.

- Different filtering conditions to select the records to backup according to time, section, level and application.

Backup Jobs

Logbook Configurator allows users to define one or more *backup jobs* which will be stored inside Logbook Configuration Database and applied by Logbook Server to the logbook database currently in use.

From Logbook Configurator, it is also possible to:

- Enable/disable backup jobs
- Define the order according to which every backup job will be carried out
- Define a start time to synchronize the start of multiple backup jobs

The execution of all backup jobs is carried out in a single thread, therefore, if more than one backup job are scheduled, their execution will be serialized.

Backup Commands

After configuring a backup job, it is possible to:

- Start a job
- Stop a job
- Check the current status of an ongoing backup job, and display the backup percentage and estimated time left.

2.8 SIMATIC IT System Monitor enhancements

2.8.1 Monitoring of Production Modeler Instances and GSI activities

The System Monitor pages related to a PM Instance include the status of the corresponding GSIs.

2.8.2 SIMATIC IT System topology

The user can collect and export in XML format all information related to computers and applications running on the SIMATIC IT Network.

This type of information is useful to describe the current SIMATIC IT System, for example when the user needs assistance from the Technical Support Service.

To export the System topology, the user can click the “Save Report” button, which is available in the right-hand panel of System Monitor when the root of Network Tree is selected.

The exported report describes name and status of:

- The computers of the SIMATIC IT network
- The applications which run on each computer and, if present, their sub-processes
- In case of cluster:
 - The cluster member
 - The groups
 - The application/entity belonging to the group

In particular, some specific diagnostic information is also reported for Production Suite Components, Production Modeler and Data Integration Service.

2.8.3 Information on DIS Connectors

The extended interface of SIMATIC IT Component Monitoring also shows:

- The connector list and the global status of each connector (“Client List” tab).

- The details related to a single connector. If a problem occurs, it is possible to navigate this tree to understand and solve the problem (“Connectors Detail” tab).

2.9 SIMATIC IT Production Modeler enhancements

2.9.1 SIT-EQU (Equipment), SIT-MST (Manager/Spooler Template) and SIT-TLS (Tools) in Production Modeler

SIMATIC IT Production Modeler Equipment Libraries (SIT-EQU)

With the Equipment Libraries (SIT-EQU) it is possible to:

- Model the plant equipment
- Synchronize between equipment status change in control systems and equipment status change in Manufacturing Execution Systems (SIT-EQU library)
- Reuse equipment classes with typical characteristics required in Manufacturing Execution Systems as assembling, storing, measuring, transporting, transforming, synchronizing, writing, reading.

Status synchronization between the control system and MES is guaranteed by rules that capture the status change from one layer and extend it to the other layer.

Integration with the control system is enabled by a RTDS tag attribute in the EQU-Spooler instantiated in the equipment.

The following libraries are available in Production Modeler:

- SIT-EQU-AS: contains classes of equipment with *assembling* characteristics and can be used during the analysis phase to create instances of equipment with assembling characteristics.
- SIT-EQU-ST: contains classes of equipment with *storage* characteristics and can be used during the analysis phase to create instances with storage characteristics.
- SIT-EQU-MS: contains classes of equipment with *measuring* characteristics and can be used during the analysis phase to create instances of equipment with measuring characteristics.
- SIT-EQU-TP: contains classes of equipment with *transportation* characteristics and can be used during the analysis phase to create instances of equipment with transportation characteristics.
- SIT-EQU-TF: contains classes of equipment with *transforming* characteristics and can be used during the analysis phase to create instances of equipment with transforming characteristics.
- SIT-EQU-PK: contains classes of equipment with *packaging* characteristics and can be used during the analysis phase to create instances of equipment with packaging characteristics.

SIMATIC IT Manager/Spooler Template (SIT-MST)

SIT-MST template contains a common logic to handle any other Production Modeler library Manager/Spooler.

This library is based on two entities:

- The Manager, which enables the management of the rule-based logic of Production Modeler libraries.
- The Spooler, which enables the control of the units on which they are settled.

As its name suggests, Manager / Spooler template Library provides the basis for these two entities management.

