SIEMENS

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1

SIMATIC

Process control system PCS 7 SIMATIC BATCH V9.0 Getting Started

Getting Started

Legal information

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This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

\land DANGER

indicates that death or severe personal injury will result if proper precautions are not taken.

\land warning

indicates that death or severe personal injury may result if proper precautions are not taken.

indicates that minor personal injury can result if proper precautions are not taken.

NOTICE

indicates that property damage can result if proper precautions are not taken.

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Preface

Overview

BATCH Getting Started gives you an overview of the SIMATIC BATCH software package in combination with the SIMATIC PCS 7 process control system. It also allows you to become familiar with the functions of the batch process control. Getting Started is intended for new users of SIMATIC BATCH.

Prerequisites

To understand BATCH Getting Started documentation, basic knowledge in the area of automation engineering and process control engineering is required.

It is assumed that the reader knows how to use PCs or other equipment similar to PCs (such as programming devices) operating under Windows operating systems approved for SIMATIC PCS 7.

SIMATIC BATCH uses the SIMATIC PCS 7 software. You should already have experience with the configuration. The entire SIMATIC PCS 7 documentation is available to you free of charge and in multiple languages as a manual collection in MyDocumentationManager via the following Internet page:

Complete SIMATIC PCS 7 documentation (http://www.siemens.com/pcs7-documentation).

Scope of the Documentation

This documentation applies to the software package SIMATIC BATCH V9.0 in combination with the process control system SIMATIC PCS 7 V9.0 SP2 UC03.

Additional Support

If you have questions about using the products described in this manual that are not answered in this document, please contact your local Siemens representative.

Contact partners (http://www.siemens.com/automation/partner).

You can find a guide to the collection of technical documentation for individual SIMATIC products and systems at SIMATIC technical documentation (<u>http://www.siemens.com/simatic-tech-doku-portal</u>).

You can find the online catalog and the online ordering system at Industry Mall - Siemens (<u>http://</u>www.siemens.com/automation/mall).

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Here you will find:

- Our newsletter, which will keep you constantly updated with the latest information concerning your products.
- The search facility allows you to search for the correct documents.
- A forum, on which users and specialists from around the world can share their experience.
- Your local Automation and Drives representatives.
- Information relating to on-site service, repairs and spare parts.

A wealth of other information also awaits you under "Services".

Introduction to batch processes

3.1 Classification of Batch processes

Classification of technical processes

	Manufacturing process "Transformation"	Distribution process "Transport"	Storage
Process engineering	Refinery chemical reactions	Gas distribution, Pipeline	Tank, Bunker
Production engineering	Turning, Milling	Assembly line, Packaging	Storage process "Saving"

Difference between process and factory automation

- Process technology usually handles the production of liquid or solid materials.
 - Physical / chemical / biological processes
 - Safety, control of the (dangerous) process
 - Sometimes Undefinable
 - Uninterruptible at times
- Factory automation processes handle the production of packages such as screws or computers.
 - Mechanical processes
 - Throughput, speed
 - Definable
 - Can be interrupted

3.2 Characteristics of Continuous and Batch Processes

Definitions within the technological processes

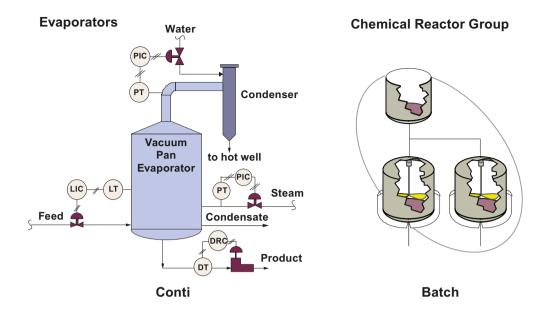
- Continuous process (below "Conti process" or simply "Conti")
 - Started and operated continuously over longer periods of time.
 - Synonym: Flow process
 - Examples: Ammonia synthesis, ethylene production
- Discontinuous process (below "batch process" or simply "batch")
 - Produces the product in separate batches of defined quantities
 - Synonym: Batch process
 - Examples: Production of synthetic resin, dye and fertilizers

3.2 Characteristics of Continuous and Batch Processes

	Conti		Batch
~	Continuous flow of products	~	Limited product quantities
~	Large-scale production	~	Small-scale production
~	Setpoint-driven	~	Recipe-driven
~	Rare changes to the plant	~	Frequent changes to the process
~	Single-product plant	~	Different products in the same plant
~	Rare operator intervention	~	Often only with partial automation -> operator inter- vention
~	The automation system contains the pro- duction know-how	٧,	The recipes contain the production know-how
~	Equilibrium states	V	Various process states

Comparison of continuous and batch processes

3.2 Characteristics of Continuous and Batch Processes

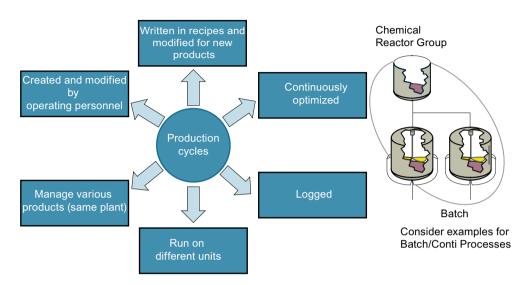


- The main difference between Batch and Conti is the production method.
- The product quantities in a batch process are fixed and can be clearly identified for this reason.
- Recipes contain the setpoints for the relevant process variables and product quantities. They also describe the method or procedure deployed to manufacture the product.
- The units within a Conti process are dedicated to specific tasks.
- The same unit is used for multiple tasks within the batch process which means it is used for different batches, and shared resources.
- Mixed forms are relatively frequent, where both continuous and batch processes are coupled together or where certain parts of a batch process are supplied by continuously operating intermediate stages.

3.3 Exercise: Where is this used?

3.3 Exercise: Where is this used?

Production sequences



The properties of production sequences are as follows:

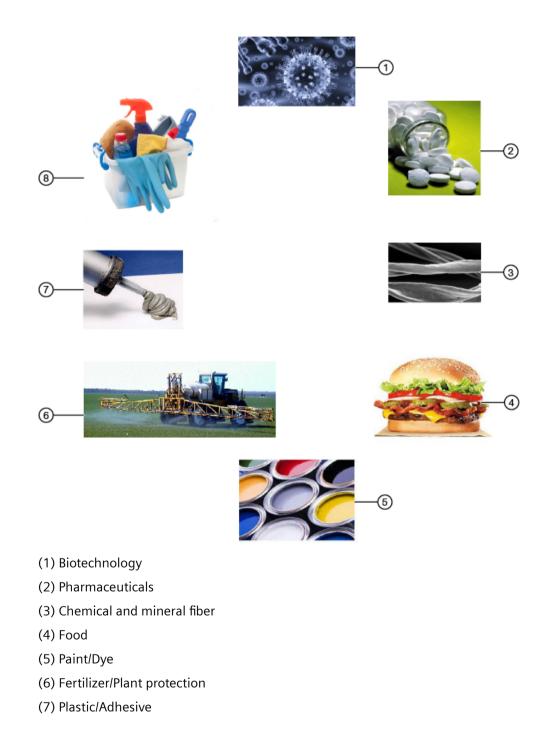
- The production sequences are described in the recipes, which represent a mapping of the production methods. In contrast to typical Conti applications or applications for the production process, the production sequence is described in the "recipe" instead of being reflected by the automation solution.
- The production sequences can be converted for new products. Automated production processes do not always return the same product; rather, they can return different end products whose manufacturing methods are contained in different recipes. These recipes are subject to continuous optimization in terms of parameter settings and runtime.
- Clear documentation of the process is often a vital aspect of production. This is essential for quality assurance and for the detection of faults.
- The customized, in-house conversion of production sequences for different products, including the introduction of new products or the modification of existing sequences, is an important factor for many end users.
- Plant operators should also be able to handle these tasks without having to consult system specialists. The automation system as such should not be modified. The conversion of sequences should be handled by means of recipes which map the production process.
- A production sequence which is described in a recipe and which is used specifically for a certain product often raises the question: "Where do I produce?". The factory usually features several production facilities which are capable of handling the same production sequence (for example, several identical production lines.). It should therefore be possible to distribute the production sequences to different production facilities. This should also be a system functionality which does not require any modification to the automation program.

3.4 Industry Sectors for SIMATIC BATCH

3.4 Industry Sectors for SIMATIC BATCH

Typical industry sectors that use batch automation

Typical business sectors that use batch processes are as shown below. For example: Beer production in the food and beverages sector.



3.5 Origins of Batch Production: The Kitchen

(8) Detergents

3.5 Origins of Batch Production: The Kitchen

Production plant "Kitchen"

This section explains about a kitchen production plant which is a simple example for a batch production:

Various products are created here. The production method is described in recipes. These can be constantly optimized and improved, and completely new recipes can be added. The chef is perfectly capable of doing this alone without help from the kitchen manufacturer. The recipe is often "secret" and contains the know-how for creating a dish.

When cooking, chefs must be able to decide which equipment will be used to implement a recipe. If there are several kitchens (for example in an industrial setting), the user can decide which kitchen will be used to make the product. Regardless of the kitchen selected, the same product should result and the actual production location should only be decided during production planning. It is important to record the production sequence (for example, quality assurance for health authorities, and for guests who want to know the method of production of the product they are consuming).



3.6 The Chef - Working Environment and Working Procedures

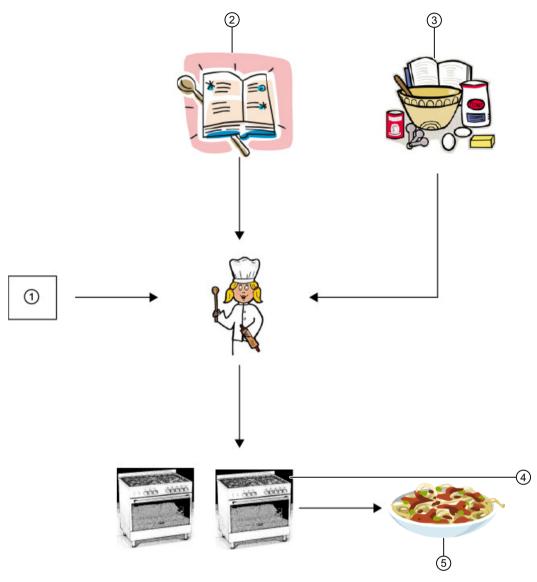
Working Environment and Working Procedures

The section below describes the working environment of the chef. The chef is in possession of recipes which contain the instructions and a list of ingredients and quantities. These recipes are known as master recipes.

The working environment involved is as explained below:

- Specific materials must be made available for production.
- The production process is initiated by an order. This order defines the product, the quantities and the time schedule for production.
- The chef handles the order in accordance with the corresponding recipe. They also allocate cooking resource such as the kitchen stove. Certain production units may be in use and not currently available, as it is common to handle several orders simultaneously.
- The result of this sequence is the finished product.

3.6 The Chef - Working Environment and Working Procedures



- (1) Order
- (2) Recipe
- (3) Ingredients for cooking pasta
- (4) Cooking pasta
- (5) Spaghetti Bolognese served

3.7 Batch Terminology

Important batch terminologies

The important batch terminologies are:

- Master recipe: Recipe level that takes into account the capabilities of the equipment and contains information specific to the process cell.
- Control recipe: A type of recipe that defines the manufacture of a single batch of a specific product through its execution.
- Batch: Apparatus-dependent quantity of a product, which is manufactured discontinuously in a defined production cycle.
- Process: A sequence of chemical, physical, or biological activities for the conversion, transport, or storage of material or energy.

Till now, we have used terms taken from everyday language. Such terms are, however, liable to subjective interpretation. The same word may mean different things to different people. This is particularly the case when people with different occupations talk to each other (for example system engineers, chemists, production engineers). A chemist might understand a recipe to be the chemical composition of a product (which should not be revealed at any cost), whereas the system engineer interprets it as an automated sequence (for example, a sequencer).

To create a production facility that operates as desired, people from various walks of life must be able to work together. Therefore, it is important that everyone speaks the same "language". NAMUR (an international user association of automation technology in process industries) and ISA 88 (a standard for batch-oriented control strategies) have set themselves the task of defining and standardizing the terms.

We will gradually replace everyday language with the terminology from the standard.

In our kitchen we can derive a control recipe from the "Spaghetti Bolognese" recipe for Fred's kitchen which determines the production sequence for producing a batch of spaghetti.

This illustrates that the control recipe derived from the master recipe is responsible for production. The control recipe must therefore know which production facilities it will be using while the master recipe remains neutral in this respect.

3.9 The Kitchen: Master Recipes – Procedure (Procedural Rules)

3.8 The Kitchen: Master recipes – Header Data

Master recipes - Header Data

Language of the Chef		ISA-88 Terms
Meal	Spaghetti Bolognese	Product
Number of persons	4 (Nominal quantity)	Reference quanti- ty
Ingredients	1 kg ground beef, 100 gm mushrooms, 1 kg pasta, pinch of salt, 1 onion, 4 tomatoes : :	Input materials

Master recipes importantly consist of three parts:

- A recipe header which provides general information about the product such as its name, reference quantity, ingredients and quantities.
- Instructions or procedural rules for production. This is known as a recipe procedure.
- Information of the capabilities of the Process Cell including the Unit (Classes)

3.9 The Kitchen: Master Recipes – Procedure (Procedural Rules)

Master Recipes - Procedure (Procedural Rules)

Instructions		Procedural Rules
1. Make Bolognese		Unit recipe 1
sauce	Chop onions and tomatoes, place in pan, weigh ground beef and add to pan	ROP 1: Prepare
		ROP 2: Heat
	Heat pan to level 6	
		ROP 3: Simmer
	Simmer for 1 hour with lid on pan	
2. Cook pasta		Unit recipe 2
3. Season	Pot	Unit recipe 3
4. Taste	Pan	Sample

3.11 The Kitchen: Automation Concept

The Recipe Unit Procedure (RUP) shows the instructions for production. It is divided into various sections (unit recipes). The unit recipes themselves are made up of recipe operations (ROPs).

We could, for example, describe the production of Bolognese sauce required to produce Spaghetti Bolognese in a unit recipe for Bolognese. We can further refine this procedure by detailing the steps in recipe operations. In the unit recipe for Bolognese sauce, we begin with the "Prepare" recipe operation. During the preparation, the input materials onions and tomatoes are chopped, ground meat is weighed and put in a pan.

At this stage, use of the term pan or pot is still generalized. These are references to the production facilities that will be required. In the standard language, these are known as unit classes. The master recipe itself is nevertheless "neutral" in terms of the unit candidates; that is, there is no mention yet of the unit candidate that will actually be used for production (for example, Fred's kitchen and Fred's favorite pot).

3.10 The Kitchen: Automation Requirements

Requirements for Batch processes

The "Kitchen" example is an analogy for the characteristics of Batch processes. The automation of such processes must meet the following requirements.

Requirements	Implementation in the "Kitchen" example
Batch processes are described in "recipes"	Spaghetti recipe.
Batch processes can be converted for new products.	The chef must create new dishes.
Batch processes are continuously optimized.	Refinements and resulting recipe adaptations.
Production processes are logged. Proof of the production process.	The production of foodstuffs should be recorded and be repro- ducible.
Process sequences may only be created or edited by author- ized persons.	Recipes are developed by the chef, not by the appliance supplier, for example.
Batch processes can be distributed to several units.	Recipes can be used in different kitchens.
Different recipes produce different products in the same process cell.	End product in the kitchen, for example: Spaghetti, schnitzel/ escalope or fried potatoes.

3.11 The Kitchen: Automation Concept

Requirement	Solution (Without using Batch)
BATCH processes are described in "recipes"	Possible with STL, SCL, SFCs, WinCC, though highly complex
BATCH processes can be converted for new products.	The programming method (STL, SCL, SFC) could be adapted.
BATCH processes are continuously opti- mized.	The programming method (STL, SCL, SFC) could be adapted.
Production processes are logged.	The programming method (STL, SCL, SFC) could be adapted.

Requirements of an Automation Concept

3.12 Automation Concept - New Approach

Requirement	Solution (Without using Batch)
Process sequences may only be created or edited by authorized persons.	Not possible.
BATCH processes can be distributed to several units.	Not possible.
Different recipes produce different prod- ucts in the same process cell.	Possible with STL, SCL, SFCs, WinCC, though highly complex

What do these requirements mean when formulating an automation concept?

Let's look at SIMATIC PCS 7 as a system platform.

Question: How can we describe the production sequences in recipes?

Answer: We can imagine structuring all possible sequences using CFC and SFC and mapping these to "recipes" using parameters stored, for example, on the OS. Structuring the sequences would, however, be extremely complex since all possibilities must be taken into account. It should also be possible to modify the recipes or to create new recipes. This could mean that the automation program (CFC, SFC) would have to be changed. The operating personnel would not be capable of doing this and the automation technician would have to be called in.

It would be possible to log the sequences using messages output on the OS in the form of reports. This would have to be implemented separately for each specific project. New and modified recipes would once again cause problems.

The complexity of the automation solution increases yet again if the sequences also need to be adapted for various units. This would mean that the SFCs would also have to determine which units are to be used.

3.12 Automation Concept - New Approach

New automation concept approach

This leads to a new solution for resolving complexity by separating the automation and procedural levels.

We shall presume that the hardware structure of the process cell is retained and only the sequences will change. Let us implement the process cell-specific elements of the automation system and map the sequences to a "recipe system" which can be handled by the process. The master recipes are created and stored in this system.

The control recipes are derived from the master recipes and address the automation system.

The control recipe operations are:

- 1. Prepare bolognese.
- 2. Cook noodles.
- 3. Add spices.
- 4. Tasting.

3.13 Separation of the Automation Level and Procedural Level

Note

The control recipe operations also contain the basic process of chopping onions and tomatoes, and putting them in the pan. Later, weighing the ground meat and adding it is also included here to prepare noodles.



(1) Process cell

3.13 Separation of the Automation Level and Procedural Level

Structure of the process cell

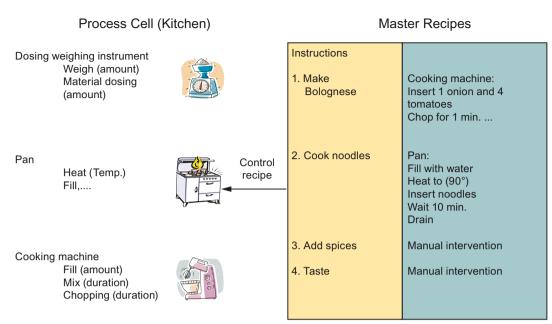
The following figure displays the structure of the process cell:

A structure consisting of units (scale, pan, mixer, etc.) can be designed in the process cell. These units are organized by technological functions such as weighing, dosing, etc. The technological functions can be assigned parameters such as "quantity" of the technological function "dosing".

All of this functionality is mapped to the AS. Here, the term process cell model is used. It represents the "tool box" for the engineer who designs the master recipe.

In the master recipe, these units with their equipment phases are used to compose the sequence.

3.14 ISA-88 - Physical Model



Separation of Automation and Recipe

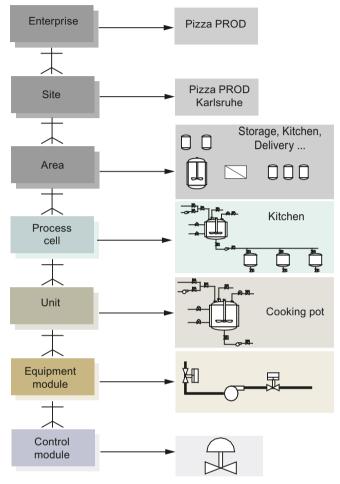
3.14 ISA-88 - Physical Model

Equipment models and their structural layers

The figure below explains the hierarchical structure of the equipment model. The properties of the model are:

- The model has seven levels. The top three levels are not dealt within the standard since these go beyond the framework of batch control.
- The lower four levels are also known as the equipment model.

- An equipment phase (heating, dosing, weighing, etc.) serves an equipment module (heating, in this case).
- The term "EPH (Equipment Phase)" is used in the PCS 7 environment.



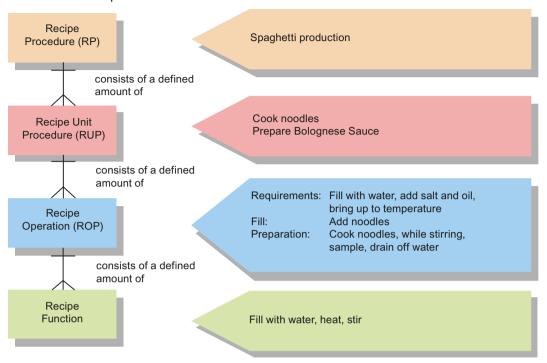
3.15 Procedural Control Model

Hierarchical model

In keeping with the physical model, a hierarchical model is used to describe the procedures as shown below.

3.16 Implementation – Physical and Procedural Model

How should it be produced?



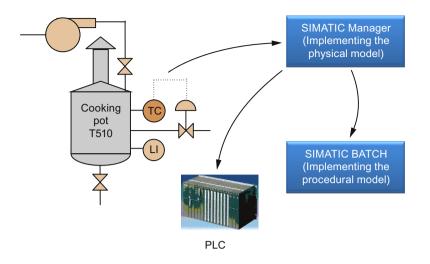
3.16 Implementation – Physical and Procedural Model

Models

The physical and procedural model are as shown in the figure below. Both models are mapped in the architecture of SIMATIC PCS 7. The hardware model is implemented in SIMATIC PCS 7 engineering. The resulting program structures are executed in the AS.

The procedural model is implemented in SIMATIC BATCH. The control recipes are executed in SIMATIC BATCH and in the AS program structures.

3.17 The ISA-88 model in PCS 7



3.17 The ISA-88 model in PCS 7

Models in SIMATIC PCS 7 and SIMATIC BATCH

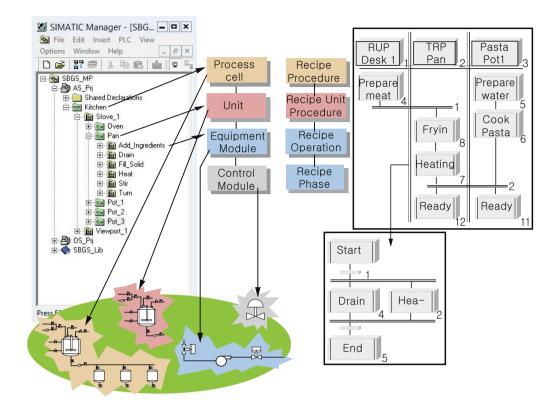
ISA S88.01 describes various models that can be fully covered with SIMATIC PCS 7 and SIMATIC BATCH.

The equipment model describes the process cell, unit, equipment module and control module level that are mapped using the plant hierarchy in the plant view of the SIMATIC Manager.

The process cell model is prepared for SIMATIC BATCH so that the procedural model in the form of recipes can be mapped to the process cell model.

- A recipe procedure runs in a process cell to control a process and to create a batch of a product.
- A recipe unit procedure runs on a unit to control a recipe stage. A unit can only be occupied by one batch at once, at any given time.
- A recipe operation or a recipe phase runs in an equipment module to perform a process task or equipment phase.
- The control module level is not within the framework of the Batch system and is only addressed via the equipment module. The control module level is located completely within AS.

3.18 Workflow in the Kitchen: Order - Master Recipe - Process Cell



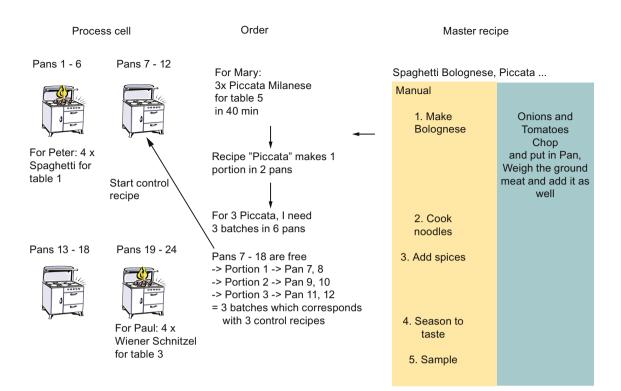
3.18 Workflow in the Kitchen: Order - Master Recipe - Process Cell

Order - Master Recipe - Process Cell

This section explains an example of the workflow in the kitchen. The example is as described below:

- Mary orders three portions of Piccata Milanese. The order was placed for table 5 and must be delivered within 40 minutes.
- The "Piccata" master recipe is available for production. The recipe describes the process for a single portion.
- The chef needs two frying pans per portion. He needs six frying pans in order to produce three portions simultaneously. He creates three control recipes, each for two frying pans. Each control recipe produces one batch of Piccata.
- All three control recipes can be started simultaneously as shown in the picture, provided all six frying pans are available.
- The three batches have to be produced in sequential order if only two pans were available.

3.19 Classification of batch process cells



3.19 Classification of batch process cells

Criteria for categorizing batch process cells

The number of products produced on the process cell represents the first classification criterion.

- Single-product process cells
- Multiple product process cells

The number of routes which support the parallel product flow forms the second criterion

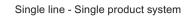
- Single-route structure
- Multiple-route structure
- Network structure with totally flexible routes

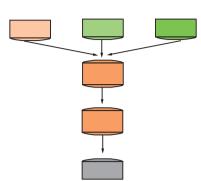
The scaling capability of SIMATIC BATCH makes it suitable for both small scale process cells and for large configuration limits.

Complexity increases in proportion to the number of products and routes. SIMATIC BATCH supports the automation of multiple routes for multi-product process cells.

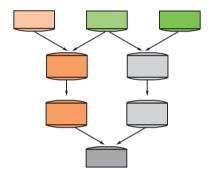
The assessment of smaller process cells for which only a few products or routes are required should be focused on licensing and engineering costs acquired by the solution with SIMATIC BATCH.

3.19 Classification of batch process cells





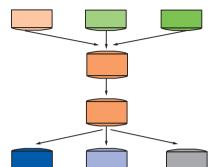
Multi-line - Single product system



Ingredients Line Product

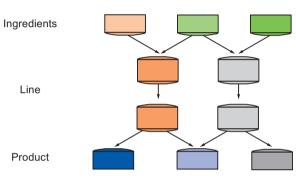
Line

Product

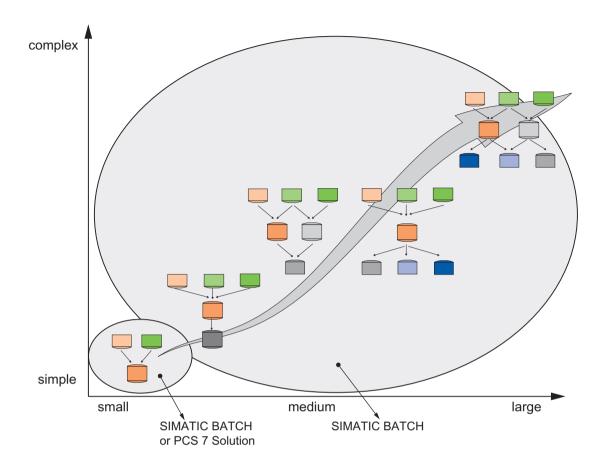


Single line - Multi-product system

Multi-line - Multi-product system



3.20 SIMATIC BATCH: Customer Benefits



3.20 SIMATIC BATCH: Customer Benefits

Customer benefits derived from the implementation of SIMATIC BATCH

The customer benefits derived from the implementation of SIMATIC BATCH are:

- The production sequences are described in master recipes which can be created/edited by operating personnel at any time.
- Greater production flexibility, reduced "time to market".
- Unit allocation can be planned. The allocation planning can be changed right up to the actual allocation. SIMATIC BATCH supports automatic unit selection and late binding of units..
- Improved utilization of resources.
- Production sequences are documented in a batch log (paper or electronic). The production sequences can be reproduced using recipes with control strategies.
- Easy quality management.

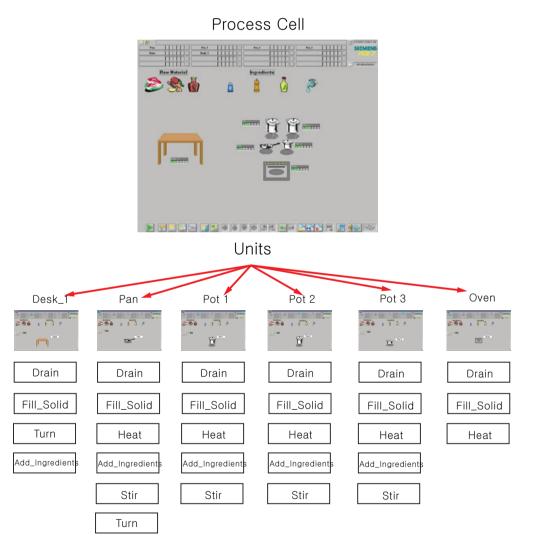
3.20 SIMATIC BATCH: Customer Benefits

- Of particular interest if validation is required according to FDA (Food and Drug Administration) guidelines:
 - Version control
 - Access control
 - Audit Trails (21CFR Part11)
 - Electronic Signatures and archiving of batch (production) data.
- Low costs of validation, as changes to recipes can be traced.
- Implementation of a standard Siemens product.
- Reduced operation and life-cycle costs.

Configuring the "Kitchen" training project

- 4.1 Basic principles
- 4.1.1 Description of the model

Overview of the equipment model



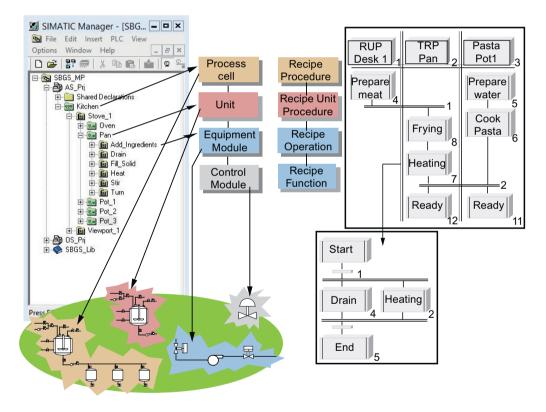
4.1 Basic principles

4.1.2 Plant Hierarchy View in SIMATIC Manager

Process cell model in the SIMATIC Manager

The properties of the process cell model in SIMATIC Manager are:

- The process cell model in SIMATIC BATCH is used to represent the procedural model in recipes.
- A recipe procedure controls a process in a process cell to create a batch of a product.
- A recipe unit procedure runs on a unit to control a recipe stage. To avoid collisions, a unit can only be allocated to one batch at any time.
- A recipe operation or a recipe phase performs a process engineering task or equipment phase in an equipment module.
- The control module level is not within the focus of the Batch system and is only addressed through the equipment module. The control module level is located completely within the AS.



4.2 Configuration

4.1.3 Hardware and Software Requirements

Hardware requirements

- PC configured according to the minimum requirements defined in the "PCS 7 Readme" file
- Network adapter

Software requirements

Installation of SIMATIC PCS 7 V9.0 SP2 UC03 with the following programs:

- PCS 7 Engineering
- BATCH Single Station
- OS Single Station
- SIMATIC Logon V1.6 Upd1
- S7-PLCSIM V5.4 SP8

4.2 Configuration

4.2.1 Retrieving the project

Prerequisites

- Unzip the "SBGS_MP.zip" sample file.
- The archived project file is called "SBGS_MP.zip" and the associated recipe database is called "sb_gs1_b.sbb". Both files are available for download in the "About" button on the web page for this Getting Started in the Siemens Industry online support portal.
- Copy both files to the following local folder on your PC: "..\SIEMENS\STEP7\examples".
- SIMATIC Manager is open.

Procedure

- 1. Retrieve the project and save it under D: drive of your PC.
- 2. In the **Component view**, expand the tree view. Expand the "SBGS_MP" project. Right click "OS_Prj>Server>Object Properties".

4.2 Configuration

3. The "Properties - SIMATIC PC Station" appears. In the "Name:" field, enter the name of your PC.

Note

To find out the name of your PC, click "Start". Right-click **Computer>Properties.** The "Computer name" field displays the name of your PC.

For Windows 10, type "About your PC" in the search box of the Windows task bar. The "PC name" field displays the name of your PC.

For Windows Server 2012. click " icon > This PC>right Click>Properties". The "PC name" field displays the name of your PC.

- 4. Under "Computer name" area click "Computer Name identical to PC station name".
- 5. Click "OK" to save and activate the name.
- 6. Expand the PC node WinccApplication > OS(1).
- 7. To open the WinCC Explorer on the ES, right-click OS(1) > Open Object.
- 8. A popup appears "The configured server is not available. Do you want to open the project with the local computer as Server?". Click "Yes".
- 9. Right-click "Computer > Properties". The "Computer List Properties" window appears with your PC name selected. Now, click "Properties". The "Computer properties" window appears.
- 10. Click "Use Local Computer Name" to change the computer name to the name of your local PC, and click "OK".
- 11. The "Change Computer Name" window appears which prompts you to restart WinCC. Click "OK".
- 12. Click "OK" and close the WinCC Explorer.

4.2.2 Configuring the BATCH Server and BATCH Client

Introduction

This section describes the requirements and procedures to be followed when configuring a BATCH Server and Client in single station system.

Prerequisites

• You only need one PC station to work locally on the ES PC with the BATCH Server and Client (single-project engineering/single station system). The BATCH Server application is set up on this PC station.

Procedure

1. Select "SBGS_MP\Server" in the Component view and open the configuration object.

<u>S</u>			SIMATIC Manage
🖻 File Edit Insert PLC View Options V	Nindow Help		
🗋 🗅 😅 🎛 🛲 X 🖻 🛍 🏜 🗣 🏪	<u>□</u> <u>-</u> <u>-</u> <u>-</u> <u>-</u> <u>-</u> <u>-</u> <u>-</u>	< No Filter >	💽 ゾ 🔡 🃾 🖷 🚍
⊡- SBGS_MP	Object name	Symbolic name	Туре
🗈 💮 AS_Pri	Configuration		PC station configuration
🖻 🎒 OS_Pri	📕 WinCC Appl.		WinCC Application
E- SERVER in WinCC Appl. in MinCC Appl. in Min CC Ap	₩ CP 1623		CP

2. Select the "BATCH Application" and drag-and-drop it in Index 2.

💘 🛛 🗛 HW Config -	[SERVER (Co	onfiguration	n) OS_Prj]	– – ×
💵 Station Edit Insert PLC View Option	ns <u>W</u> indow	<u>H</u> elp		_ & ×
🗋 🗅 😅 🖫 🖩 🖏 🎒 🛯 🛍 💼	📳 🗖 🔡	N?		
		^		
🖳 (0) PC		=	<u>F</u> ind:	nț mi
1 WinCC Appl.	^		Profile: PCS7_V90	
2 BATCH Application				
4 H CP 1623			E-G FOUNDATION FIELDBUS	^
5				
6				
7 8			SIMATIC 400	
9			SIMATIC PC Station	
10			I ⊕ ⊡ Archive ⊡ ⊡ BATCH	
11			BATCH Application	=
12		~	BATCH Application (stby)	
<		>	📕 📕 📕 BATCH Application Client	
(0) PC			Erein CP-Industrial Ethernet Erein CP-PROFIBUS	
Index Module Order Fi.	M I I	Comment	III III IIII IIIIIIIIIIIIIIIIIIIIIIII	
1 WinCC Appl	191 1		PDM	
2 BATCH Application			Route Control	~
3			📄 💼 User Application	٦. عر
4 H CP 1623 6GK1 162 V8.	1.1		Server Components Master for Batch Pcel	
5				
Press F1 to get Help.				//

📲 HW Config - [SERVER (Configuration) OS_Prj]	_ D X
Station Edit Insert PLC View Options Window Help	_ & ×
	크고
[0] PC □ [ind: □ □	nt ni
1 WinCC Appl.	
2 BATCH Application PCS7_V90	
4 FOUNDATION FIELDBUS	^
6 7 B <	
8 SIMATIC PC Station	
9 Archive	
11 BATCH Application	=
BATCH Application (stby)	
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2 BATCH Application	~
3 BATCH Application Client	د
4 Here CP 1623 [6GK1 162]V8.1.1	<u>-₹</u>
Insertion possible	

3. Select the "BATCH Application Client" and drag-and-drop it in Index 3.

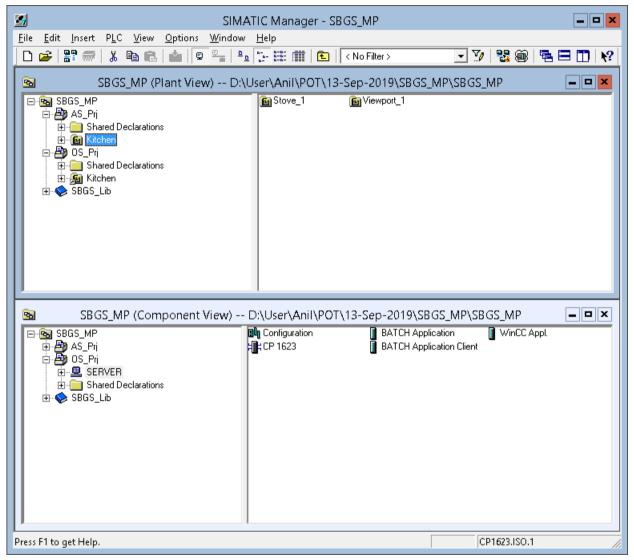
- 4. Save and compile the hardware configuration of the PC station with the newly added BATCH application.
- 5. Close HW Config.

4.2.3 Opening the Plant View

Procedure

To open and arrange plant view, component view horizontally:

- 1. Click View>Plant View.
- 2. Click Window>Arrange>Horizontally.



4.2.4 Creating the Batch Process Cell

Introduction

This section guides you the steps to assign the "process cell" ISA-88 type definition to the "Kitchen" hierarchy folder. The "Kitchen" folder then becomes green and has the "process cell" type according to ISA 88.

Prerequisites

- The **SBGS_MP** project is open in SIMATIC Manager.
- Plant View is activated.

Procedure

To create the batch process cell according to ISA 88 standard:

- 1. Select the "SBGS_MP\AS_Prj\Kitchen" object in the tree view.
- Right-click on the "Kitchen" project and select "Object Properties". The "Properties - Hierarchy Folder -- Kitchen " dialog box opens with the "General" tab activated.
- 3. Select "ISA-88Type Definition" tab.
- 4. In the "Object type" drop-down list, select "Process cell", and click "OK".

Properties - Hierarchy Folder I	Kitchen		×
General Control and Monitoring	Attributes AS-OS Assignment	S88 Type Definitio	n
Object type:	(process cell) Standard Process cell (process cell)		
ОК		Cancel	Help

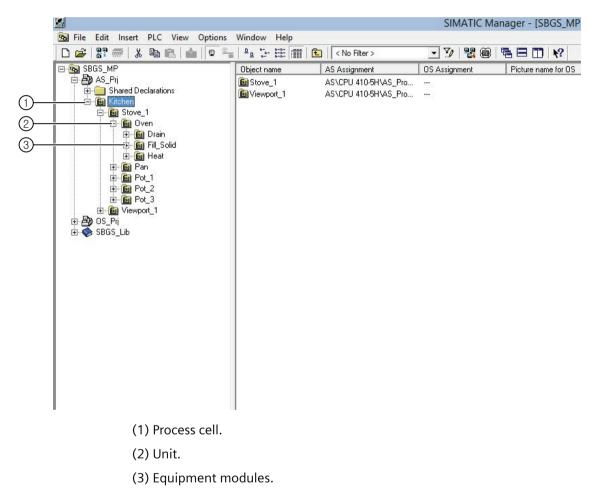
5. The "Kitchen" folder now appears in green color according to the ISA S88.01 standard.

4.2.5 Type Definition of the Plant Hierarchy according to ISA -88

Introduction

This section will guide you to assign the ISA-88 type definitions "Unit" and "Equipment module (generic and recipe aware)" to the existing hierarchy folders in this section. The following images display the different hierarchies in the "Kitchen" object:

For more information on "generic" and "recipe aware" see: Task definition and implementation concept for "Cooling" (Page 193)



Prerequisites

- The **SBGS_MP** project is open in SIMATIC Manager.
- Plant View is activated.

Procedure

- 1. Select the "SBGS_MP\AS_Prj\Kitchen\Viewport_1\Desk_1" object in the tree view.
- 2. Click Edit > Object Properties.
 - The "Properties Hierarchy Folder" dialog box opens with the "General" tab activated.
- 3. Select "ISA-88 Type Definition" tab.
- 4. In the "Object type" drop-down list, select "Unit", and click "OK".

Properties - Hierarchy Folder	- Kitchen\Viewport_1\Desk_1		×
General Control and Monitoring	g Attributes AS-OS Assignment	S88 Type Definition	
<u>O</u> bject type:	Standard Standard Unit En Offic available for batches	Predecessor / Succe	25507
ОК		Cancel	Help

The "Desk_1" folder now appears in green, identifying it as a unit according to the ISA S88.01 standard

Note

Do not touch the Stove_1 and Viewport_1 hierarchy folders. The identifier remains neutral.

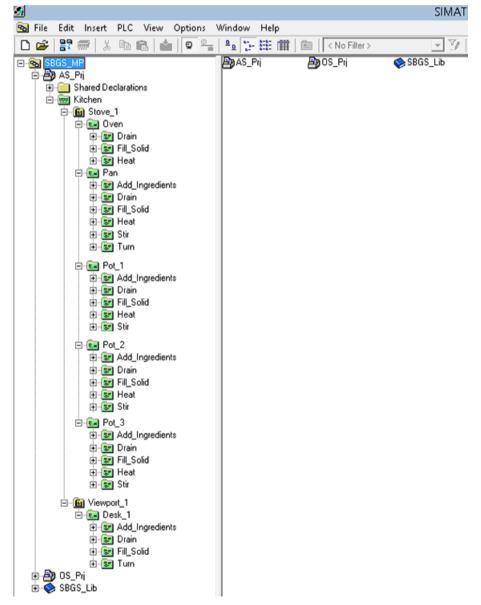
5. Follow steps 1-4 to assign the "Unit" object type to the "Oven", "Pan", "Pot_1", "Pot_2" and "Pot_3" hierarchy folders according to the ISA-88 type definition.

 Follow steps1-4 to assign the "EMOD" object type to the "Drain" hierarchy folder under Kitchen/Viewport_1/Desk_1. The "Drain" folder turns green and is labeled as an equipment module according to ISA standard \$88.01.

The CFCs with the instances of the SFC types are located on the equipment module level. You can also use SFCs in combination with the CFCs and their Batch interface blocks (IEPH, IEPAR_xxx).

7. Assign the "EMOD" object type to the hierarchy folders identified at the beginning of this chapter as "Level 3: Equipment module" according to the ISA-88 type definition, as described in step 6.

The following image displays all the hierarchy folders in green after assigning their respective object types:



4.2.6 Assigning the Batch Category "EPH"

Introduction

This section guides you to assign the EPH batch category.

Prerequisites

- The **SBGS_MP** project is open in SIMATIC Manager.
- **Component View** is activated.

SFC types

SFC types contain equipment phases with and without selfcomplete functionality. This property is set by default at the following SFC types:

- Self-Completing: Drain, Fill_Solid, Turn and Add_Ingredient
- Non Self-Completing: Stir and Heat

The SFC types used can be used in runtime of the Getting Started BATCH project.

The block contact "Ready_TC" reports the end of the RUN sequence within non self-completing equipment phases. Such an equipment phase waits for an external command input either by an operator or by SIMATIC BATCH.

For detailed information on equipment phases, refer to the SIMATIC BATCH Online Help.

Assigning the "EPH" Batch Category to SFC Types

Assign the "EPH" Batch category to the existing SFC types. With the "EPH" category, the SFC type is classified as a phase type. As a result, the information relevant to S88.01 is created automatically during subsequent type generation.

You can find the existing SFC types in the Component view in the "charts" folder under AS:

	A No Filter >	- Y
Object name	Version PH Assignment	Туре
Pot3_Val_Drain	0.0001 Kitchen\Stove_1\Pot_3\	CFC
Pot3_Val_Oil	0.0001 Kitchen\Stove_1\Pot_3\	CFC
Pot3_Val_Pepper	0.0001 Kitchen\Stove_1\Pot_3\	CFC
Pot3_Val_Salt	0.0001 Kitchen\Stove_1\Pot_3\	CFC
Pot3_Val_Solid	0.0001 Kitchen\Stove_1\Pot_3\	CFC
Pot3_Val_Water	0.0001 Kitchen\Stove_1\Pot_3\	CFC
🔂 Unit_Desk_1	0.0001 Kitchen/Viewport_1/Des	CFC
🔁 Unit_Oven	0.0001 Kitchen\Stove_1\Oven	CFC
Unit_Pan	0.0001 Kitchen\Stove_1\Pan	CFC
Unit_Pot1	0.0001 Kitchen\Stove_1\Pot_1	CFC
Unit_Pot2	0.0001 Kitchen\Stove_1\Pot_2	CFC
Unit_Pot3	0.0001 Kitchen\Stove_1\Pot_3	CFC
Add_Ingredient	0.0001	SFC typ
🔳 Drain	0.0001	SFC typ
🖪 Fill_Solid	0.0001	SFC typ
	0.0001	SFC typ
	0.0001	SFC typ
I Turn	0.0001	SFC typ
	Object name Pot3_Val_Drain Pot3_Val_Oil Pot3_Val_Pepper Pot3_Val_Solid Pot3_Val_Solid Pot3_Val_Solid Pot3_Val_Water Unit_Desk_1 Unit_Desk_1 Unit_Pan Unit_Pan Unit_Pot1 Unit_Pot1 Unit_Pot2 Unit_Pot3 Add_Ingredient Fill_Solid Heat	Object name Version PH Assignment Pot3_Val_Drain 0.0001 Kitchen\Stove_1\Pot_3\ Pot3_Val_Oil 0.0001 Kitchen\Stove_1\Pot_3\ Pot3_Val_Pepper 0.0001 Kitchen\Stove_1\Pot_3\ Pot3_Val_Salt 0.0001 Kitchen\Stove_1\Pot_3\ Pot3_Val_Salt 0.0001 Kitchen\Stove_1\Pot_3\ Pot3_Val_Solid 0.0001 Kitchen\Stove_1\Pot_3\ Pot3_Val_Water 0.0001 Kitchen\Stove_1\Pot_3\ Pot3_Val_Water 0.0001 Kitchen\Stove_1\Pot_3\ Pot3_Val_Water 0.0001 Kitchen\Stove_1\Pot_3\ Pot3_Val_Water 0.0001 Kitchen\Stove_1\Pot_3\ Punit_Desk_1 0.0001 Kitchen\Stove_1\Pot_3\ Punit_Oven 0.0001 Kitchen\Stove_1\Pot_1 Punit_Pot1 0.0001 Kitchen\Stove_1\Pot_2 Punit_Pot2 0.0001 Kitchen\Stove_1\Pot_3 Punit_Pot3 0.0001 Kitchen\Stove_1\Pot_3 Punit_Pot3 0.0001 Kitchen\Stove_1\Pot_3 Punit_Pot3 0.0001 Kitchen\Stove_1\Pot_3

(1) Existing SFC types

Procedure

To assign the EPH batch category:

- 1. Select the "SBGS_MP\AS_Prj\AS\CPU 410-5H\AS_Program\Charts" object in the tree view, and select "Heat".
- 2. Click Edit > Object Properties.

The "Properties SFC type" dialog box opens with the "General" tab activated.

3. Select "Options" tab.

- 4. In the "Category" drop-down list, select "EPH".
- 5. Select the "Allow operator instructions" check box and click "OK"

Properties SFC type		×
General AS Operating Parameters	Options Version	,
SIMATIC BATCH <u>Category</u> <u>EPH</u> <u>Derived from</u> interface:	Allow operator instructions	
WinCC Create block icon:		
SIMATIC IT		
Control strategy selection		
ОК	Cancel	Help

In the same manner, assign the "EPH" batch category to the remaining "Stir", "Drain", "Fill_Solid", "Turn" and "Add_Ingredient" SFC types.