The library functionalities may be divided into two parts: the engineering one and the runtime one:

- The Engineering phase regards the Spoolers creation operation. Note that SIT-MST manages only the creation operation. It is up to each library to handle Spoolers configuration
- The Runtime phase regards the find operation made on Spoolers and Managers.

SIMATIC IT Tools Library (SIT-TLS)

The SIT Tools Library provides common tools which can be used by any Production Modeler library. These tools are used e.g. when data is shared between libraries and functions and has to be converted, updated or filtered. The Tools Library rules are exclusively called by other library rules and functions, within the SIT-TLS and from other libraries, thus no graphic interface is needed.

Furthermore, the SIT-TLS extends the available tools for connecting units in the Plant Model, and the library also provides the possibility of runtime debugging, i.e. to make an Expression Check of a rule currently running on the PM. These two functionalities are integrated in the Production Modeler, but do not use library rules.

SIT-TLS consists in a logical object, the TLS-Manager, which contains the logic of the library. The library may be used by other SIT libraries, providing common tools.

2.9.2 PM-to-PM communication hierarchical rules availability

Production Modeler makes it possible for the user to call rules on remote plants by *remote rule calling*.

To call a rule on remote plant equipment without having to retain a hierarchical relationship, the user can use the Remote-Rule-Caller step.

Such a scenario includes the following entities:

- The *calling* rule defined in a piece of equipment of a plant. This rule contains the Remote-Rule-Caller step.
- The *called* rule defined in the root node of a remote plant.

The Remote-Rule-Caller step has been changed by adding a new attribute named "Remote-Sub-Object".

Additionally the user can now select a Remote-Sub-Object, which is an object contained (any level) in the plant specified in the Remote-Object attribute.

If the Remote-Sub-Object attribute is configured, then the Remote-Rule browser shows the list of the selected Sub-Object rules.

If the new attribute is not configured, the behavior of the step is the same as before: it is possible to call only the rules directly belonging to the plant specified in the Remote-Object attribute.

In this manner, the PM-to-PM communication makes available the rules belonging to both high and low hierarchical levels.

2.9.3 New Engineering Scripts for PM Rules

A set of new system commands is now available:

- Create-plant
- Delete-object
- Get-dependencies

- Get-object-attribute-value
- Get-plant-enabled
- Import-equipment-objects-from-xml-file (sequence and structure management).
- Load-libraries
- Load-plants
- Register-plants-rtds-tags
- Save-libraries
- Save-object-to-bpm
- Save-plants
- Save-user-root
- Set-dependencies
- Set-object-attribute-value
- Set-plant-enabled
- Unload-libraries
- Unload-plants

Starting from version 6.4, it is possible to call these engineering scripts from any PM rule.

2.9.4 *Automatic synchronization at runtime*

When a project library is substituted with a new version or revision or when loading a new library delta file, *automatic synchronization* makes it possible to automatically synchronize the plant objects with their corresponding library objects.

Automatic synchronization is necessary in engineering-runtime scenarios where libraries used in the runtime station must always align with library developed in the engineering station. In these scenarios, during a library update operation (either through versioning or revising practice), objects running in the Plants environment must automatically synchronize with the minimum impact on the production workflow.

After loading a new version (or revision) of a project library, all the plant objects that have their related “Autosynchronization” attribute enabled are automatically synchronized. To prevent automatic synchronization of a specific plant object, the user can set its disable auto-synchronization property before loading the corresponding new library version (or revision).

When loading a new library delta file, it is possible that some of the plant rules are running. When synchronization starts, these rules continue their execution with the old copy of the rule. At next execution, the new copy of the rule is executed.

To prevent substitution of dependent rules during execution, a system timeout check (Delta Load Timeout) is performed on these rules before performing synchronization. After synchronization is performed, a log file is generated.

2.10 Microsoft Visual Studio .Net support

SIMATIC IT Production Suite 6.4 supports Microsoft Visual Studio .Net 2008 and Microsoft .NET Framework 2.0 for custom GUI engineering (SIMATIC IT CAB).

Please note that Microsoft Visual Studio .Net 2005 is no longer supported starting from this SIMATIC IT Production Suite version.

For more information, please refer to the Product Technical Documentation delivered with SIMATIC IT installation.

Contact: marketing.simatic-it@siemens.com