4.2.7 Generating the Type Definition in the Batch Types

Introduction

As the basis for creating recipes in SIMATIC BATCH, the type description of the process cell must be generated and synchronized with the block instances of the CFC charts.

Туре	Editing Options and Results
Data types	The system specifies the standard data types such as floating point number, integer, string, input material, output material, material, and Boolean. You can also create custom data types and edit their properties.
Units of measure	You can create new units of measure and edit their properties.

Туре	Editing Options and Results
Operation types, phase types and process tag types	To allow recipe creation purely on the basis of types, they must be specified without the block instances for them to exist
	1. Operations types: Type information for the equipment operations (EOP)
	2. Phase types: Type information for the equipment phases (EPH)
	3. Process tag types: Type information of the TAG_Coll blocks
	Operation types, phase types and process tag types can be assigned to control strategy parameters.
Equipment properties	Create new equipment properties in the "Equipment properties" folder such as the size of the unit (capacity of a silo) or the material composition of the silo shell or dynamic properties like temperature and pressure. Equipment properties are assigned to units in the ES configuration and then requested as conditions when creating recipes.

Prerequisites

- The **SBGS_MP** project is open in SIMATIC Manager.
- Plant View is activated.

Procedure

- 1. Select SBGS_MP object
- 2. Right click on the "SBGS_MP" object and select **SIMATIC BATCH > Open configuration** dialog.

The "Configure Batch process cell 'Kitchen' in SBGS_MP" dialog box appears

rocess cell data	Properties		
SBGS_MP	💣 Batch types		
S7 Programs Stations	Description		
E A Ktchen	Last changed on	5/7/2019 3:02:47 PM (UTC +5:30)	
	Batch types Propagatg	Log Additional Generate V Da	

Note

A format conversion may be necessary for projects created with an older version of CFC/ SFC. You can only open the configuration dialog after you have completed the conversion.

- 3. Select "Batch types" in the tree view and click "Generate & Propagate".
- 4. Select "Batch instances". In the "Batch instances" area, click "Merge".
- 5. Now, select "Kitchen". In the "Batch process cell" area, click "Transfer Messages" (Only One time).
- 6. The "transfer messages to OS" popup appears. Click "Yes".
- 7. Click "Apply" and "OK" to exit.

4.2.8 Compiling and Downloading the AS, OS and Batch Process Cell Data

Prerequisites

- The **SBGS_MP** project is open in SIMATIC Manager.
- Plant View is activated.
- Component view is activated.

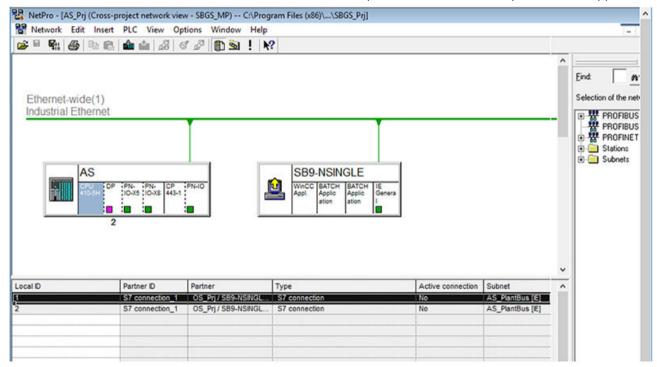
Procedure

- 1. In "Component view", select the SBGS_MP multi project.
- 2. Right-click and select **SIMATIC BATCH > Open configuration dialog**.
- 3. In "Configuration Batch process cell "Kitchen" in 'SBGS_MP'" window, under 'Stations', click on "Update".
- 4. Select 'AS' and in the properties area, select the checkbox for 'Simulation (TCP/IP) on/off' and click OK.
- 5. Open any CFC chart.
- 6. Select **Options > CUSTOMIZE > Compile/Download** in the CFC Editor, and click "OK". Check or increase the number of "Installed blocks per runtime group or OB" to 100. This prevents warnings from occurring during compilation.
- 7. Click 🔐 icon in the toolbar. The "Compile program" window appears.

8. Click "OK" to compile the complete AS program. After successful compilation, click Chart > Exit to close the CFC editor.

	Compile pro	gram	x
Compile Charts as Program]		
CPU: Program name:	CPU 410-5H AS\CPU 410-5H\A	S_Program\	
Scope Entire program Changes only			
Generate module drive	ers	<u>B</u> lock Driver Settings	
ОК		Cancel Help)

- 9. In the "Component view", select "AS_Prj" project. Click "Options > Configure Network". The "Netpro.." window appears.
- 10. In the "Netpro.." window, click "View" > "Cross-Project Network View" to view both AS and Server. Click "Network > Save and Compile". The "Save and Compile" window appears.



11.Select "Compile and check everything" and click "OK". Close the "Netpro.." window.12.Select OS_Prj click on "Options > Compile Multiple OSs Wizard > Start".

- 13. The "Wizard: Compile Multiple OSs" window appears. Click "Next" and "Connection...". The "Select Network Connection" window appears.
- 14. In the "WinCC unit" column, click on the "Industrial Ethernet" drop-down list, and select "TCP/ IP". Click "OK".

	Select Network Connection							
S7 program	n: AS_Program	1						
Subnet	Subnet type Ind. Eth.	WinCC unit	Address 192.168.0.1	Station no.	Segment no.	Rack no. O	Slot no. 3	Send/receive r
S7	Sym. conn.	TCP/IP V Industrial Ethernet Industrial Ethernet (II) TCP/IP	132.100.0.1			0	5	
<			Ш					>
OK						C	ancel	Help

15. In the "Wizard: Compile Multiple OSs" window, click "Next".

16. Compile the entire OS with memory reset. Click **Next > Compile**. After compilation, click "OK" to close the "Wizard: Compile OS" window.

Wizard: Compile Multiple OSs	×							
Select the data you want to comp	ile and the scope of the compilation.							
Data ✓ Tags and messages	Further options Minimum acquisition cycle of the archive tags:							
SFC Visualization	☐ <u>Wi</u> th interconnection partner (SFC option)							
Picture Tree	Compression Settings							
Scope	Create <u>s</u> erver data							
_	memory reset							
Language settings Multiple languages are installed in the STEP 7 multiproject. This has an impact on the duration of the OS compilation. Do you want to start the wizard for the language settings?								
< <u>B</u> ack <u>N</u> ext >	<u>F</u> inish C <u>a</u> ncel Help							

17.Right-click "SBGS_MP" project and select SIMATIC BATCH > Open configuration dialog > Batch instances > Merge to compile the batch process cell data.

tocess cell data	Properties	
SBGS_MP	Batch instances	
S7 Programs Stations	Description	
E - 5 Ktchen ⊛ - 5 Batch types	Last changed on	5/7/2019 3:03:01 PM (UTC +5:30)
	Batch instances Batch instances Merge	Log Merge V (3) D Emor(s) (4) D Warning(s)

18. Select the "SBGS_MP" project.

19. Select **Settings > OS Objects > Update** to update the plant status.

20. Click "OK" to close the view.

21. Click "Apply" and then click "OK" to close the "Configure Batch process cell" window.

4.2.9 Downloading the AS to PLCSIM

Introduction

Open SIMATIC Manager to download the compiled AS data to the "PLCSIM" simulation program.

Prerequisites

• Component view is activated.

Procedure

- 1. Click "Options > Set PG/PC Interface". The "Set PG/PC Interface" dialog box appears.
- 2. In the "Access Path" tab, "Interface Parameter Assignment Used" area, select "PLCSIM. TCPIP.1" and click "OK".
- 3. Click "OK" on the "Warning" window.
- 4. To open PLCSIM in SIMATIC Manager, click 🕮 icon.



- 5. To download the HW configuration to PLCSIM, select your AS in the Component view.
- 6. Right click on "Hardware" and select "Open Object"
- 7. Click the 🛍 icon in the toolbar to download the hardware configuration to the AS.
- 8. The "Select Target Module" window appears. Click "OK".
- 9. The "Select Node Address" window appears. Click "OK".
- 10. Close HW Config.
- 11.Open any CFC chart from the chart folder of your project in the component view and download the entire program to PLCSIM.

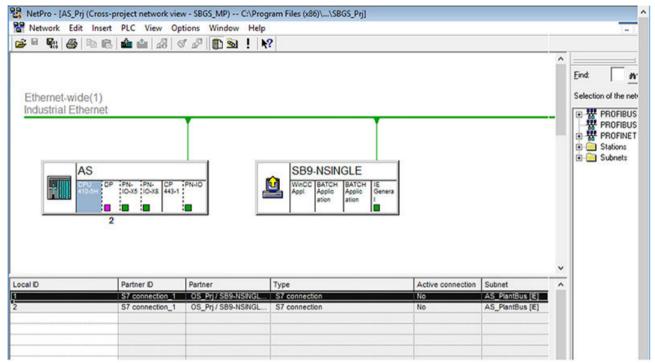
Note

If the dialog "Download S7 - Read Back" is displayed, click "No". This means that parameters from the AS will not be read back before loading.

^{12.} Close the CFC Editor.

13. Click "Options > Configure Network". The "Netpro.." window appears.

14. Under "AS" select "CPU 410-5H" and click icon . The "PLC Download to Current Project Selected Stations" dialog box is displayed. Click "Yes".



15. After the download activity, close the "NetPro" window.

16. Start simulation by setting the PLCSIM-CPU into "RUN-P".

17. Save the simulation data you downloaded in order to prevent its loss after you exit PLCSIM. Steps 1 to12 must be repeated the next time you open a PLCSIM session after closing PLCSIM without saving the data. Saved simulations can be activated directly in "Run" mode by opening the corresponding file.

4.2.10 Downloading the Batch Process Cell Data

Prerequisites

- The **SBGS_MP** project is open in SIMATIC Manager.
- Plant View is activated.

Procedure

- 1. Right click on the "SBGS_MP" project and select **SIMATIC BATCH>Open configuration dialog**.
- 2. The "Configure Batch process cell 'Kitchen' in 'SBGS_MP' " window appears.

BGS_MP/Kitchen						
rocess cell data	Properties					
SBGS_MP S7 Programs	Kitchen	5 Kitchen				
37 Programs ⊛ 8 Stations	Description					
E-M Ktchen	Process cell component grouping					
⊕ ∰ Batch types ⊕ ∰ Batch instances						
E an oach nach cos						
	Batch process cell	Log				
	Caron process con					
		Market and a second sec				
	Ogeck validity	Validation 🗸				
	Qzeck validty Iransfer messages	Valdation V Solution V Emor(s)				
	Iransfer messages	🔯 D Enor(s)				
		🔯 D Enor(s)				
	Iransfer messages	🔯 D Enor(s)				

- 3. Click "Download..." to download the Batch process cell data generated on the ES to the BATCH Server and Client. The BATCH Server and Client in your configuration are operated on a single PC.
- 4. The "BATCH configuration" dialog box appears. Click "OK".

5.	The "Download Batch process cell 'SBGS	_MP' " window appears.	Click "Start'	' to start the
	download process.			

ħ	Compone Batch Da		ise Serve	PC station		Target system	verify	Status
~		<u>وم</u>	Project	OS_Prj\SERVER		{local}		Downloaded
~	Master	5	Offline	OS_Prj\SERVER	_	{local}		Not up-to-date
~		D.	Online	OS_Prj\SERVER		{local}		Not up-to-date
		8	Project					
	Standby	51	Offline					
		D.	Online					
	Batch Se	rver						
~	Master			OS_Prj\SERVER		{local}		Downloaded
	Standby							
e	Batch Cli	ent						
~				OS_Prj\SERVER		{local}		Downloaded

6. The "Status" column turns green after the download is complete. It is as shown in the figure below.

Master OS_Prj\SERVER Image: Standby Downloaded	Compon	ent	PC station	Target system	verify	Statu
Master Offline OS_Prj\SERVER Downloaded Online OS_Prj\SERVER Image: Ocal > Downloaded Standby Project Downloaded Standby Offline Image: Offline Downloaded Batch Server OS_Prj\SERVER Image: Offline Image: Offline Downloaded Master OS_Prj\SERVER Image: Ocal > Downloaded Downloaded Standby OS_Prj\SERVER Image: Ocal > Downloaded Batch Client Emage: Ocal > Downloaded Downloaded	🔵 Batch D					
Image: Standby Online OS_Prj\SERVER Image: Standby Downloaded Standby Image:						Downloaded
Standby Project Standby Offline Online Online Batch Server OS_Prj\SERVER Master OS_Prj\SERVER Standby Downloaded Standby Batch Client	Master					Downloaded
Standby Offline Online Online Batch Server OS_Prj\SERVER Master OS_Prj\SERVER Standby Downloaded Standby Batch Client		🛐 Online	OS_Prj\SERVER	📇 {local}		Downloaded
Batch Server Master OS_Prj\SERVER Standby Downloaded Batch Client		Project				
Batch Server Master OS_Prj\SERVER Downloaded Standby	Standby	🛐 Offline				
Master OS_Prj\SERVER Image: Second		🛐 Online				
Standby Batch Client	🗐 Batch S	erver	·			·
Batch Client	Master		OS_Prj\SERVER	📇 {local}		Downloaded
E paren circuit	Standby					
OS_Prj\SERVER 0ocal} Downloaded	😨 Batch C	lient				
			OS_Prj\SERVER	📇 {local}		Downloaded

- 7. Click "Close" to exit the "Download Batch process cell 'SBGS_MP' " window.
- 8. Click "OK" to exit the "Configure Batch process cell 'Kitchen' in 'SBGS_MP' " window.

Note

Messages in other languages

Message output in languages other than German / English is only available if project data was configured, compiled and downloaded in the corresponding regional language.

4.2.11 Starting the OS

Prerequisites

• Component view is activated.

Procedure

1. Click "Start", right-click "File Explorer", and then click "Manage". The " Computer Management" console is displayed.

Note

- If you are using Windows 7, click "Start", right-click "Computer", and then click "Manage".
- If you are using Windows Server OS PC, select "Computer Management" from the "Administrative Tools" folder.
- 2. In the "Computer Management" console, create a new user with user name and password. In our example, the user is "SBGettingStarted".
- 3. Then, create a new Windows group. In our example, this is the "SBatch" group.
- 4. Add the new Windows user to the following groups:
 - SBatch
 - Administrators
 - Logon_Administrator
 - SIMATIC BATCH
 - SIMATIC HMI
 - SIMATIC HMI CS
 - SIMATIC NET
- 5. Close the "Windows Computer Management" console.
- 6. In the tree view, expand the "Server (your PC name)". Now, expand "WinCC Application"
- 7. Right click "OS(1) > Open Object". The "WinCC Explorer" window appears.

- 8. Right Click "User Administrator > Open". The "User Administrator WinCC Configuration Studio" window appears.
- 9. In the "User Administrator" pane, create the "SBatch" Windows group with unrestricted rights.

User Administrator «	0	Authorizations [SBatch]		Find		، م	
∃– 🙀 User Administrator		Function	Enable	Pot_1	Pot_2	1	\[
Administrator-Gruppe	1	User administration	v	V	V		
Administrator	2	Authorization for area	v	V	V		
SBatch	3	System change		v	V		
	4	Monitoring	v	v	v		
	5	Process controlling		1	v		
	6	Higher process controlling	v	v	V		
	7	Report system		v	v		
	8	Archive controlling		1	v		
III Tan Managana	9	Activate remote	\checkmark	v	V		
Tag Management	10	Configure remote		v	v		Ъ.
Alarm logging	11	Web Access - monitoring only		v	v		
	12	Highest process controlling		v	v		
Tag Logging	13	Advanced operation 1					
222	14	Advanced operation 2	(mm)	(m)	(m)		

10. In the "Properties - User Administrator" pane, enable the "SIMATIC Logon" check box. Close the "User Administrator - WinCC Configuration Studio" window.

👬 User Adr	ninistrator - WinCC Con	figuration Stu	idio 📃 🗖 🗴
<u>F</u> ile <u>E</u> dit <u>V</u> iew Too <u>l</u> s <u>H</u> elp			
User Administrator «	Find	<mark>۶ -</mark>	🛊 Properties - User Administra »
🖃 📲 User Administrator	Group name	Logon with \land	Selection
Administrators	1 Administrators		Object type User Administrator
Administrator	2		Object name User Administrator
	3		SIMATIC Logon
	4		SIMATIC Logon
	5		Tag Logon
	6	=	Computer name
	7		Tag name <tag name=""></tag>
	8		Low limit 0
	9		High limit 1
	10		
Tag Management	11		
-	12		
Alarm logging	12		
Tag Logging	13		
101 ···· ···· ·························			
● 🕆 🖾 -	15 H ← ► ► Groups / <		
Ready NUM Scroll	English (United States) Tal	ole: 1 Group 100% 😑

11. In the "WinCC Explorer' window, right click "Tag Management > Open". The "Tag Management - WinCC Configuration Studio" appears.

- III Tag Management WinCC Configuration Studio \times File Edit View Tools Help **Tag Management** ~ Find • ۹ Properties - Channel unit >> 🖃 🛄 Tag Management Selection ^ Name ^ Object type Channel unit 🗄 🍄 Internal tags 1 AS1_Program Object name TCP/IP 2 AS1_Program - I SIMATIC S7 Protocol Su General II MPI 3 AS1_Program TCP/IP Name 4 AS1_Program PROFIBUS Number 5 5 AS1_Program Industrial Ethernet ID 618 6 AS1_Program Slot PLC Assignment 7 AS1 Program - TCP/I Communication driver SIMATIC S7 Protocol Suite New Connection rogran Properties rograr PROF 🝙 Byte Access V Сору rograr Indus 💦 V Bit Access Paste rograr Watchdog Name rograr Start-Up Signal 🔢 Soft P ど Export rograr Reentrant 🗄 🗟 Structure tag rograr System parameters Remote tag - AssetC rograr Online Connections ∇ < > 16 AS1_Program Online tag V 17 AS1_Program Register a Tag \checkmark Tag Management **Own Properties** V 18 AS1_Program Intel Byte Order 19 AS1_Program 1 Alarm logging 20 AS1_Program 21 AS1_Program Tag Logging 22 AS1_Program 🎼 🦗 🏭 🐠 🛧 🔛 H I I I C Ready NUM English (United States) Table: 5077 Tags 100 % (=) 0 Ð
- 12. In the "Tag Management WinCC Configuration Studio" window, right click "TCP/IP > System parameters".

13. The "System Parameter - TCP/IP" dialog appears. Select the "Unit" tab. In the "Logical device name" area, click "PLCSIM(TCP/IP)" drop-down list, and select "PLCSIM.TCPIP.1" and click "OK".

System Parameter - TCP/IP		×
SIMATIC S7 Unit		
Select logical device name		
CP type/bus profile:	TCP/IP	
Logical <u>d</u> evice name:	PLCSIM.TCPIP.1 ~	
Set <u>a</u> utomatically	CP_H1_1: CP_L2_1: Intel(R) Ethemet Connection I217- Intel(R) Ethemet Connection I217- MPI	
Job processing	PLCSIM.TCPIP.1	
<u>W</u> rite with priority	PLCSIM.TCPIP_internal.1 S7ONLINE TS Adapter IE	
Enter a new device name or se	ect the requested device from the list.	
ОК	Cancel Help)

14. Close the "Tag Management - WinCC Configuration Studio" window.

15. Open the OS Project Editor and navigate to all the available tabs, and then click "OK". This function is used to configure the WinCC Runtime user interface and the alarm system. This operation may take a few minutes.

Note

Adapt a screen resolution of 1280*1024 for a SIMATIC Standard-Layout as mentioned under Layout description in the figure. This resolution may vary according to the display resolution set on your PC.

OS Proje	ect Editor					?
Layout	Message Config	guration 📔 🖪 Message	Display 💏 Area	Runtime Window	Basic Data 😭 Ge	eneral
Current L	ayout: SIMAT	IC Standard 1280*1024				
Available	Layouts:			Layout Description:		
SIM	IATIC Server 2560*16 IATIC Server view 102	24*768	^	SIMATIC Standard-Layou 1280*1024	t for screen resolutio	on of
SIM SIM	IATIC Server view 115 IATIC Server view 126 IATIC Server view 166 IATIC Server view 166 IATIC Server view 196	0°1024 0°1200 0°1050	1	Number of area keys: Number of server keys: Overview extended confi	turation -	16 Detail
SIM SIM	IATIC Server view 192 IATIC Server view 256 IATIC Standard 1024*	20*1200 50*1600 768		Runtime help available Display		- Country
SIM	ATIC Standard 1152* ATIC Standard 1280* ATIC Standard 1600*	1024	~	User name	O User ID	
Monito	or configuration					
۲		0 🔳	2 3	0 🔳	0 🔳	2
0	1	0	2 3 4	2		
				ОК	Cancel	Apply

16. Start Runtime on the OS. An initial startup may take a few minutes. Log on with the user logon data you have just created. Click "Pan" in the runtime window as shown below.

	Fot.3		Oven Desk_1		Pot, t		RG		SIEMENS POS 2 stategistated
Kich Overá Doveří-t	* *	Raw Materi	_		<u>)</u>		dients	*	
Storefte	**** **** ****************************								
	88 88			9	Pan]			
E	۳		1 1	\$ \$ \$	* <u>*</u> d		5 6 8		1

Note

To check if the connection between AS and OS is established:

- 1. In the "WinCC Explorer" click "Tools > Status of Driver Connections"
- 2. The "Status Logical Connections" window appears.
- 3. Here, the "State" column must display as "OK". If not, please check the set PG/PC Inteface and Tag Management system parameters.

4.2.12 Starting the BATCH Launch Coordinator

The BATCH Launch Coordinator is visible as a symbol in the taskbar at the bottom right on your desktop. You make operator input in a shortcut menu which you open by right-clicking on the symbol.

The start mode of the BATCH Launch Coordinator is set to "automatic" as standard. This means that the BATCH Launch coordinator starts the BATCH project and BATCH Runtime after successfully starting WinCC Runtime. You also need to change the security settings to read the batch data. You have two options to read the batch data namely:

- NTLM Mode
- Compatible Mode

Note

It is always recommended to use NTLM mode for reading Batch data.

Option 1: Reading Batch Data in NTLM Mode

- 1. Click "Start > Control Panel" The "All Control Panel Items" window appears.
- 2. Open "Administrative Tools". The "Administrative Tools" window appears.
- 3. In the "Name" column, double click "Local Security Policy". The "Local Security Policy" window appears.
- 4. Expand "Local Policies" and select "User Rights Assignment".
- 5. In the "Policy" column, select "Log on as a service" and right click "Properties". The "Log on as a service properties" window appears.
- 6. Click "Add Users or Groups".
- 7. The "Select Users, Computers, Service accounts, or Groups" dialog appears.

Select Users or Groups	×
<u>S</u> elect this object type: Users or Built-in security principals	Object Types
From this location:	
SERVER	Locations
Enter the object names to select (<u>examples</u>):	Check Names
<u>A</u> dvanced OK	Cancel

8. In the "Enter the object names to select (examples)" area, enter the computer name or the domain name along with the user name "SBGettingStarted".

Select Users or Groups	×
Select this object type: Users or Built-in security principals	Object Types
From this location:	Locations
Enter the object names to select (<u>examples</u>):	
<computer domain="" name="" or="">\SBGettingStarted</computer>	<u>C</u> heck Names
Advanced OK	Cancel

Note

It is recommended to create separate user for this task (NTLM).

9. Click "Check Names" and click "OK".

10. In the "Log on as a service properties" window, click "Apply" and "OK".

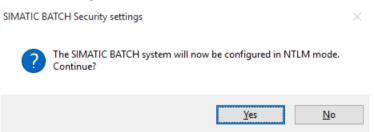
11. Click "Change security settings"

	BATCH Runtime	>
	BATCH project	>
	Change start mode from	>
	BATCH status	
	Change server language	
	Change security settings	
	About	
	Exit	
°		
4	CEN MA	
H	CEN MA	

12. The SIMATIC BATCH Server security window appears. Choose the "NTLM (recommended) option, and enter Logon and Password as shown below. Please use your computer name here. The user name will be "SBGettingStarted".

SIMATIC BATCH	Server security		×
	oose between secure communication and co M mode not all the scenarios from the past a		on. Please
	ting the system operates just as in the past patibility. Please activate this mode only wh		
NTLM (recom	mended)		
Use this mod mode.	e as long as there are no technical reasons	to change to the com	patibility
Logon:	Computer Name\SBGettingStarted		
Password:	•••••		
	ase note that the SIMATIC BATCH Server n tarted to change the access data.	eeds to be stopped a	nd
OK		Cancel	<u>H</u> elp

13. Click "OK". The "SIMATIC BATCH Security settings" dialog appears. Click "Yes" and "OK". You have thus configured to read batch data in NTLM mode.



Option 2: Reading Batch Data in Compatible Mode

1. Click "Change security settings"

BATCH Runtime	>
	Ś
BATCH project	<i></i>
Change start mode from	>
BATCH status	
Change server language	
Change security settings	
About	
Exit	

2. The SIMATIC BATCH Server security window appears. Choose the "Compatible" option here, and click "OK".

SIMATIC BATCH Server security	×
Here you can choose between secure communication and compatible communication. Pleas note that in NTLM mode not all the scenarios from the past are supported.	se
Compatible With this setting the system operates just as in the past. This provides the greatest possible compatibility. Please activate this mode only when the NTLM mode does not	
O NTLM (recommended)	
Use this mode as long as there are no technical reasons to change to the compatibility mode.	
Logon:	
Password:	
Please note that the SIMATIC BATCH Server needs to be stopped and restarted to change the access data.	
OK Cancel <u>H</u> elp	

If the BATCH Launch Coordinator has ended, navigate to windows Start menu and click **BATCH** > **BATCH Launch Coordinator** to restart.

For Windows 10 and Windows server 2012, click the **311** icon + R to open the "Run" dialog. Enter "sblaunchcoordinatoricon32ux.exe". Click "OK" to restart.

If the start mode is set to "manual", you have to start both the BATCH project and BATCH Runtime in the shortcut menu of the Launch Coordinator. Please note that the start mode of the BATCH Launch Coordinator can only be set or changed by users who are logged on with administrator rights.

4.2.13 Loading the supplied recipes and materials

Introduction

This chapter will guide you to load the supplied Batch Control Center backup "sb_gs1_b.sbb" for the "Kitchen" process cell. Which contains recipes, materials, information on users, groups and role assignments is saved in the restore file.

Batch Control Center

The BATCH Control Center (BatchCC) is the central component for:

- Batch scheduling
- Batch control
- Management of all BATCH data
- Libraries, master recipes, formulas, materials and management of rights and roles

Prerequisites

To start BatchCC or the BATCH Recipe Editor, the BATCH Launch Coordinator must be started and the "Running" status must be displayed in the information bar displayed as

6

Procedure

To restore the batch sbb file:

 In the Windows Start menu, select Start > All Programs > Siemens Automation > SIMATIC > SIMATIC Batch > Control Center. In Windows 10 select Start > Siemens Automation > Control Center.

Note

If several projects are detected when you start BatchCC, or if the connection to the project cannot be established, a selection dialog appears.

2. In the "SIMATIC BATCH: Control Center" window, select "Options>Restore"

SIMATIC BATCH: Control Center	-	- 🗆	×
i Program Edit Control Planning O : 숙니슈 I 않	Permission management Roles management	🐼 🚍 1 < Full view	
	Backup Restore		
	Export Import Logbook Active applications Important system messages Compress data Start Recipe Editor Start viewer for archived batches Always on top Migration Settings		
	Extended batch information	3	
	Type Status name Q Q Q	-	
Restores the data from a backup file		0 🙎 s	BGetting:

- 3. The "Restore" window opens for the selection of the batch .sbb file. This .sbb file is file is available as mentioned above inside the downloaded .zip file.
- 4. Select the sb_gs1_b.sbb file and click "Open"

?	Restore					×
	Look in:	Final PRJ		~	G 🌶 🖻 🖽	
	Quick access	Name	^ ;		Date modified 10/30/2017 3:45 PM	Type SBB File
	Desktop					
	Libraries					
	Land This PC					
	Setwork	<				>
		File <u>n</u> ame:	sb_gs1_b		~	<u>O</u> pen
		Files of type:	Backup files (*.sb	b;*xml)	~	Cancel
] Without log		Start ID:	Last ID:		
		Batches:	1		<u>R</u> ead out IDs	
		Recipe/Library:	1			
		Formula:	1			
		Categories:	1			
		Materials:	1			

Result

The sb_gs1_b.sbb file is successfully restored

Note

If the "Kitchen" process cell is already in the BATCH Control Center, you cannot use the "Restore" command. The associated Batch database has already been created and loaded. However, you can perform all other configuration tasks such as assigning new names to objects such as materials, recipes or batches.

4.2.14 Setting up Roles Management in SIMATIC Logon

Introduction

In order to obtain unrestricted access to BatchCC with the user logged into WinCC runtime, the logged on user is added to the "Superuser" role in the SIMATIC Logon roles management.

Note

Information on role assignment in the restore file is related to the PC on which the backup file was created. It is recommended that you always perform the role assignment again in the SIMATIC Logon roles management.

Prerequisites

• BatchCC is open.

Procedure

To set up roles management in SIMATIC Logon:

1. Click **Options > Roles management** in Batch CC. The "SIMATIC Logon Role Management" window appears.

🔝 SIMATIC Logon Role Management		? ×
<u>F</u> ile <u>E</u> dit <u>?</u>		
D D. 6. × ?		
Configured roles and assignment types	All roles Name Description Super user Factory manager Operator Process engineer Automation engin Emergency opera WebClientUser	
Available assignment types	No selection	
€		

2. Select Roles>Super User>Groups and users, and right-click to "Edit".

🔝 SIMATIC Logon Role Management				?	\times
File Edit ?					
D D. & × ?					
Configured roles and assignment types	Role: Super user				
Roles Super user Factory manager Factory manager Fact	Groups and users	Roles	Domain / Computer	Description	r
Available assignment types	No selection				
⊕-∰ Groups and users					

3. In the "Edit groups and users" window, select your Domain/Computer Name and click on "List". All the users & groups of particular domain or computer will be listed.

4. Search for the "SBatch" group. Select the group and click the

-

icon to add the user to the "Configured groups and users" area.

	Edit g	roups an	d users		X
Role: Super user					
		Search path	n		
Domain / Computer:	IPC02 (this computer)	~	Name:	*	
List	Stop				
Available groups and user		٦	Configured gro	ups and users	
	Domain / Computer A IPC02	-	SBatch	IPC02	_
Siemens TIA Engi				IFCOZ	
	IPC02 IPC02				
	IPC02 IPC02				
	IPC02				
SIMATIC HMI VIE		→			
SIMATIC Manage					
SIMATIC NET	IPC02	+			
SQLServer20055	IPC02 ≡				
Osers	IPC02				
MinRMRemoteW/	TPC02				
	>				
OK		Cancel		Help	

- 5. Click "OK" and then "File>Save".
- 6. Close the "SIMATIC Logon Role Management" window.

Note

The PC name and user credentials are always valid for your own PC's. Please use specific user names and passwords created for your PC while performing roles management steps.

4.2.15 Updating Downloaded Batch Process Cell Data

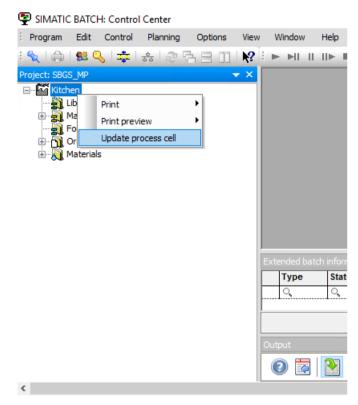
Prerequisites

• BatchCC is open.

Procedure

To update the downloaded batch process cell data:

1. Right-click on the "Kitchen" process cell and select "Update process cell"



2. Click "OK" in "Updating the process cell" window.

Assignment Preview				
Current process cell	New process cell	edited	Current Logic op.:	
Ktchen Data types	Data types		Kitchen	
Add_ngredient Add_ngredient Gerating State Classes Cl	Add_Ingredient Operating State Units of measure Classes Equipment prope Operation types Phase types Process tag types Instances Stove_1 Viewport_1		Values without assignment	
< Elements were assigned based on internal i	IDs	>	Assigned values	
Show deleted objects				

4.2.16 The Recipe for Pasta Piccata Milanese

Recipe

Meal	Piccata Milanese
Quantity	2.9 kg (reference quantity)
Ingredients	100 ml oil
	1.9 kg pasta
	50 g salt
	1 l tomato sauce

Inst	tructions	Editing Options and Results
1	Prepare water	Fill a pot with 3 litres of water, add 100 ml of oil and a pinch of salt, heat to 100°C
2	Cook pasta	Put 1.9 kg of pasta in the boiling water and cook for 6 minutes.
3	Prepare sauce (while cooking pasta)	Pour 1 litre of tomato sauce in a pot. Heat for 5 minutes at 40 $^\circ$ C while stirring
4	Make complete	Add salt and/or pepper to flavor. Serve the pasta and sauce

4.2.17 Setting up the Output Material

Defining output materials

At the beginning, define the materials and optionally, the qualities for input materials/output material for SIMATIC BATCH.

You can define the materials in the list boxes displayed in subsequent dialogs for recipe creation and batch planning. Materials and qualities must also be assigned a unique code (for example, an internal company code). This code can be used to specify the setpoint and process value at the interface blocks or SFC types to identify the material or product. In order to write recipes, material information needs to be defined. Input and output materials with various qualities can be created. These are created in the BatchCC, in the Materials folder, under the process cell you have loaded.

Prerequisites for adding output material

• BatchCC is open.

Adding an output material

In this section, we will explain the steps to add an output material (Piccata Milanese). Users can follow the same steps to add additional output materials.

To add an output material:

1. Right-click "Materials>New" in the "SIMATIC BATCH: Control Center" window.

	BATCH: C	ontrol Cer	nter				
Program	Edit Co	ntrol Pla	anning	Options	View	Window	Help
ः 💊 । 🌧 ।	👥 🔍	💠 🖧	24	19 11	N? -	► HI II	
Project: SBGS				-	×		
E Kitche							
	braries aster recip	es					
- 🛐 F	ormulas						
🗄 🖓 🔮							
÷ 💫 M	ateriais	New					
	9		older				
							1.5.6
						xtended bat	Statu
					- IF	् ा ype	्
						Dutput	
<							

2. The "New material" window appears. In the "General" tab, enter "Piccata Milanese" in the "Name:" text box. Enter a random code in the "Code:" text box. In the "Usage" area, select the "Output material" check box, and click "OK".

ew material			
General Quality 🥖 C	hange Log		
Name:			
Piccata Milanese		 	
<u>C</u> ode:			
123		 	
Description:			
p		 	~
			~
<			~
< Usage			
	Qutput material		
Usage	Qutput material		

3. Follow step 1 and in step 2, In the "Usage" area, select the "Input material" check box, and click "OK" to create the "Water" input material. The final display is as shown below.

SIMATIC BATCH: Control Center - [Materials]

Program Edit Control Planning Options View	Window Help			
े 🔨 । 🚓 । 😫 🔍 । 🏚 । 🚓 । ಿ 🖓 🔁 🔲 । 📢 ।	► HE IE IN ■ X ⊅ ⊅	100 X		î.
Project: SBGS_MP <	阈 [Materials]			
E- Kitchen	Name	Code	I	O Description
	Enter text here			I 🍸 Enter text here
Getting_Started_Template_Recipes		3	×	
Formulas	Penne	9	x	
iain Orders iain Materials	Penne hot	19	x	
Dish/Product	Penne piquant	20	x	
	Penne spicy	21	x	
	Pepper	2	x	
	Pork Schnitzel	5		x
Water	Product_Getting_Started	1111		x
	Balt	1	x	
🕀 🖓 Pasta	Spaghetti	8	x	
	🔐 Spaghetti piquant	17	x	
Product_Getting_Started	Spaghetti spicy	18	x	
	Tomate Sauce	14	x	
	Tomate Sauce hot & Spicy	12		x
	Tomato Sauce piquant	10	x	
	Tomato Sauce spicy	11	x	
	Turkey hens	7	x	
	Veal	6	x	
	Viennese Schnitzel	13		x
	😽 Water	4	х	
	20 Element(s) 0 selected			

4.2.18 Creating a Master Recipe in BatchCC

Introduction

This section will guide you to create a master recipe in BatchCC.

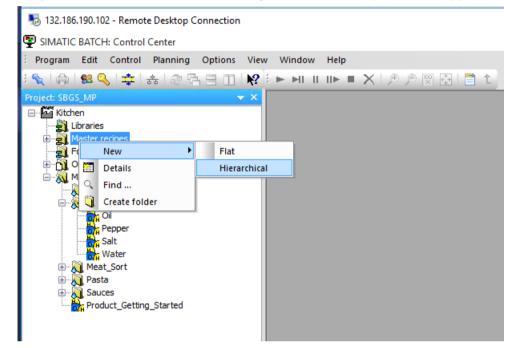
Prerequisites

• SIMATIC BatchCC is open

Procedure

To create a new master recipe in BatchCC:

1. In the "SIMATIC BATCH: Control Center" window, right click on **Master** recipes>New>Hierarchical. The "Creating a new master recipe" window appears.



2. In the "Name" input box, enter "Training Recipe". The "Version" input box is automatically populated as V1.0 since you are creating the master recipe for the first time. Click "OK". Now, "Training Recipe V1.0" is created under "Master recipes".

Creating a new master recipe	\times
Folder	
Master recipes	
Name:	
Training Recipe	
Version:	
V1.0	
OK Cancel Help	

3. Right click on **Training Recipe V1.0>Properties**. The "Properties of 'Training Recipe_V1.0'" window appears. Select the "Product" tab and enter the details as shown below:

operties of 'Training Recipe_V1	.0'			2
👹 Output material	Parameters	-	Transfer paran	neters
Dependencies	Process tag		🥖 Change	Log
흃 General 🛛 🕸 Alle	ocations	Product	👹 Input r	naterial
Product:	<u>Q</u> u	ality		
Piccata Milanese				\sim
Product code:				
123				
Reference quantity for quantity so	caling: <u>U</u> ni	it of measure	2:	
2.9	kg	I		\sim
Minimum quantity of a batch:	Ma	ximum quan	tity of a batch:	
1 kg	10	0	k	g
<				>
		rint	Close	Help

4. Select the "Output material" tab and click "New". Now, click on the "Material" input box. The "Select the material" window appears. Select "Piccata Milanese" and click "OK".

elect the material								×
Material:		Input material:	<n< td=""><td>leutral</td><td>> ~</td><td></td><td></td><td></td></n<>	leutral	> ~			
<u>C</u> ode:		Output material:	Yes	s	\sim			
Eolder: <neutral></neutral>					\sim			
5 entries found							Fiļter	
Materials	Code		I	0	Folder			
Piccata Milanese	123			x	Materials			
Product_Getting_Started	1111			x	Materials			
Pork Schnitzel	5			x	Materials/Meat_	-		
Tomate Sauce hot & Spicy	12			x	Materials/Sauce			
Viennese Schnitzel	13			x	Materials/Meat_	Sort		
<								>
OK						ncel	Help	

5. In the "Properties of 'Training Recipe_V1.0'" window, select the "Output material" tab and enter 2.9 in the "Quantity" input box. Now, click "OK".

R Dependen		@ p	cess tags	1 char	nge Log	🚫 ESIG
			-			
💑 General		Allocatio		Product		out material
🎯 Output n	naterial	સ	Parameters	;	Transfer p	arameters
t:						
Name	Materia	l (set)	Code (set)	Low recipe	Quantity (s	High recip
1 Output mate			123		2.9	
:						
-	w 1:					2
scription from ro	w 1:					2
-	w 1:				^	2
-	w 1:				^	1
-	w 1:				^	3
	w 1:					
-	w 1:					<u>N</u> ew
scription from ro	w 1:					<u>N</u> ew
-	w 1:				>	

Result

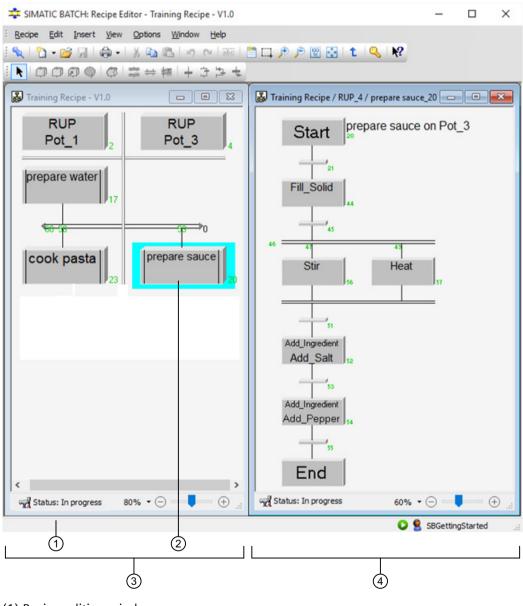
The master recipe has been successfully created.

4.2.19 Setting up a Recipe Structure in the Recipe Editor

4.2.19.1 Introduction of the Recipe Editor

Layout of the Main Window in the Recipe Editor

The basic layout of the user interface of the BATCH Recipe Editor is shown in the figure below, which illustrates an example of a hierarchical recipe. You can create or modify recipes in the editing windows using the structure elements of the "Insert" menu.



(1) Recipe editing window.

(2) Editing with an ROP sequence.

(3) Editing level 1 (RUP is always shown in a column and ROPs are arranged vertically).

(4) Editing level 2 (ROP sequence with the SFC structure elements, steps, branches, and so on).

Basic integration of the hierarchy in the BATCH Recipe Editor

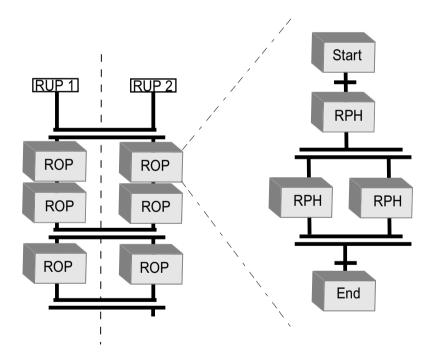
The diagram below shows the basic integration of the hierarchical structure for editing in the BATCH Recipe Editor. The structure of a hierarchical recipe is edited at two levels, that is, editing levels 1 and 2.

Editing level 1 (RUPs and ROPs)

Editing level 1 is intended for the plant view in which the processes of several cells can be synchronized. A recipe unit procedure (RUP) is made up of recipe operations (ROPs). To structure the process, you can use double lines to synchronize. This allows you to synchronize the timing of ROPs in several recipe unit procedures.

Editing level 2 (RPHs)

Editing level 2 is used to create ROP sequences. An ROP sequence begins with a Start step. The Start step is followed by a transition that defines the start conditions. Every ROP has a sequence of RPH and ends with an End step. A transition that defines the end condition precedes every end step.



SIMATIC BATCH: Recipe Editor - Training Recipe - V1.0 \times Recipe Edit Insert View Options Window Help 🍬 🗋 • 💕 🗔 🕼 • 1 X 📭 🛍 🗠 🖉 🦄 🛅 🗖 📮 🏓 🖉 🔂 主 🔍 😽 🛃 Training Recipe / RUP_4 / prepare sauce_20 💼 🔳 Training Recipe - V1.0 - - -RUP RUP prepare sauce on Pot_3 Start Pot 3 Pot 1 21 prepare water Fill Solid **4**55 **⊅**0 **'**45 45 prepare sauce cook pasta Stir Heat **5**1 Add_Ingredient Add_Salt 53 Add_Ingredient Add_Pepper End < > Status: In progress Status: In progress 80% • 🖂 💳 - + ... 60% • 🖂 = . = + 🖸 🙎 S8GettingStarted

Implementation in the BATCH Recipe Editor

Tools for Creating the Recipe Structure

📫 SIMA	TIC BATCH	l: Recipe	Editor -	[—		×	
🛃 <u>R</u> ec	pe <u>E</u> dit	<u>I</u> nsert	<u>V</u> iew	<u>O</u> ptions	<u>W</u> indow	<u>H</u> elp	
្មភ្លី Statu	s: In progre	SS	100	% • 🗇 🛛	-		-12 13

(1) Select

- (2) Insert recipe procedural element
- (3) Insert recipe phase/operation
- (4) Create library reference
- (5) Insert operator instruction
- (6) Insert a command step
- (7) Insert simultaneous branch
- (8) Insert synchronization
- (9) Insert monitoring area
- (10) Insert transition
- (11) Insert alternative branch
- (12) Insert loop
- (13) Insert jump

4.2.19.2 Working on Editing Level 1

Introduction

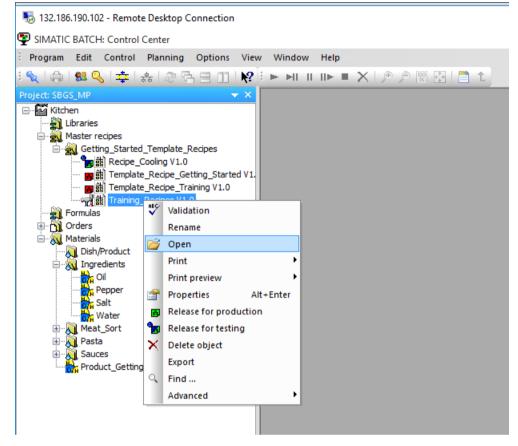
This section guides you to set up the recipe structure in the Recipe Editor in accordance with the description in the recipe.

Prerequisites

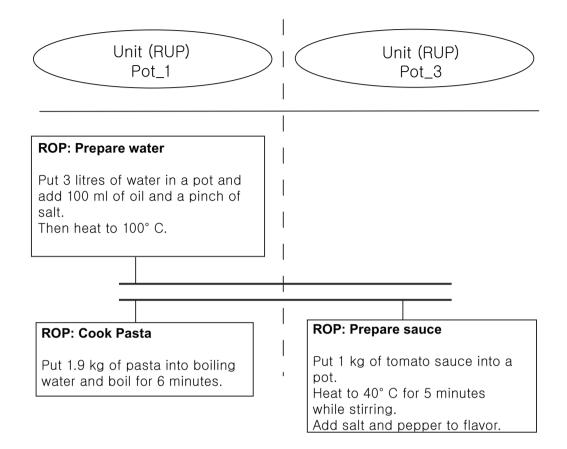
The SIMATIC BATCH Recipe editor is open.

Procedure at editing level 1

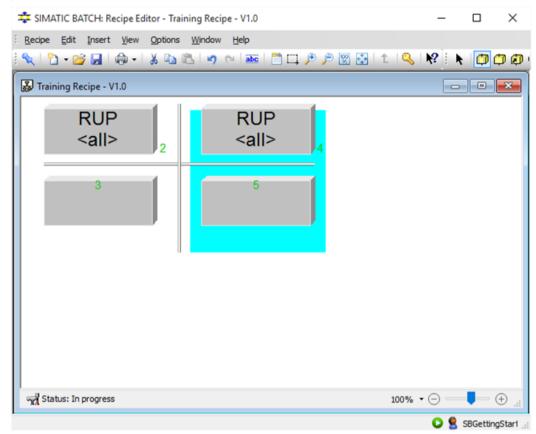
1. In the "SIMATIC BATCH: Control Center" window, right click Training Recipe V1.0>Open.



2. Create the "Piccata Milanese" dish using the corresponding tools and recipe description. Refer to the diagram on this page for help.



3. In the "SIMATIC BATCH: Recipe Editor" window, click the 🗇 icon to create an RUP. Repeat the procedure to create two RUP's as shown below:



4. Select the left RUP and right-click for "Properties". The "Properties of 'RUP_2" window appears. Select the "Allocation" tab. Now, click on the "Strategy" drop down list and select "Preferred unit". Later, click on the "Preferred unit" drop down list and select "Pot_1". Click "OK".

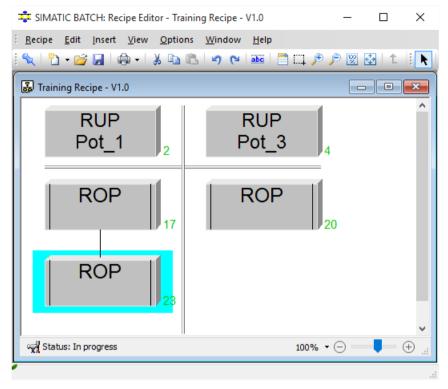
Properties of 'RUP_2'					×
F Transfer parameters	Process ta Input mate		🖉 ESIG 🎯 Output m		nchronization Parameters
Tree structure:		<u>S</u> trate	egy:		
Class view	~	Prefe	erred unit		\sim
Equipment selection:		Prefe	rred unit		
0 000 Desk_1		Pot_	1		~
			art allocation		
🗹 🏎 Pot_1		_	art allocation		
		_	able phases:		
			_Ingredient (EP n (EPH)	H)	
		_	Solid (EPH)		
			t (EPH) (EPH)		
			(211)		
		<			>
ОК			Print	Cancel	Help

Note

Follow these steps to select an individual unit in the "Equipment selection" area:

- 1. In the Recipe Editor, select **Recipe > Header parameters**. The properties dialog box is displayed.
- 2. Click the "Allocation" tab and clear the "Condition" and "constrain" check box.
- 5. Assign the "Pot_3" unit as the preferred unit for the second (right hand) RUP as explained in step 4.

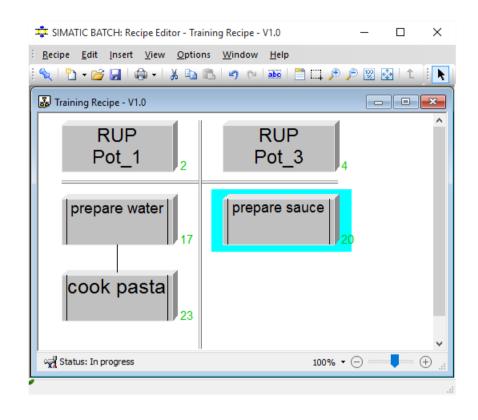
6. Insert the relevant ROPs (recipe operations) as shown below. Refer to step 3 for details.



7. Select the top left ROP and right-click for "Properties". The "Properties of ROP_17" window appears. Select the "General" tab and enter "prepare water" in the "Name" input box. Now, Click "OK".

Properties of 'ROP_17'			>	<
Transfer parameters (i)	🗅 Process tags aterial 🛛 🙀	ESIG Output material	SynchronizationParameters	
<u>N</u> ame: prepare water				
<u>U</u> nit dass:	Prefi	erred unit: _1		
Planned runtime: <u>M</u> onitoring	time: Run <u>t</u>	ime scaling:	~	
s s				
Description:			^	
			~	
ОК		Print C	ancel <u>H</u> elp	

8. Repeat steps 6 and 7 and assign the name **cook pasta** to the bottom left ROP, and **prepare sauce** to the right ROP. The final result after assigning the names for the ROP's are as shown below:



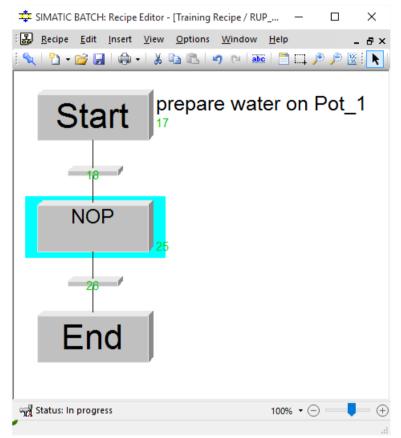
Note

The number in RUP_2 and RUP_4 is only a representational indication. The numbers may vary according to each user's PC.

4.2.19.3 Working on Editing Level 2

Procedure at editing level 2

1. To insert a recipe phase (NOP), double click on the "Prepare Water" ROP and click the 🗇 icon and place them in between the "Start" and "End" blocks to create an NOP.



2. Select the "NOP" and right-click for "Properties". The "Properties of 'NOP_25" dialog box appears. Click the "Phase" drop down list and select "Add_Ingredient (EPH)". Now, click the "Control Strategy" drop down list and select "Add_Water", and click "OK". The recipe phase takes the name of the equipment phase in this case.

Properties of 'Add_Ir	ngredient'				×
🕂 Transfer para 👼 General	meters 🚽	Ale Description	Output mater		nchronization Parameters
Phase:		Cor	ntrol strategy		
Add_Ingredient (EP	н)	\sim Ad	d_Water		\sim
<u>U</u> nit dass:			ferred unit: ht_1		
Planned runtime:	<u>M</u> onitoring	time: Ru <u>r</u>	time scaling:		
00	00				\sim
s	S		<u>C</u> ontinue		
Description of the ph	ase:				
FB 1101					<u></u>
<					>
ОК			Print	Cancel	<u>H</u> elp

3. In the "Properties of 'Add_Ingredient'" dialog box, click the "Parameters" tab, and enter "5" in the "Value" input box for the "Simutime" parameter.

Properties of 'Add	l_Ingredient_25'				×
Transfer pa	arameters 🖉	Description	ESIG Output material	C Synchron	ization neters
List:					
Name 1 Simutime	Low recipe limi 5 X		igh recipe lim U DO X se		
, D <u>e</u> scription:					<u>~</u>
< OK			Print (Cancel	> Help

Note

Runtime characteristics

Here, and in all the recipe phases, the "Simutime" parameter is used for simulation. The parameter has no influence on the runtime characteristics of equipment phases and recipe phases in a batch.

4. Now, select the "Input material" tab and click "Material" input box. The "Select the material" dialog box appears

Properties of 'Add	_Ingredient_2	5'					×
Transfer pa		All Descrip t material	tion 🎯	Output ma			onization ameters
List:							
Name	Material (s	Code (set)	Low re	ecipe limi	Quantity (s High	recipe lim
1 Li_quantity	<u></u>		0	X	0	100	X
<							>
Description:							
							~
<							>
·							-
OK				Print	Cancel		<u>H</u> elp

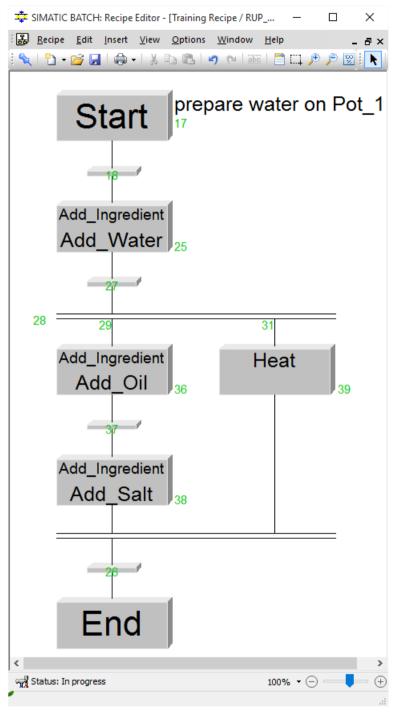
5. In the "Select the material" dialog box, select "water" and click "OK".

Select the material						×
Material:		Input material:	Yes		~	
Code:		Output material:	<ne< td=""><td>eutral</td><td>> ~</td><td></td></ne<>	eutral	> ~	
Eolder: <neutral></neutral>					~	
16 entries found						Filter
Materials	Code		I	0	Folder	^
Tomate Sauce	14		x		Materials/Sauces	
Oil	3		x		Materials/Ingredients	
Pepper	2		x		Materials/Ingredients	
Salt	1		x		Materials/Ingredients	
Water	4		x		Materials/Ingredients	
Spaghetti	8		x		Materials/Pasta	
Tomato Sauce piquant	10		x		Materials/Sauces	
Tomato Sauce spicy	11		x		Materials/Sauces	
Veal	6		x		Materials/Meat_Sort	
Turkey hens	7		x		Materials/Meat_Sort	
Penne	9		x		Materials/Pasta	
Penne spicy	21		x		Materials/Pasta	
Penne hot	19		x		Materials/Pasta	
Penne piquant	20		x		Materials/Pasta	~
<	17				Manager Bases	>
ОК					Cancel	Help

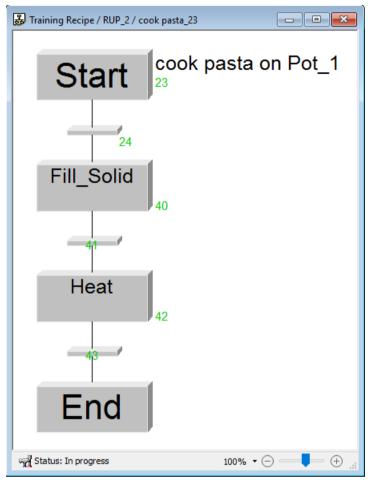
- 6. Now, enter "3" in the "Quantity(set)" input box, and click "OK".
- 7. To insert a parallel branch, click the 🚔 icon, and place them in the recipe . Click the 🗇 icon to add three NOPs, and place them in the recipe.

- 8. Within the simultaneous branch, assign an "Add_Ingredient" equipment phase with the "Add_Oil" control strategy to a recipe phase. Then, pass the "Oil" material to the "Li_quantity" input material with a quantity of "0.1 I". Specify a value of "5 sec" for Parameter "Simutime".
- 9. Assign an "Add_Ingredient" recipe phase with the "Add_Salt" control strategy below the "Add_Ingredient" recipe phase. Assign the material "Salt" and the quantity "0.01 kg" to the "Kg_quantity" input material. Specify a value of "5 sec" for Parameter "Simutime".

10. Assign the "Heat" equipment phase to a recipe phase and assign the value "100° C" to the "Temp" parameter. Set the "Simutime" to the value "300 sec".



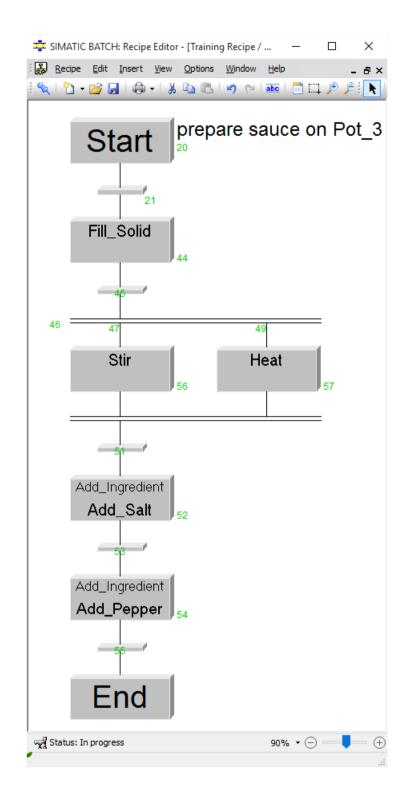
11. Complete the "Cook Pasta" ROP according to the recipe description for "Piccata Milanese". For example, select one of the pasta from the pasta list (For example: Penne). For more information refer to The Recipe for Pasta Piccata Milanese (Page 74)



12. Complete the "Prepare Sauce" ROP according to the recipe description for "Piccata Milanese" and select "Tomato Sauce" from the "Input material" list. For more information, refer to The Recipe for Pasta Piccata Milanese (Page 74)

Note

Please add salt and pepper according to your requirements while completing the "Prepare Sauce" ROP.

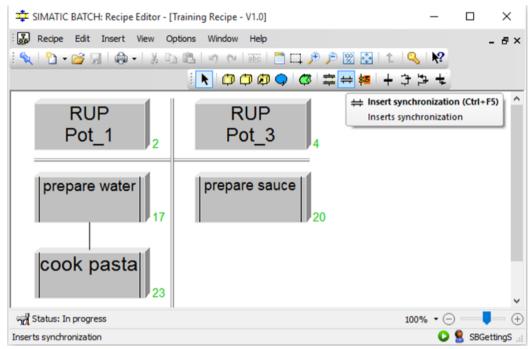


4.2.20 Completing the Training Recipe

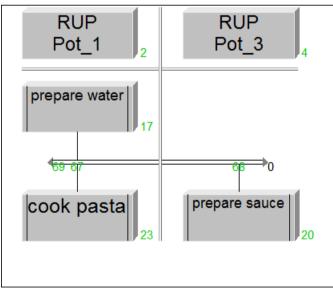
Completing recipes

To complete the training recipe:

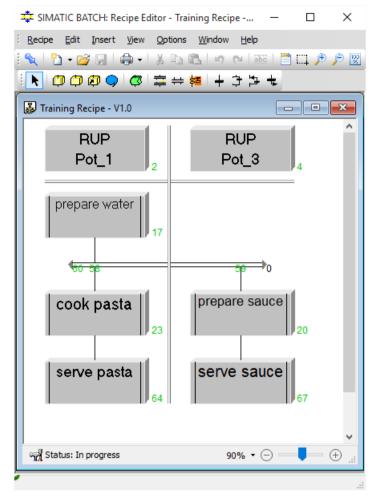
1. In the "SIMATIC BATCH: Recipe Editor" window, on the toolbar, select "Insert synchronization".



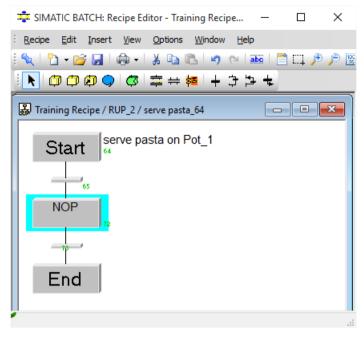
2. Draw a line between the left and right columns. This inserts a synchronization line between two recipe operations in the recipe.



3. Insert two recipe operations (ROPs), and label them as "Serve Pasta" and "Serve Sauce".



4. Right-click the "Serve pasta" recipe operation and click "Open object". The "Training Recipe / RUP_2 / serve pasta_64" window appears. Drag and drop "NOP".



Note

In the "Training Recipe / RUP_2 / serve pasta_64" window, the numbers 2 and 64 are allocated based on the configuration done in every individual PC. These numbers may vary according to every user's PC.

- 5. Right-click the "NOP>Properties". The properties dialog box appears.
- 6. In the "General" tab, from the "Phase" drop-down list, select "Drain (EPH)".

7. In the "Output material" tab, in the "Material (set)" column, select "Piccata Milanese". In the "Quantity (set)" column, enter the value "1.9".

Properties of 'Drain'						×
🕂 Transfer param 👼 General		All Desc nput material	A	ESIG Dutput material	😳 Synchr 🎱 Par	onization rameters
List:						
Name Mat	terial (set)	Code (set)	Low recipe limi	Quantity (set)		
1 Kg_quantity Piccata	Milanese	123	0 X	1.9	100 X	kg
<						
Description from row 1:						
						\sim
<						>
OK				Print	Cancel	<u>H</u> elp

8. In the "Parameters" tab, in the "Value" column, enter the value "5".

rope	erties of 'Dra	ain'						
-	Transfer pa General		All [put materi		🚫 ESIG tput mate			ronization rameters
ist:	Name	Low re	cipe limi	Val	High rec	ine lim	Unit o	fmea
1 5	Simutime	5	-	5	100		sec	•
) <u>e</u> scri	iption:							
) <u>e</u> scri	iption:							~ ~
) <u>e</u> scri	iption:							>

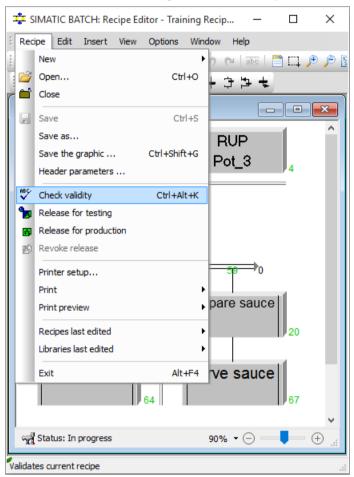
9. Click on the "OK" button and then save the recipe

10. To Configure "Serve Sauce", repeat steps 4 to 8 with assignment of "Tomato sauce hot & spicy" Output material in step 7.

Note

Process events can be monitored as well as a defined area of a recipe (monitoring area). A command step transfers a command (S88 command) in the recipe operation to one or more target recipe elements (RPEs).

11. In the **Recipe** menu bar, click "Save". Now, click "Check validity" to validate the master recipe. Click "OK" in the Acknowledge window to complete validation.



12. Close the "Recipe Editor".

4.2.21 Releasing the Master Recipe for Production

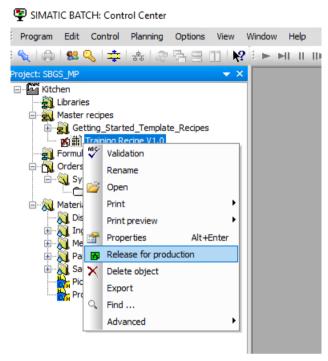
Introduction

Before you can use your master recipe "Training_Recipe V1.0" to create a batch, the recipe must be released for production or testing.

Procedure

To release the master recipe for production:

1. In the "SIMATIC BATCH: Control Center" window, right-click the "Training Recipe V1.0" master recipe, and then click "Release for production".



Note

If you cannot edit the recipe, activate the "Allow editing of recipes with "release revoked" status" in the Options - Project settings dialog box of Batch Control Center.

Online structure change is applicable for recipes which are released for testing.

2. Check your project settings.

Display	Property	Value
General	Allow simultaneous ROPs	Yes
Warning/Error	Allow editing of recipes with 'Release r	Yes
- Color settings	Allow jump beyond synchronization line	es No
Versioning Used plug-in modules	Transfer setpoints when changing fro.	No
- User credentials	Validation plausibility check	Yes
Electronic signatures	Unit selection according to conditions	Yes
- Batches	Allow importation of materials	Yes
Backup	Display of indexes	Unique
Report creation	Release recipe element after stop/abo	rt Yes
	Force step-transition-step sequence	Yes
	Area-oriented WinCC messages	No
	Allow start of IEPH/IEOP in error state	No
	Use optimized start behavior for SFC t	Yes
		ease revoked/invalid' status aster recipes that have the status "Release ures that recipes released for production

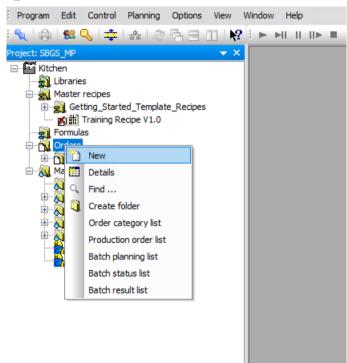
4.2.22 Creating an Order (Batch)

Procedure

To create an order:

1. In the "SIMATIC Batch: Control Center" window, right-click the "Orders" folder, and then rightclick "New". The "New order category" dialog box appears.

SIMATIC BATCH: Control Center



2. In the "Name" input box, enter "order_category_GS", and then click "OK".

New order category			×
📆 General			
Name:			
order_category_GS			
Description:			
			^
			~
<			>
ОК	Print	Cancel	Help

3. Right-click the "order_category_GS" folder and click "New". The "Create order" dialog box appears.

SIMATIC BATCH: Control Center

-					
Program Edit Control Plan	ning	Options	View	Window	Help
े 🔨 🚑 😫 🔍 🏚 क्वे	2	43	II N?	E ⊫ 1	HI II II
Project: SBGS_MP			👻 🗙		
Kitchen Kit	V1.0	te_Recipes			
		Rename		-	
🖃 滅 Materials	2	New			
		Details			
🗄 🖓 Meat_Sort	1	Properties	5	Alt+Er	nter
🗄 🖳 Pasta	\mathbf{x}	Delete obj	ject		
⊡	୍ଦ୍	Find			
Product_Getting_St		Production	n order lis	st	
		Batch plar	nning list		
		Batch stat	tus list		
		Batch res	ult list		

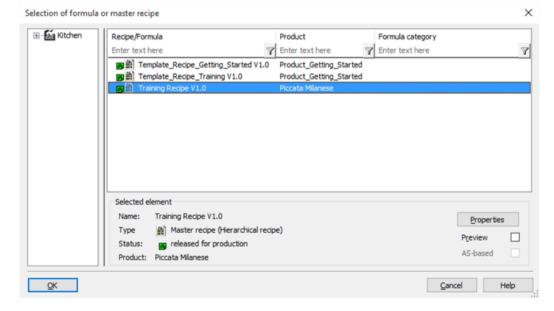
4. In the "Name" input box, enter "Order_GS", and then click "OK".

<u>l</u> ame:		Unit of measu
Order_GS		
Planned quantity: Currently planned 0 0	Actual quantity:	
arliest start for the batches:	Latest end for the batches:	Batches:
- 12/1/2017 3:33:03 PM (UTC -8:00) 🔶 🗸	- 12/2/2017 3:33:03 PM (UTC -8:00)	0
		^
		^
		^

5. Right-click the "Order_GS" folder and click "New". The "Add batch(es)" dialog box appears.

Add batch(es)						×
Main character	istics					
List:						
Name		Status	Release	Mode	Start	ŀ
<						>
Description:						
				^	No. of copies:	1
					<u>С</u> ору	
					<u>A</u> utomatic .	
					New	
					<u>1</u> 077	
<				>	Delete	
				_		
OK			Print	Cance	el <u>H</u> elj	p

6. Click "New". The "Selection of formula or master recipe" dialog box appears.



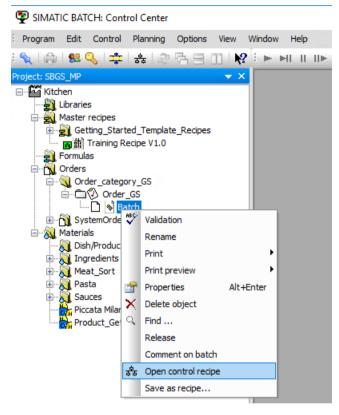
- 7. Select "Training Recipe V1.0" and click "OK". In the "Add batch(es)" dialog box. By default, the unique Batch name will be mentioned. This can be changed as per user's requirements.
- 8. Click "OK". The "Batch" object is created in the "Order_GS" folder.

4.2.23 Releasing and Starting a Batch (Control Recipe)

Procedure

To release and start a batch:

1. In the "SIMATIC BATCH: Control Center" window, right-click the "Batch" object, and then click "Open control recipe". The "Control recipe: Order_GS / Batch" window appears.



2. Right-click the "Batch" object, and then click "Release". The "SIMATIC BATCH: Control Center" dialog box appears.

Program Edit Control Planning Options View Window Help	SIMATIC BATCH: Control	Center		
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Comment on batch 숭숭 Open control recipe		Find		
ਫ਼ੇਂਦ Open control recipe		Release		
		Comment on batch		
Save as recipe	**	Open control recipe		
		Save as recipe		

3. Click "Yes". The color of the control recipe icon changes as shown in the following image: D

4. Right-click the "Batch" object, and then click "Start". The "SIMATIC BATCH: Control Center" dialog box appears. Note that you must activate WinCC Runtime to start the batch.

Normal Stress Program Edit Control Planning Options View Window Help | 🕼 | 😫 🔍 | 🏚 | 🊓 | 🤃 🖳 🚍 🛄 | 😢 !> 🕨 II II I> 🗉 🗙 | 🥬 🎾 🕅 🔂 | 🚍 🏌 ▼ × oject: SBGS_MP RUP RUP E-Kitchen 🖏 Libraries Pot 1 Pot 3 10 🖶 📆 Master recipes 🖪 🏦 Training Recipe V1.0 Prepare Water Formulas 🖻 📆 Orders 📄 🐧 Order_category_GS Grder_GS 🛄 🚺 🛃 🔤 Pn Print ۲ SystemOrder(🗀 🖗 System Print preview Prepare sauce 🗄 - 👸 Materials Cook pasta 2 Properties Alt+Enter 0 Find Lock Cancel Serve sauce Serve pasta . Start Comment on batch 52 용 Open control recipe Save as recipe...

SIMATIC BATCH: Control Center - [Control recipe: Order_GS / Batch]

5. Click "Yes".

The color of the control recipe icon changes as shown in the following image. The units are occupied and started according to the recipe structure.

SIMATIC BATCH: Control Center - [Control recipe: Order_GS / Batch] Program Edit Control Planning Options View Window Help I 🏔 l 😫 🔍 | 💠 | 🚓 | 🤃 🔁 🛄 | 🐶 | 🕨 🖬 🗉 💷 🔺 🏓 🔎 🕅 🔂 | 🚍 🏠 Project: SBGS_MP **-** × RUP RUP E-Kitchen 🖏 Libraries Pot 1 Pot 3 10 🚊 📆 Master recipes 👪 🏦 Training Recipe V1.0 Prepare Water Formulas 🖃 📉 Orders Order_category_GS
 Order_GS 🖻 💰 Batch 477 Þo SystemOrderCategory - 🗇 🖗 SystemOrder Prepare sauce 🗄 🖓 Materials Cook pasta 13 Serve pasta Serve sauce 6. Close the "SIMATIC BATCH: Control Center" window and deactivate WinCC Runtime.

Creating an equipment phase using SFC and BATCH interface blocks

5.1 Task definition and implementation concept

Overview

An additional equipment phase is required for the "Pan" unit. This unit must be extended by adding the "Quench" equipment phase. A selectable quantity of a material, for example, red wine, will be added through a quench valve.

To simplify matters, the process of reaching the set quantity will be simulated by a selectable time. If the batch is held or aborted, the valve will close.

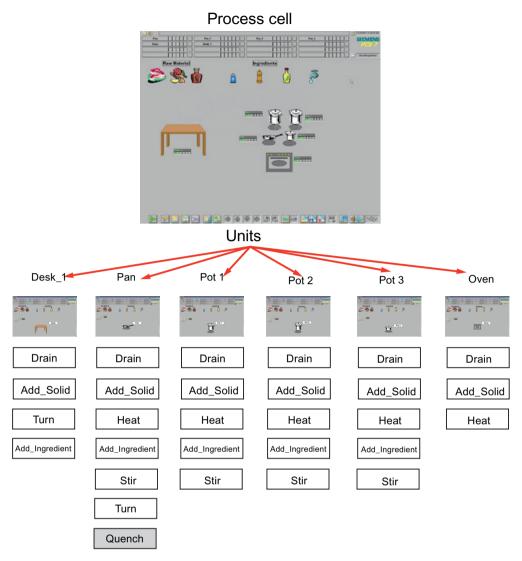
Select blocks from the SIMATIC BATCH block library to implement the equipment phase.

Note

This chapter shows you a formerly used way to create a phase for batch. In some of the old projects you will find these solutions.

This solution is included for completeness in the Getting Started and can be optionally implemented.

5.1 Task definition and implementation concept



The following table describes the process values:

Process value name	Block	Data type	Comment
Quantity	IEPAR_PI	REAL	
Duration	IEPAR_REAL	REAL	

The following table describes the block:

Block name	Block	Comment
P1_V1	IEPAR_PI	

5.2 Expanding the plant hierarchy

Prerequisite

• Plant view is activated

arread.

Procedure

To expand the plant hierarchy:

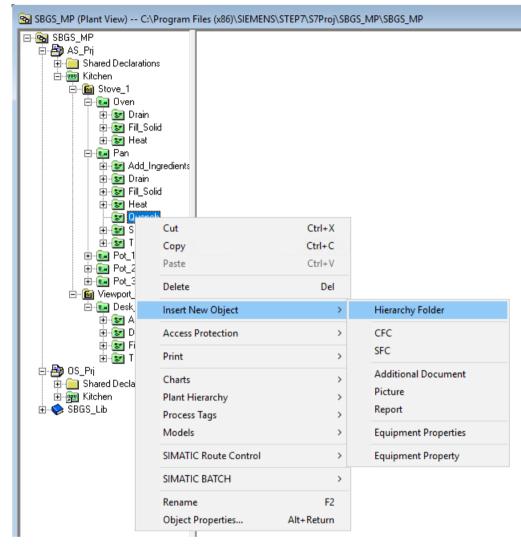
- 1. Open your edited BATCH Getting Started project "SBGS_MP" in "SIMATIC Manager".
- Right-click the "Pan" unit and select Insert New Object > Hierarchy Folder. The "Device(7)" folder is created.

<u>5</u>									
🖻 File Edit Insert PLC	<u>V</u> iew <u>O</u> pti	ions <u>W</u> indow	<u>H</u> elp						
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- SBGS_MP AS_Pri Kitchen Kitchen - Shared Declaration Kitchen - Stove_1 - Stove_1 - Stove_1 - Stove_1 - Stove_1	ns Cut Copy Paste	Object name PAdd_Ingredien Pain Fill_Solid Heat Stir	ts AS AS AS AS Ctrl+X	Assignment 1\CPU 410-5H\AS1_P 1\CPU 410-5H\AS1_P 1\CPU 410-5H\AS1_P 1\CPU 410-5H\AS1_P 1\CPU 410-5H\AS1_P 1\CPU 410-5H\AS1_P 1\CPU 410-5H\AS1_P	 				
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€ SBGS_Lib	Insert New C Access Prote Print Charts Plant Hierard Process Tage Models SIMATIC BA	chy s	4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	Hierarchy Folder CFC SFC Additional Docur Picture Report Equipment Prope	rties				

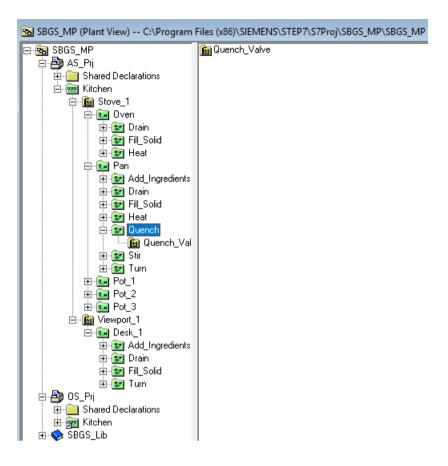
3. Rename the "Device(7)" folder as "Quench". This folder is automatically displayed as an equipment module. It can be used for SIMATIC BATCH.

SBGS_MP	Add_Ingredients	📴 Drain	😰 Fill_Solid	🞯 Heat	Quench	😰 S
- 🗃 AS_Pri	😥 Turn	Unit_Pan				
E Shared Declarations	_					
🖻 🖮 Kitchen						
🖻 🛅 Stove_1						
🖻 💽 Oven						
🕀 🔝 Drain						
🔁 😰 Fil_Solid						
🕀 🖅 Heat						
🖻 💿 Pan						
Add_Ingredients						
🕀 🐷 Drain						
🗈 🐷 Fil_Solid						
🕀 🔝 Heat						
E SQuench						
🕀 🔝 Stir						
😟 😰 Turn						
⊕-@ Pot_2 ⊕-@ Pot_3						
E Viewport_1						
⊡ @ Desk_1						
🖲 🐷 Drain						
🕀 😥 Fill_Solid						
ter 😥 Turn						
🖓 OS_Pri						
🗄 🧰 Shared Declarations						
🗄 👼 Kitchen						
SBGS_Lib						

 Right-click the "Quench" folder and select Insert New Object > Hierarchy Folder. The "Element(1)" folder is created.



5. Rename the "Element(1)" folder as "Quench_Valve". The control modules (associated valve, in this case), should be located at this level.



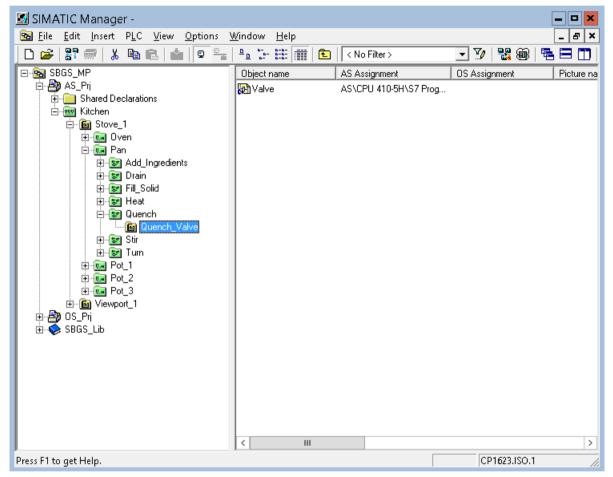
5.3 Configuring the control module level (Valve P1_V1)

5.3 Configuring the control module level (Valve P1_V1)

Procedure

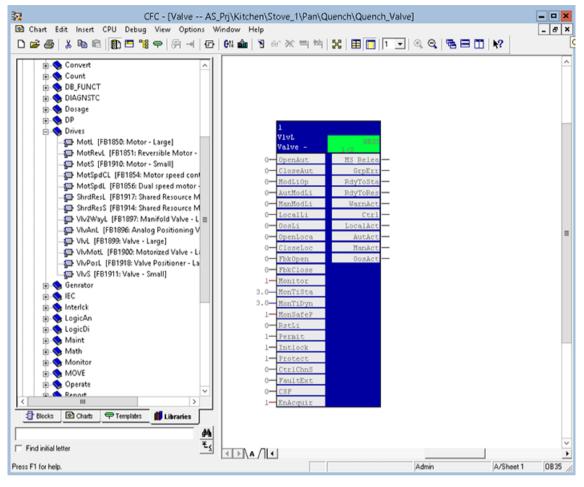
To configure the control module level (Valve P1_V1):

- Right-click the "Quench_Valve" folder and select Insert New Object > CFC. The "CFC(1)" chart is created.
- 2. Rename the "CFC(1)" chart as "Valve".

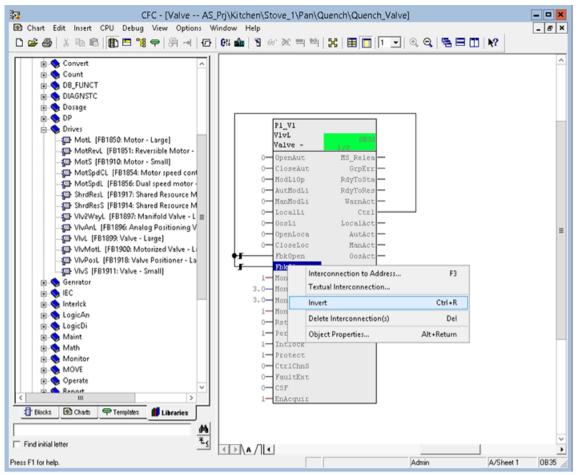


5.3 Configuring the control module level (Valve P1_V1)

3. Open the "Valve" chart and click "Libraries" tab. As shown in the figure below, drag and drop the valve block "VlvL [FB1899: Valve - Large]". Assign the name "P1_V1" to the valve block.



5.3 Configuring the control module level (Valve P1_V1)



4. Interconnect output "Ctrl" with inputs "FbkOpen" and "FbkClose" and invert "FbkClose".

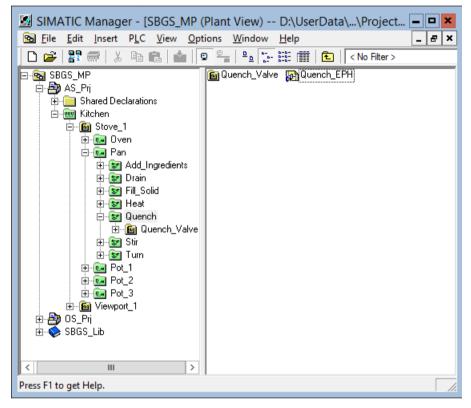
 Right click "P1_V1 > Object Properties". The "Properties - Block -- Valve\1" appears. Navigate to "I/Os" tab and clear the "Invisible" check box for "BatchEn", "BatchID", "BatchName", "Occupied" and "StepNo" inputs and outputs.

5.4 Configuring BATCH interface blocks

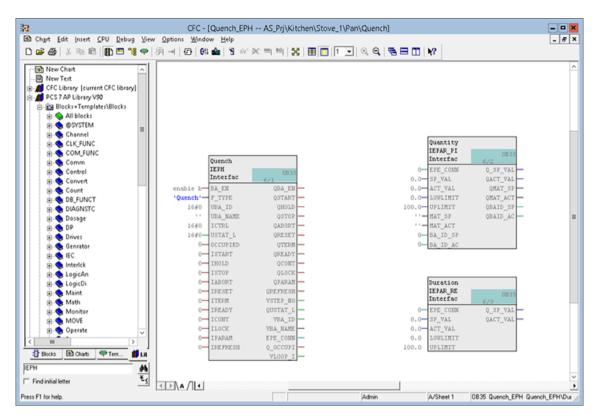
Procedure

To configure BATCH interface blocks:

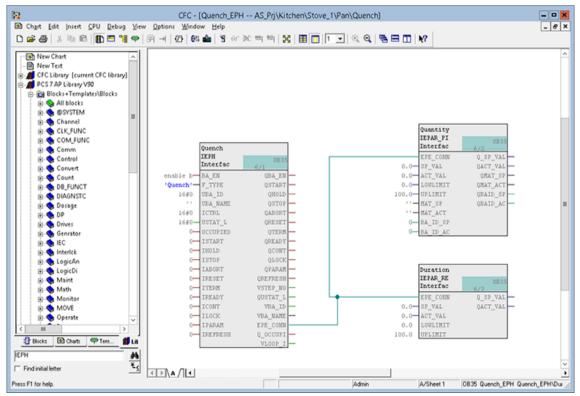
1. In the "Quench" folder, create a CFC chart named "Quench_EPH". Make sure that the "Quench" folder already contains the "Quench_Valve" subfolder.



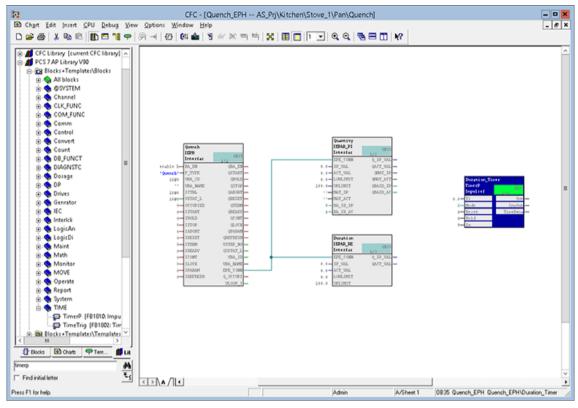
 Open the "Quench_EPH" CFC chart and add "IEPH", "IEPAR_PI", and "IEPAR_REAL" blocks from the "SIMATIC BATCH Blocks" library. Assign the name "Quench" to the "IEPH" block. Set "Quench" as input value to the "F_TYPE" input. Assign the name "Quantity" to the "IEPAR_PI" block and the name "Duration" to the "IEPAR REAL" block.



3. Interconnect the "EPE_CONN" output of the "IEPH" block (Quench) with the "EPE_CONN" inputs of the "IEPAR" blocks (Quantity, Duration).



4. Add the "TimerP" block for the simulation of the "Duration" process value. Assign the name "Duration_Timer" to the "TimerP" block.



5. For the "TimerP" block, set the "Mode" input to "1". Interconnect the "Duration" block with the "Duration_Timer" block as follows:

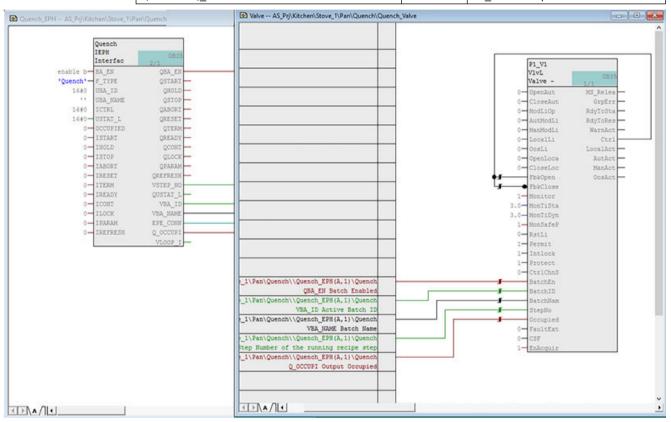
Duration / Q_SP_	VAL		with	Dur	ation_Time	er / Ti
Duration_Timer	TimeRema		with	Dur	ation / ACI	[_VAL
	Duration IEPAR_RE Interfac	0B35 4/3		Т	Duration_Tim TimerP Impulsef	er (90)
0.0-	EPE_CONN SP_VAL ACT VAL	Q_SP_VAL QACT_VAL		1-1	Ti Mode Reset	Out - InvOut - TimeRema
0.0	LOWLIMIT UPLIMIT			0-1		-1 Line Rena

6. Interconnect the "Quantity" block for the simulation as follows:

Quantity / Q_SP_VA	L		with	Quantity / ACT_VAL
Quantity / QMAT_SF)		with	Quantity / MAT_ACT
	Quantity IEPAR_PI Interfac	0B35 4/2		
0.0- 100.0- ''-	EPE_CONN SP_VAL ACT_VAL LOWLIMIT UPLIMIT MAT_SP MAT_ACT BA_ID_SP BA_ID_AC	Q_SP_VAL - QACT_VAL - QMAT_SP - QMAT_ACT - QBAID_SP - QBAID_AC -	-	

7. Make the interconnections between the Batch control block "Quench" and the valve block as shown in the table. Open the two blocks in the CFC Editor, arrange the opened windows next to each another:

Quench / QBA_EN	with	P1_V1 / BatchEn
Quench / VSTEP_NO	with	P1_V1 / StepNo
Quench / VBA_ID	with	P1_V1 / BatchID
Quench / VBA_NAME	with	P1_V1 / BatchName
Quench / Q_OCCUPI	with	P1_V1 / Occupied



8. Close the CFC Editor.

5.5 Creating an SFC

Introduction

The configuration of the SFC explained here is only an example. For more information about the configuration of SFCs, refer to *PCS 7 Getting Started Part 1* and *Part 2* and the help files on SFC.

Procedure

To create an SFC:

1. In the "Quench" folder, create an SFC with the name "Quench_SFC". Make sure that this folder already contains the "Quench_Valve" subfolder and the "Quench_EPH" CFC chart.

	👔 Quench_Valve	🙀 Quench_EPH	Quench_SFC
🖻 🖓 AS_Prj	—		
🗄 💼 Shared Declarations			
🖻 🎰 Kitchen			
🚊 🔤 Stove_1			
🚊 🚾 Oven			
🚊 🐨 Drain			
🕀 📴 Fill_Solid			
🕀 📴 Heat			
🖃 🚾 Pan			
庄 🐷 Add_Ingredients			
庄 🐷 Drain			
庄 😰 Fill_Solid			
🕀 😰 Heat			
🚊 😰 Quench			
😟 💼 🖬 Quench_Val			
庄 😰 Stir			
🗄 😰 Turn			
🕂 🚾 Pot_1			
🔄 🚾 Pot_2			
😟 🚾 Pot_3			
⊡í⊡ Viewport_1			
🖻 🚾 Desk_1			
🕀 😰 Add_Ingredients			
🔃 😰 Drain			
🕀 😰 Fil_Solid			
🔃 🐷 Turn			
🖻 🎒 OS_Prj			
🗄 📄 Shared Declarations			
⊞∰ Kitchen ⊕⊗ SBGS_Lib			

- 2. Open the SFC and configure the "RUN" sequencer. Base your configuration on the outline. The "Duration_Timer" block is available in the "Quench_EPH" chart, and the "P1_V1" block is available in the "Valve" chart.
- 3. Double-click the "RUN" sequencer tab to open the "Properties" dialog box. Click the "Start condition" tab and set the properties as shown in the following example.

Diagram of the "RUN" sequence (RUN=1)

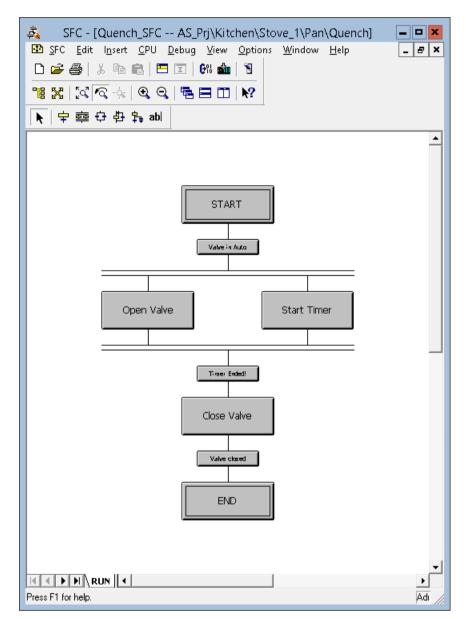
Path for the Start condition:

Kitchen\Stove_1\Pan\Quench\\Quench_SFC.RUN

Properties - RUN AS	_Prj\Kitchen\Stove_1\Pan\Quench	\\Quench_SFC 🛛 💌
General Start condition OS Comm	ent Preprocessing Postprocessing	1
1 Quench_SFC.RUN	<u>f(x)</u> = ▼ 11	f(x)
2	f(x)	f(x)
3	f(x)	f(x) &
4	f(x)	f(x)
5	f(x)	f(x)
6	f(x) -	f(x) & -
7	f(x) -	f(x) &
8	f(x) -	f(x) &
9	f(x) -	f(x)
10	f(x)	f(x)
<u>C</u> lose <u>A</u> pply	Print Browse	<u>G</u> oto Help

Result

Rename and configure the sequencer as per the names shown in the figure below.



Example of a step and of a transition

Step: Start Timer

1. Double-click the "Start Timer" step. The "Properties - Start Timer" dialog box appears.

Properties - Start Timer AS_Prj\Kitchen\Stove_1\Pan\Quench\\Quench_SFC 💌			
General Initialization Processing Termination			
Number Number	er: 5 🗖 Confirmation		
Run times			
Minimum: Magim	um:		
Co <u>m</u> ment:			
OS comment:			
Acknowledgment information:			
Qlose Apply ← ↑ → Print	Browse Go to Help		

- 2. Click the "Processing" tab and click "Browse". The "Browse" dialog box appears with the "Plant View" tab activated.
- 3. Select the "Duration_Timer" block in the tree view. The section on the right side shows all corresponding block inputs and outputs.

ant View Component View Runtime Groups SymbolsStove_1\Pan\Quench\Quench_EPH\Duration_Timer.							
				l/Os <fil< th=""><th>tered></th><th></th><th></th></fil<>	tered>		
Image: Store 1 Image: Store 1	N / EN Hold Init Mode Reset Sampl Ti	Data t BOOL STR BOOL INT STR REAL REAL	I/O IN IN IN IN IN IN IN IN IN	CFC i Opu Sho Sho App	en Chart w Block w I/O oly I/O en Structu	Hold	

4. Right-click the "In" input and click "Open Structure".

- Structure In

 Name
 Data t...
 I/O
 CFC i...
 SFC a...
 Comm...

 Value
 BOOL
 IN
 Value
 Sign...

 ST
 BYTE
 IN
 Sign...
 In

 Image: Structure International structure Internati
- 5. Select the "Value" row, click "Apply", and then click "Close".

6. In the right side input box, enter "1".

Properties - Start Timer AS_Prj\Kitchen\Stove_1\Pan\Quench\\Quench_SFC 💌				
General Initialization Processing Termination				
1 Quench_EPH\Duration_Timer.In.Value	:= TRUE	f(x)		
2 🔽	:=	f(x)		
3 🔽	:=	f(x)		
4	:=	f(x)		
5 🔽	:=	f(x)		
6 🔽	:=	f(x)		
7 🔽	:=	f(x)		
8 🔽	:=	f(x)		
9 🔽	:=	f(x)		
10 🔽	:=	f(x) 👻		
	Print Browse Go to	Help		

7. Click "Apply" and then click "Close".

Transition: Timer ended

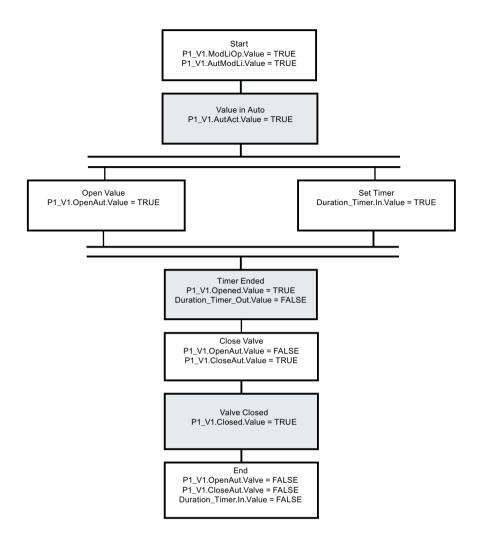
Follow the steps explained for the "Start Timer" block and set the following conditions for the "Timer ended" block.

Path for the Conditions: Quench\Quench_Valve\\Valve\P1_V1.Opened.Value

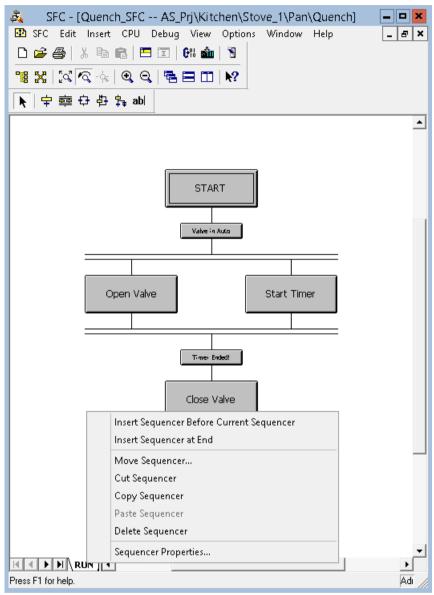
Kitchen\Stove_1\Pan\Quench\\Quench_EPH\Duration_Timer.Out.Value

Properties - Timer Ended! AS_Prj\Kitchen\Stove_1\Pan\Quench\\Quench 💌
General Condition OS Comment
1 Valve\P1_V1.0pened.Value f(g) = ▼ TRUE f(g)
2 EPH\Duration_Timer.Out.Value f(g) = FALSE f(g)
3 <u>f(x)</u> <u>f(x)</u> <u>f(x)</u> <u>k</u> _
<u>4</u> <u>f(x)</u> <u>▼</u> <u>f(x)</u>
5 <u>f(x)</u> <u>(x)</u>
6 f(x) v f(x)
7 f(x) - f(x) &
8 <u>f(x)</u> <u>f(x)</u> <u>k</u>
9 <u>f(x)</u> <u>f(x)</u>
<u>Close</u> Apply ← ↑ ↓ → <u>Print</u> <u>Browse</u> <u>Go</u> to Help

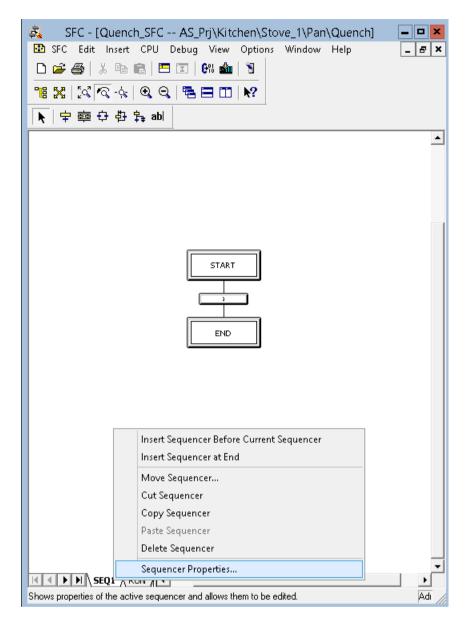
The following diagram guides you to configure the remaining parts of the sequencer. Please follow the same steps as per the given examples:



1. In the "Quench_SFC" chart, right-click the "RUN" tab, and then click "Insert Sequencer at End". A new sequencer "SEQ1" is added next to "RUN" sequencer.



2. Right-click the "SEQ1" tab and click "Sequencer Properties...". The "Properties" dialog box appears.



3. In the "General" tab, in the "Name" input box, enter "Abort-Hold-Comp".

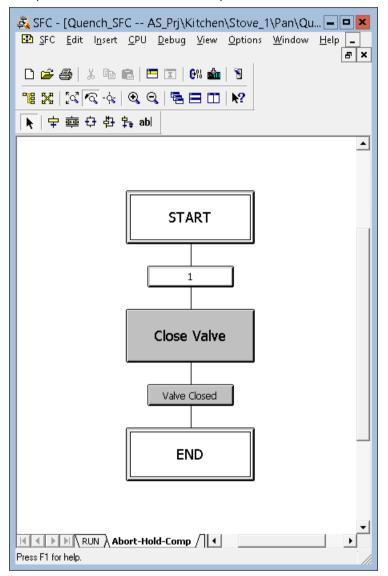
- 4. Click the "Start condition" tab and configure the start conditions for the sequence:
 - Activate the "I/Os" view via the menu bar of SFC.
 - Drag-and-drop the output parameters "HOLDING", "ABORTING" and "COMPLETING" parameters as start conditions.
 - Create a logical OR operation to logically connect the configured parameters of the "Start condition".

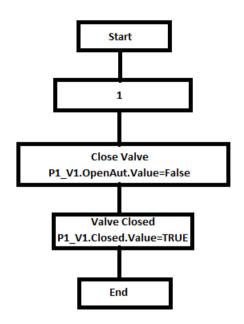
Properties - Abort-Hold-Comp AS_Prj\Kitchen\Stove_1\Pan\Quench\\Que ×				
General Start condition OS Comment Preprocessing Postprocessing				
1	Quench_SFC.COMPLETING	f(x) = 💌 Completi	f(x)	
2	Quench_SFC.HOLDING	f(x) = 💌 Holding	f(x)	
3	Quench_SFC.ABORTING	f(8) = 💌 Aborting	<u>f(≋)</u> ≥1	
4		f(x) -	f(x)	
5		f(x) -	f(x)	
6		f(x) -	f(x) & -	
7		f(x) 💌	f(x) &	
8		f(x) -	f(x) &	
9		f(x) -	f(x)	
10		f(x) -	f(x) ↓	
	lose Apply	Print Browse	<u>G</u> o to Help	

Note

The logical expressions has to be changed from "& - AND" to ">_1 -OR" in the figure above.

- 5. Click "Apply" and then click "Close".
- 6. Configure the "Abort-Hold-Comp" sequencer as shown below: The following is a screen shot of the Hold/Abort/Complete sequence (Holding=1, or Aborting=1, or Completing=1). For configuring the rest of the sequence refer to *Example of a step and of a transition* in this chapter.





- 1. In the SFC chart window, on the "SFC" menu, click "Properties". The "Properties SFC chart" dialog box appears.
- 2. Click the "AS Operating Parameters" tab and from the "operating mode" drop-down list, select "AUTO".

Properties SFC chart	×				
General AS Operating Parameters OS Ve	rsion				
Defaults Step control mode:	Operating <u>m</u> ode: AUTO _▼				
<u>Command output</u> <u>Cyclic operation</u> <u>Time monitoring</u>	SFC startup after CPU restart				
Start options Autostart Use default operating parameters when SEC chart starts					
ОК	Cancel Help				

3. Click "OK".

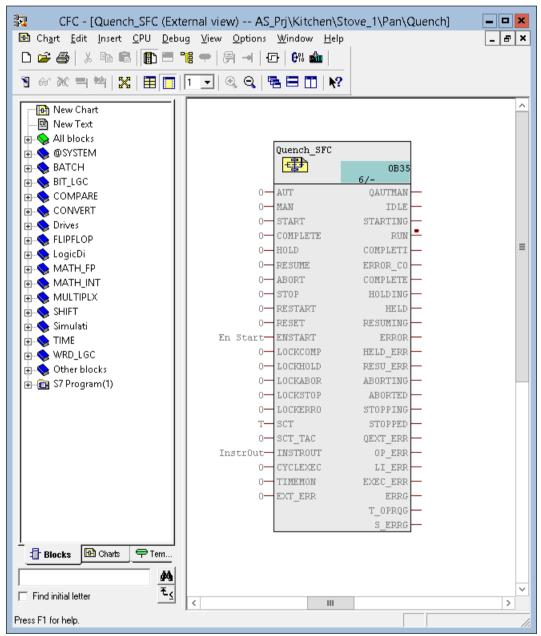
5.6 Connecting the BATCH control commands with the SFC

5.6 Connecting the BATCH control commands with the SFC

Procedure

To connect the BATCH control commands with the SFC:

1. Right-click the "Quench_SFC" chart and click "Open External View". The "Quench_SFC (External View)" window appears.



2. Open the "Quench_EPH" chart with the "Quench" interface block.

5.6 Connecting the BATCH control commands with the SFC

3. Interconnect the "Quench" interface block with the external view of the "Quench_SFC" chart as shown below:

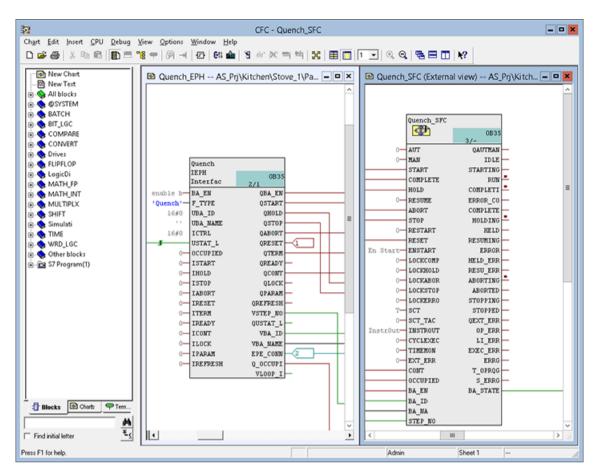
Note

Start by activating the visibility of all parameters listed below.

Quench / QSTART	with	Quench_SFC / START
Quench / QHOLD	with	Quench_SFC / HOLD
Quench / QSTOP	with	Quench_SFC / STOP
Quench / QABORT	with	Quench_SFC / ABORT
Quench / QRESET	with	Quench_SFC / RESET
Quench / QTERM	with	Quench_SFC / COMPLETE
Quench / QCONT	with	Quench_SFC / CONT
Quench / QBA_EN	with	Quench_SFC / BA_EN
Quench / VSTEP_NO	with	Quench_SFC / STEP_NO
Quench / VBA_ID	with	Quench_SFC / BA_ID
Quench / VBA_NAME	with	Quench_SFC / BA_NA
Quench / Q_OCCUPI	with	Quench_SFC / OCCUPIED
Quench / USTAT_L	with	Quench_SFC / BA_STATE

Creating an equipment phase using SFC and BATCH interface blocks

5.6 Connecting the BATCH control commands with the SFC



4. Export the plant hierarchy from AS to OS so that required tags/pictures/faceplates are updated, to do the same,

Right Click on Multiproject "SBGS_MP" > Plant Hierarchy > Update in the Multiproject, refer the following images:

File Edit Ins	ert PLC View Options	Window Help		
🗅 💣 🛿 🚟 🖉	🗴 🖻 🛍 🗖 🐾	🌯 😳 🏥 🏢 🚨	🖬 < No Filter > 🔄 🍸 🖓 🍪 🖷 🗖 🚺	
 SBGS_MP AS_P AS_P	Cut Copy Paste Delete Multiproject PLC PCS 7 License Information	Ctrl+X Ctrl+C Ctrl+V Del	age UNC path Path on "Computer" Com	
	Shared Declarations Plant Hierarchy Process Tags Models	> > > >	Settings Check Consistency Open Check Log	
	SIMATIC BATCH Rename Object Properties	F2 Alt+Return	Create/Update Block Icons Open Block Icons Log Cancel Assignment	
		[Create/update diagnostic screens Ctrl+Alt+D Display Diagnostic Screens Log Advanced Diagnostics Settings Ctrl+Alt+W Configured Objects Update in the Multiproject Clear Shortcut	

5.6 Connecting the BATCH control commands with the SFC

Plant Hierarchy - Update in Multiproject
Merge the PH of all projects in the multiproject Export the PH of one project in other projects Select the project to be used as a template: AS_Prj OS_Prj
OK Cancel Help

Plant Hierarchy - Update in I	Multiproject (Target Projects)
Select the projects into which the PH is to be export	ed:
✓OS_Prj	
ОК	Cancel Help
	- Carlon Hop

5.7 Compiling and downloading the AS and OS

5.7 Compiling and downloading the AS and OS

Procedure

To compile and download the AS and OS:

1. Open the "Quench_SFC" chart in external view.

SIMATIC Manager - [SBGS_MP (Plant)		Anil\POT\14-11-2019\Co	ompleted_Projec	t\SBGS_MP 🗕 🗖 🗙
😼 File Edit Insert PLC View Options	·			_ & ×
🗋 🗅 📂 🏭 🛲 X 🖻 🛍 🏜 🗣 🐾	₽ <u>₽</u>	🔄 📔 < No Filter >	- 🏹 器 🎟	
SBGS_MP AS_Pri Shared Declarations Kitchen Kitchen	Dbject name	Open External View Cut Copy Paste Delete PLC Access Protection Print Charts Plant Hierarchy SIMATIC BATCH Rename		Picture name for OS Quench_Valve

2. On the "Chart" menu, select **Compile > Charts as Program**. The "Compile program" dialog box appears.

5.7 Compiling and downloading the AS and OS

3. In the "Scope" area, click "Changes only". If this option is disabled, then select "Entire program".

	Compile pro	gram	x
Compile Charts as Program]		
	CPU 410-5H AS\CPU 410-5H\A:	S_Program\	
Scope <u>Entire program</u> <u>Changes only</u>			
Generate module drive	rs	Block Driver Settings	
Ge <u>n</u> erate SCL source			
ОК		Cancel Hel	>

Note

If you select the "Entire program" option, the "Download S7 - Read back" pop up appears. Click 'No'. Now, the "Download" pop up appears, Click "Yes".

- 4. Click "OK". The "Logs" dialog box appears.
- 5. Click "Close".
- 6. On the "CPU" menu, click "Download". The "Download" dialog box appears.
- 7. Select "Changes only" and click "OK".
- 8. After the download, verify that the AS is in RUN_P state.
- Compile the modified OS data. To do this, in the "SIMATIC Manager", select "OS_Prj", on the options menu select 'Compile Multiple OSs' Wizard > Start. The "Wizard: Compile Multiple OSs" dialog box appears. Follow the wizard instructions to compile.

5.8 Generating BATCH types

5.8 Generating BATCH types

Procedure

To generate BATCH types:

- 1. Open the "SIMATIC Manager" in the plant view.
- 2. Right-click the "SBGS_MP" folder and select **SIMATIC BATCH > Open configuration dialog**. The "Configure Batch process cell 'Kitchen' in 'SBGS_MP" dialog box appears.

🔁 SBGS_MP (Plan	t View) C:\Program Files (x86)\	SIEMENS\STEP7\S7	7Proj\SBGS_MP\SBGS_MP
⊡-•®a SBGS_MP ⊡®a AS_Pri ⊕-•@a Shar	ed Declarations	1 💽 View	vport_1
	Cut	Ctrl+X	
	Сору	Ctrl+C	
	Paste	Ctrl+V	
	Delete	Del	
	Insert New Object	>	
	Access Protection	>	
	Print	>	
	Charts	>	
	Plant Hierarchy	>	
	Process Tags	>	
	Models	>	
Ė… ® Ė…[SIMATIC Route Control	>	
	SIMATIC BATCH	>	Open configuration dialog
	Rename	F2	Compile/load
🖃 🛃 OS_Prj	Object Properties	Alt+Return	
⊕ — 📻 Shar ⊕ – 👳 Kitch ⊕ – 🍫 SBGS_L			

5.8 Generating BATCH types

Confi	gure Batch process cell 'K	itchen' in 'SBGS_MP'				
SBGS_MP/Kitchen/Batch types						
P <u>r</u> ocess cell data	Pr <u>o</u> perties					
SBGS_MP	🛃 Batch types					
	Description					
🖹 🎬 Kitchen	Last changed on	11/15/2019 1:07:09 PM (UTC +5:30)				
Batch types Data types Data types Detain types Phase types Phase types Drain Phase Fill_Solid Phase Heat						
🕀 🙀 Stir	Batch types	Log	Additional functions			
ie - ₩ Turn ie - ₩ Add_Ingredient ie - ₩ Ventilate	Propagat <u>e</u>	Generate 🗸	<u>P</u> rint			
in - M Quench ⊡ Process tag types	<u>G</u> enerate	🔀 0 Error(s)				
■ Equipment properties ■ Batch instances	New	0 Warning(s)				
	Delete	Display				
OK Apply		Cance	Help			

3. Expand the "Batch types" node and then expand the "Phase types" node.

5.9 Compiling and downloading BATCH process cell data

4. Click "Generate & Propagate". The new data you configured in the CFC chart "Quench_EPH" is now loaded. The "Quench" node is added under "Phase types".

Conf	figure Batch process cell 'K	itchen' in 'SBGS_MP'				
SBGS_MP/Kitchen/Batch types						
P <u>r</u> ocess cell data	Pr <u>o</u> perties					
SBGS_MP ───────────────────────────────	🛃 Batch types					
🗄 🖽 Stations	Description	11/15/2019 1-02-09 DM (UTC -5-20)				
ia-∰ Kitchen ia-∰ Batch types ia-∰ Batch instances	Last changed on	11/15/2019 1:07:09 PM (UTC +5:30)				
	Batch types	Log Additional functions				
	Propagat <u>e</u>	Generate V <u>Print</u>				
	<u>G</u> enerate	😮 🛛 Error(s)				
	New	🛕 🛛 Warning(s)				
	Delete	Display				
OK Apply		Cancel Help				

5. Click "OK" to close the "Configure Batch process cell 'Kitchen' in 'SBGS_MP'" dialog box.

5.9 Compiling and downloading BATCH process cell data

Procedure

To compile and download BATCH process cell data:

- 1. Right-click the "SBGS_MP" folder and select **SIMATIC BATCH > Open configuration dialog**. The "Configure Batch process cell 'Kitchen' in 'SBGS_MP" dialog box appears.
- 2. Select the "Batch instances" folder and click "Merge".
- 3. Select the "Kitchen" node and click "Download". The "Download Batch process cell" dialog box appears.
- 4. Click "Start".
- 5. After the completion of the download process, click "Close".
- 6. Click "Apply" and then click "OK" to close the dialog.

Illustrations to the above described procedure items

For illustrations pertaining to the above described steps, refer to **Configuring test project** "Kítchen" > Configuring > "Compiling the AS, OS and Batch Process Cell Data".

See also

Compiling and Downloading the AS, OS and Batch Process Cell Data (Page 48)

5.10 Expanding a Recipe

Introduction

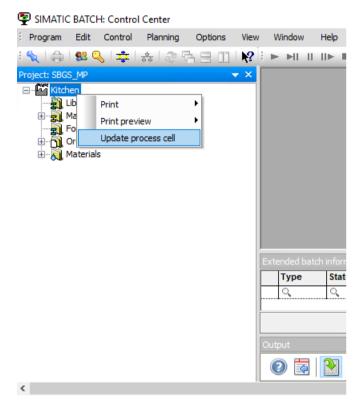
This chapter guides you to expand a recipe and perform associated operations.

Prerequisites

- SIMATIC Manager is open.
- WinCC explorer is open.
- Batch Control Center is activated.

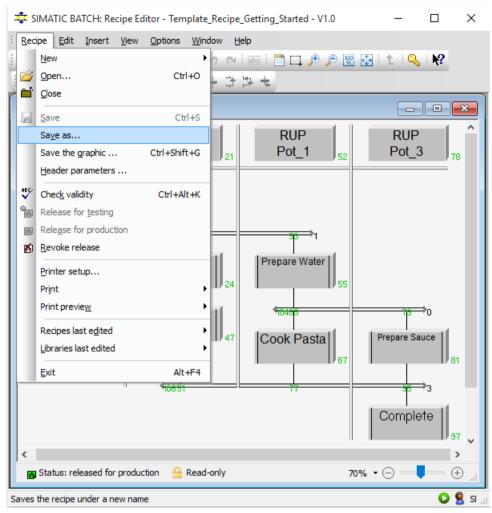
Procedure

- 1. In the "WinCC Explorer" window, start the runtime.
- 2. Start the Batch Control Center. In the "SIMATIC BATCH: Control Center" window, click "Update process cell", and then click "OK".



- In the "SIMATIC BATCH: Control Center" window, expand the "Master recipes>Getting_Started_Template_Recipes" folders and click "Template_Recipe_Getting_Started V1.0 > Open".
- 4. The "SIMATIC BATCH: Recipe Editor" window appears. Click "OK".



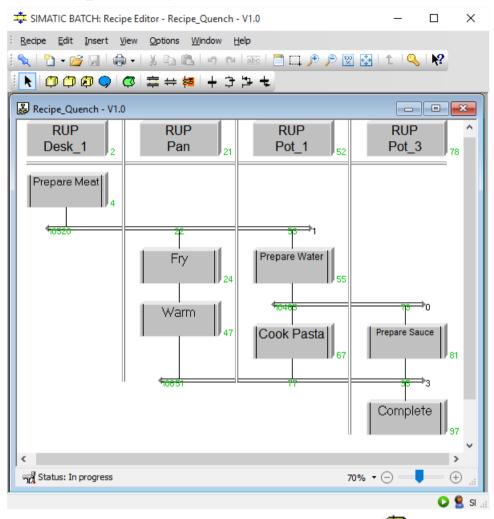


5. In the "SIMATIC BATCH:Recipe Editor" window, select **Recipe > Save as**.

6. In the "Save recipe as ..." dialog box, rename the recipe as "Recipe_Quench" in the "Name [Template recipe getting started]" text box, and click "OK".

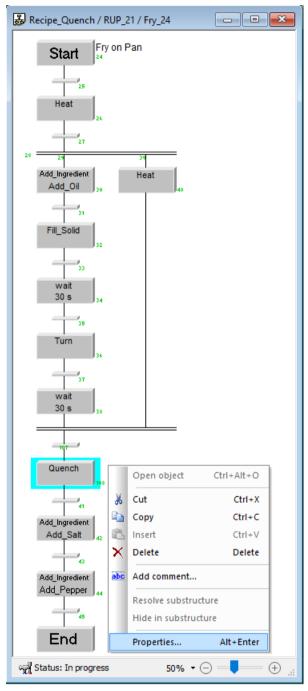
Save recipe as
Kitchen Master recipes Getting_Started_Template_Recipes Template_Recipe_Getting_Started V1.0 Template_Recipe_Training V1.0 Training Recipe_V1.0 Training Recipe_old V1.0
< >>
New folder
Name [Recipe_Quench]
Recipe_Quench
Version [V1.0]
V1.0
OK Cancel Help

7. In the "SIMATIC BATCH Recipe Editor" window, insert the newly configured "Quench" phase in the "Recipe_Quench" recipe inside the FRY - ROP.



8. Open "FRY ROP" by double clicking. Add recipe phase by clicking 🕮

9. In the "SIMATIC BATCH Recipe Editor" window, configure the "Quench" phase. To configure the "Quench" phase, right click "Quench>Properties".



10. The "Properties of "Quench_108" window appears. Click on "Input material" tab and select "Penne" from the "Material (set)" option.

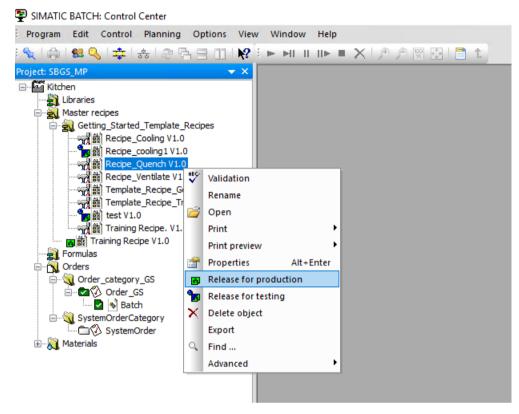
	Transfer p	An	-	A Descr		🚫 E		and the second second	ynchroniza	
ł	General		Inpu	ut material		Output m	aterial	0	Parame	ters
st:										
1	Name	Material	(se	Code (set)	Low rec	ipe limit	Quanti	ty (s Hig	gh recipe	limi
1	Quantity	Penne		9	0	X	1.9	100	0	X
۲										;
:	cription from re	ow 1:								;
:	cription from re	ow 1:		_	_	_	_	_		
	cription from re	ow 1:		_	_	_	_	_		
< :sc	cription from re	ow 1:		_		_	_			;

11. Now, navigate to the "Parameters tab, and enter the values as shown below, and click "OK".

Properties of 'Quench_108'							
Transfer par		All Descri		ESIG	💭 Synchroni 🕐 Param		
General	👹 Input r	naterial	🥲 Outp	ut material	🌚 Param	leters	
Name	Low recipe	limi Va	alue Hig	h recipe lim	Unit of mea		
1 Duration	0	X 5	100	X		<u>,</u>	
Description from rea							
Description from ro	W 1:					~	
<						>	
OK			Print	Can	cel <u>t</u>	<u>H</u> elp	

12. Save and Close the "Recipe Editor".

13. In the "SIMATIC BATCH Control Center" window, select Recipe Quench V1.0 > Release for production. Then create a new batch with the "Recipe_Quench" recipe, release and start it. For more information, refer to Creating an Order (Batch) (Page 109) and Releasing and Starting a Batch (Control Recipe) (Page 114)



14. Close the SIMATIC BATCH Control Center and exit WinCC Runtime.

Creating an Equipment Phase Using SFC Type

6.1 Task definition and implementation concept for "Ventilate"

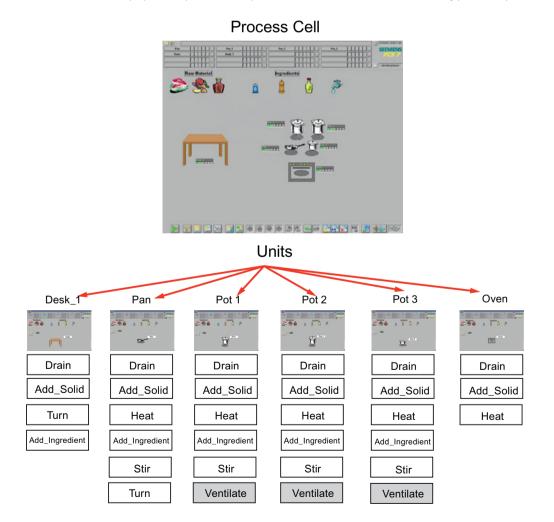
Introduction

This section guides you to define and implement the tasks for the "Ventilate" phase.

Procedure

An additional equipment phase is required for the pots. You need to add the "Ventilate" phase. A ventilation valve must be opened for a selectable time. If the batch is held or aborted, the valve will close.

Since the same equipment phase is required for Pots 1-3, select the SFC type to implement it.



Implementation Concept for SFC Type "Ventilate"

Table 6-1	Control strategies
-----------	--------------------

Control strategy name	Comment
Ventilate	First control strategy, QCS=1

Table 6-2 Setpoints

Setpoint name	Data type Comment	
Duration	REAL	Unit of measure seconds

Table 6-3 Process values

Process value name	Data type	Comment
None		

Table 6-4 Timers

Block name	Block type	Comment
T_Duration	TimerP	Timer for setpoint "Duration", Mode=1

Table 6-5Block contacts

Block name	Block type Comment	
V1	VlvL	Ventilation valve

6.2 Creating an SFC Type "Ventilate"

Introduction

This section guides you to create the "Ventilate" SFC type.

Prerequisites

- SIMATIC Manager is open.
- The **SBGS_MP** project is open in SIMATIC Manager.
- Component view is activated.

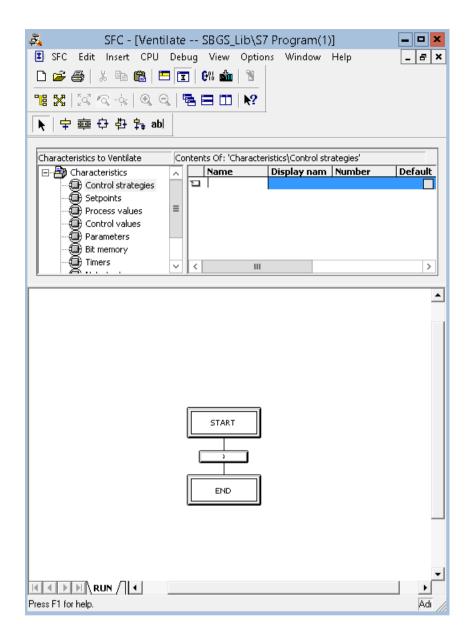
Procedure

To add a new SFC type "Ventilate":

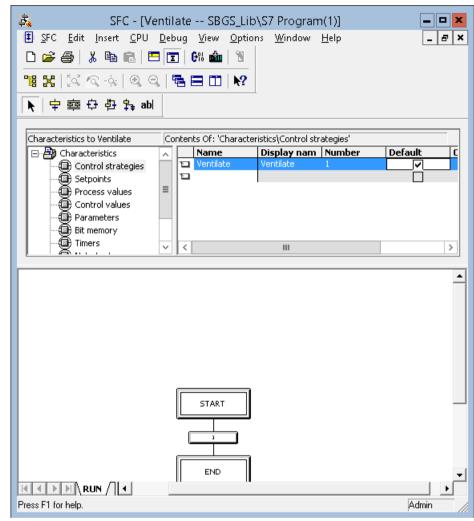
 In the Component view, expand the library "SBGS_Lib", right-click "Charts" and select Insert New Object>SFC type. A "SFC type(1)" is created. Rename it as "Ventilate". Click on "Ventilate" to open it.

🔄 SIMATIC Manager - [SB			:\User\	Anil\POT\14-	11-201	9\SBGS_MP\\$		
-	View Options Window						6	י א וי
🗅 🛩 🎛 🛲 🐰 🛍 🖻	l 🚵 😨 💁 🕒 🤃		<u>e</u> <	No Filter >		- 🏹 💱 🎒		
⊡ 🛐 SBGS_MP	Object name	Version P	H Assigni	ment	Туре		Author	^
🖻 🎡 AS_Pri	IXI ABS	0.0001 P	rocess ta	g types	Function		SBGetting	
🗄 🎒 OS_Prj	+ ADD	0.0001 P	rocess ta	g types	Function		SBGetting	
⊡… 🧇 SBGS_Lib ⊡… 🗊 S7 Program(1)	AnalogMonitoring	0.0001 T	emplates	Monitoring	Process	tag type	AP_Lib90	
Sources	AnalogMonitoring_Fb		•	Monitoring	Process	2 21	AP_Lib90	
Blocks	& AND		rocess ta	2 21	Function		SBGetting	≡
Charts	CascadeControl	0.0001 T	emplates'		Process	2.01	AP_Lib90	
		Ctrl+X		Control	Process		AP_Lib90	
Сору	v	Ctrl+C		Control	Process		AP_Lib90	
Paste		Ctrl+V		Control	Process	2.51	AP_Lib90	
Paste	8	Ctri+v		Monitoring Monitoring	Process		AP_Lib90	_
Delet	te	Del		Monitoring	Process Process		AP_Lib90 AP_Lib90	
Inser	rt New Object		_	CFC	THUESS	lag lype	SBGetting	
	chew object					tag type	AP_Lib90	
PLC				SFC		tag type	AP Lib90	
Acce	ess Protection			SFC type		tag type	AP_Lib90	
Chos	ck Consistency		-	SFC type (EPH)			SBGetting	
	,		plates	Control	Process	tag type	AP_Lib90	
Com	npile	Ctrl+B	plates	Control	Process	tag type	AP_Lib90	
Char	ts		🖡 essita	g types	Function		SBGetting	
Plant	t Hierarchy			g types	Function		SBGetting	
				g types	Function		SBGetting	
SIMA	АТІС ВАТСН		ess ta	2 51	Function		SBGetting	
Rena	ame	F2		g types	Function		SBGetting	
Ohie	ct Properties	Alt+Return		g types \Motors	Function		SBGetting	-
	•	-aconcetum	plates	VMOtors	Process	tag type	AP_Lib90	_ _
P	ial Object Properties						2	
Inserts SFC type at the cursor posi	ition.							1

2. In the "SFC" window, click the 🗊 icon to open the characteristics dialog of the "Ventilate" SFC type.



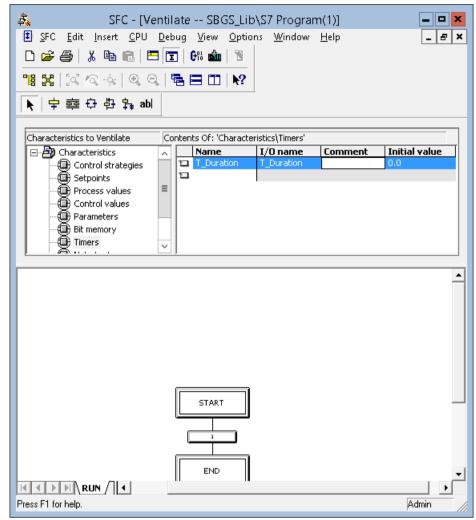
3. Select the "Control strategies" characteristic and enter "Ventilate" under the "Name" column. Select the checkbox under the "Default" column. This control strategy initiates the start of the SFC instance.



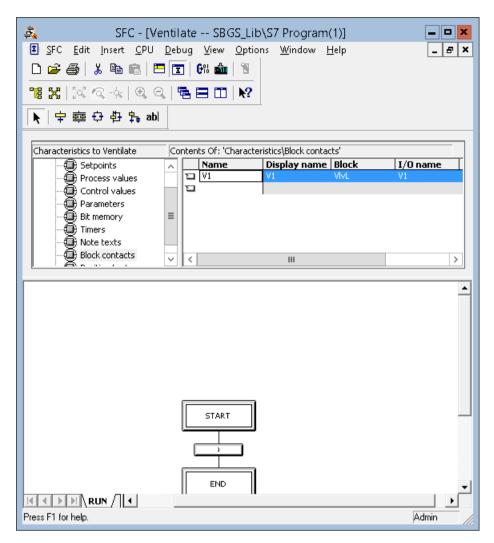
4. Now select the "Setpoints" characteristic and enter "Duration" in the "Name" column. Select "REAL" data type under "Data type" column. Enter "sec" as the unit of measure under the "Unit" column.

Image: Specified intervention of the specified of the spec
Characteristics to Ventilate Contents Of: 'Characteristics\Setpoints' Characteristics Name Display name Data type I/O name Control strategies Duration Duration REAL Duration Process values Parameters Bit memory Image: Control values Image: Control values

5. To define the timer, select the "Timers" characteristic. Enter "T_Duration" in the "Name" column. The timers that are used in this way within SFC types, have characteristics similar to the standard "Timer_P" block from the PCS 7 library.



6. In the final step, you will create the valve. Select the "Block contacts" and enter the "V1" in the "Name" column. In the "Block" column, select the "VIvL" block type.



You have now specified all the characteristics required for the "Ventilate" example. The sequencers must now be created and configured.

6.3 Creating sequencers

Introduction

This section guides you on the process of creating sequencers. The Run sequencer that is processed in the "Run" status has already been created. The sequencer which is processed in the "Holding", "Aborting" and "Completing" states is still missing. You only need to create one sequencer and name it "Abort-Hold-Comp" as the content is the same in all three sequencers.

Prerequisites

• "SFC" editor is open

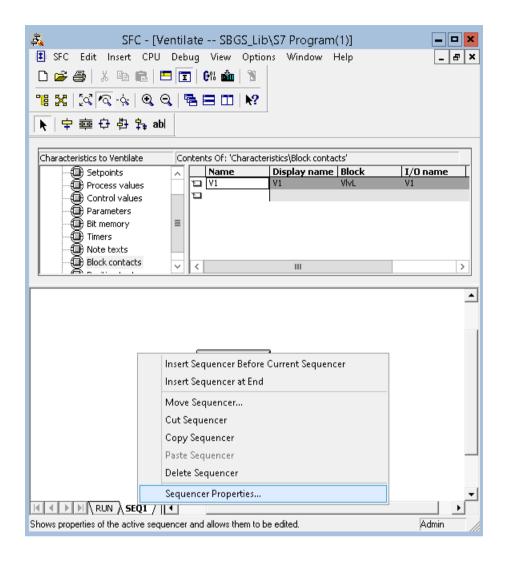
Procedure

To insert a new sequencer:

1. Right-click on the "RUN" tab and select "Insert Sequencer at End". A new tab "SEQ1" is created.

SFC - [Ventilate SBGS_Lib\S7 Program(1)]	×
😰 SFC Edit Insert CPU Debug View Options Window Help	_ 8 ×
🗅 📂 🎒 X 🖻 💼 📇 🛐 6% வ 🖻	
🎌 🔀 🖾 🗟 - 🌭 🍳 🤤 🖷 🖃 🖽 🕅	
▶ 中 韓 母 异 abl	
Characteristics to Ventilate Contents Of: 'Characteristics\Block contacts'	
Setpoints A Name Display name Bloc V1 V1 V1 VVL	k I/O name V1
	14
Control values	
Bit memory	
Note texts	
Block contacts	
	>
	_
Insert Sequencer Before Current Sequencer	
Insert Sequencer at End	
Move Sequencer	
Cut Sequencer	
Copy Sequencer	
Paste Sequencer	
Delete Sequencer	
Sequencer Properties	-
	• •
Inserts a new sequencer after the last sequencer.	Admin

2. Right click on the "SEQ1" tab, and select "Sequencer Properties"



3. In the "Properties - SEQ1" dialog box, select the "General" tab and enter "Abort_Hold_Comp" in the "Name" input box.

Propertie	es - Abort_Hold_Comp SBGS_Lib\S7 Program(1)\Ventilate 🛛 💌
Preprocessing (te General	echnological) Preprocessing Post-processing (technological) Postprocessing Start condition (technological) Start condition OS Comment
<u>N</u> ame:	Abort Hold Comp Number: 2
Co <u>m</u> ment:	<u>^</u>
<u>P</u> riority	1
<u></u> lose	Apply Print Go to Help

4. In the "SFC" window, click 🛄 icon to open the I/Os dialog of the "Ventilate SFC type".

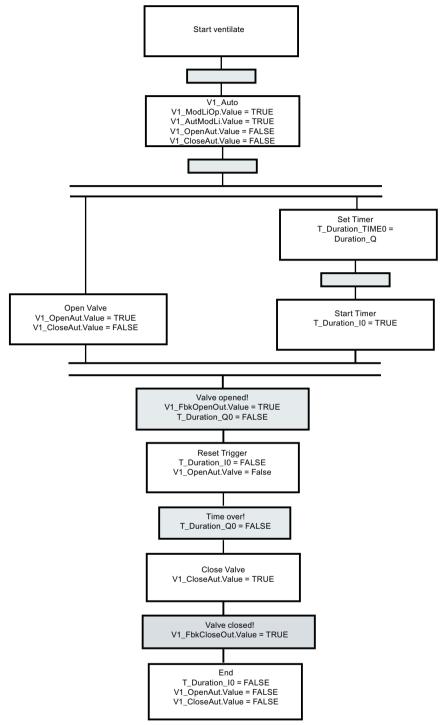
5. Navigate to the "Start condition" tab, and add the respective outputs via drag and drop as shown below from the "OUT" node in the SFC editor. Later, close the "Properties" dialog box.

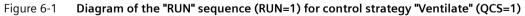
Properties - Abort_Ho	ld_Comp SBGS_Lib\S7 Program	m(1)\Ventilate 🛛 💌
	Preprocessing Post-processing (technolog	
General Start condition	n (technological) Start condition	OS Comment
1 ABORTING	f(x) = 💌 Aborting	f(x)
2 HOLDING	f(x) = Holding	f(x)
3 COMPLETING	f(x) = 💌 Completi	<u>f(®)</u> ≥1
4	f(x) -	f(x)
5	f(x) -	f(x)
6	f(x) 👻	&
7	f(x) -	f(x) &
8	f(x) -	f(x) &
9	f(x) -	f(x)
10	f(x) -	f(x)
<u>C</u> lose <u>Apply</u>	<u>P</u> rint	<u>G</u> o to Help

Note

The logical expressions has to be changed from "& - AND" to ">_1 -OR" in the figure above.

Add other sequences and steps as shown in the following figures:





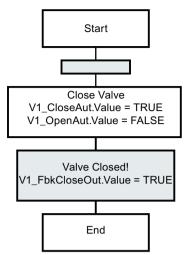


Figure 6-2 Diagram of the "Hold/Abort/Complete" sequence (Holding=1, or Aborting=1, or Completing=1)

6. Switch to the "RUN" sequencer tab and insert a step using 🛱 icon. Right-click on the newly added step and select "Object properties".

In the "General" tab, enter "V1 Auto" in the "Name" input box.

Prope	rties - V1_Auto SBGS_Lib\S7 Program(1)\Ventilate	×
General Actions (ter	chnological) Initialization Processing Termination	
<u>N</u> ame:	V1_Auto Number: 3 Confirmation	
Run times Minim <u>u</u> m:	Ma <u>x</u> imum:	
Co <u>m</u> ment:		
<u>O</u> S comment:		^ ~
Ac <u>k</u> nowledgment information:		▲▲
<u>C</u> lose Ar	pply ← ↑ ↓ → Print Go to	Help

7. Switch to the "Processing" tab. Drag-and-drop the I/O from the "Block contacts" in the upper section to the dialog box for configuring the steps / transitions as shown below.

1	V1_ModLiO	lp.Value	:= TRUE	f(s
2	V1_AutMod	ILI.Value	:= TRUE	f(s
3	V1_OpenAL	.t.Value	:= FALSE	ffx
4	V1_CloseA	.t.Value	;= FALSE	f(s
5			:=	f(x)
6	9		:=	f(x)
7	v)=	fóx
8	9		:=	fóx
9	ম		:=	f(x
10				fóx

8. Complete the engineering according to the diagrams shown above.

Setting parameters for SFC type Ventilate

In addition to the above mentioned configurations, perform the below mentioned steps in order to complete creating the sequencers:

In the SFC dialog box, click the icon. In the "I/Os to Ventilate" area, expand the "Interface" list. Now, expand the "IN" list, and set the start value as "1" (extended pulse) for "T duration MODE" as shown below:

SFC Edit Insert CPU Debug		[Ventilate SBGS_Li	b\S7 Program	(1)]	- 4
📽 🍪 👗 🗞 🖻 🔳 🕅	🖬 🖇 🗶 🏹 🗞 @	Q 3 8 8 8 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	•		
令 韓 단 삼 않 해					
Os to Ventilate	Contents Of: 'Interface\JIV				
- JELFCOMP	Name	Data Type	Initial Value		
SELFRESET	IRESI01	Int	0	(Reserved)	
- INSTROUT	Jan SELCS	DWord	16#00000001	Enable control strategies	
- CYCLEXEC	CS CS	Int	1	AUTO: Prepared control strategy (apply at next "Start")	
TIMEMON	CSP_DEFAULT	Int	0	Prepared control strategy default value (apply at next "Start") Control strategy "High limit"	
- EXT_ERR	pa CS_H pa CS_H	Int	1	Control strategy "Low limit"	
T_OPROCA	pa cs_u pa scr	Bool	TRUE	AUTO: Step control mode by transition	
- SERRCA	SCT_TAC	Bool	FALSE	AUTO: Step control mode by transition/transition and operator confirmation	
- MSG_LOCK	RUNHOLD	Bool	FALSE	Response of the RUN-Seg to the "Hold" command: 0: Hold/1: Abort	
CONT CONT	SELFCOMP	Bool	TRUE	Self "Complete"	
PARAM	SELFRESET	Bool	FALSE	Self "Reset" (only in MANUAL)	
A BA_EN	INSTROUT	Bool	TRUE	AUTO: Instruction output	
ENACQUIRE	CYCLEXEC	Bool	FALSE	AUTO: Cyclic execution	
BA_ID	TIMEMON	Bool	FALSE	AUTO: Time monitoring	
BA NA	EXT_ERR	Bool	FALSE	External error	
TI STEP_NO	T_OPRQCA	Bool	FALSE	AUTO: Confirm all operator requests for transitions	
-ZI STEP_T	S_ERRCA	Bool	FALSE	AUTO: Confirm all runtime errors for steps	
ZI CONT_T	MSG_LOCK	Bool	FALSE	1: Messages locked	
ACQ_ID	CONT	Bool	FALSE	Set "Continuous mode"	
- AC_Request	PARAM	Bool	FALSE	Check control strategy + setpoints	
AC_Priorky	I BA_EN	Bool	TRUE	BATCH: Enable	
	ENACQUIRE	Bool	TRUE	1=Can be acquired by an EPH	
AC_WakTmMax	a BA_ID	DWord	16#00000000	BATCH: Charge number	
- AC_SaleOrMsk	A BA_NA	String[32]		BATCH: Charge name	
AC_SafeNotMsk	TEP_NO	D/Word	16#00000000		
AC_AcquireId	T STEP_T	Dint	0	BATCH: Max. step run time [s]	
	ZII CONT_T	Dint	0	Max. run time for "Continuous mode" [s]	
- P RUNUPCYC	ACQ_ID	DWord		Acquire identifier for type "relay"	
- MSG_EVID	AC_Request	Byte	16#00	Request type	
- MMSG_EVID1	AC_Priority	Byte	16#00	Priority	
MMSG_EVID2	AC_WaitTmMax	Real	0.0	Waiting time maximum value [s]	
- J USTATUS	AC_SafeOrMsk	D/Word D/Word	16#00000000		
- Duration_HL	AC_SafeNotMsk AC_AcquireId	DWord		AND NOT mask for forced but safe ownership change Acquire ID for type "take over"	
- Duration_LL	AC_AcquireId	Real	1.0	Sampling time (s)	
- Puration	AMPLE_T AMPLE_T RUNUPCYC	Int	3	Number of run up cycles	
- Duration_AI	MSG_EVID	DWord		ALARM_EP message event ID	
T_Duration_MODE	NMSG_EVID1	DWord		NOTIFY_SP message event ID 1	
B V1_GrpErr	VID ADAGC EVEDO	DWord		NOTIFY_8P message event ID 2	
B V1_RdyToStart	USTATUS	Word	16#0000	Status word in VSTATUS	
VI_RdyToReset	Duration_HL	Real	100.0	High Limit	
B AT CPI	Duration_LL	Real	0.0	Low Limit	
图 VI_AutAct	Duration	Real	0.0	Setpoint Automatic Input	
P 3 V1_FbkOpenOut	The Providence AT	Real	0.0	Actual Value Input	
B-18 V1_FbkCloseOut	T_Duration_MODE	Int	1	Operating Mode	
- V1_A/State	V1_GrpErr	Struct		1 = Group error is active	
- VI_AfRegPrev	V1_RdyToStart	Struct		1 = ready to start	
V1_AfTimeStamp	V1_RdyToReset	Struct		1 = ready to reset via RstLi or automatic commands	
VI_AfWaltTmAct	V1_Ctrl	Struct		Control output (dependent from SafePos)	
E D OUT	V1_AutAct	Struct		1=Automatic mode is active	
TUO_NI 🔁 🖲	Vijekon MODE Vijekon MODE	Struct		1=Valve is Opened	
alalah nun (daa mit a					
< EXAMPLE ADDRT_Hold_Comp					
s F1 for help.				Admin 0835 X	0B

2. Set the start value "1" at parameter CS (control strategy).

				[Ventilate SBGS_L	ib\S7 Progra	im(1)]	_ 0
] Ž≵C	Edit Insert CPU	Debug	View Options Wind	dow ∐elp			- 8
تعم ۱	AN X DN R P		64 🎰 🕺 🛸 😒	00400	15 mil	N2	
				1.6 a [10] 10 10 a - 10	10001		
ب	· 翰 🕀 🗄 😘 abi						
•							
iOr to 1	Ventilate	60	ntents Of: 'Interface\IN'				
103 (0)	- 20 SELFCOMP		Name	Data Type	Initial Value	Comment	
	- SELFRESET	<u> </u>	21 C	Int	1	AUTO: Prepared control strategy (apply at next	"Sat")
	INSTROUT		CSP_DEFAULT	Int	0	Prepared control strategy default value (apply a	
	CYCLEREC		I CS_HL	Int	1	Control strategy "High limit"	
			I CS LL	Int	1	Control strategy "Low limit"	
	TIMEMON		20 SCT	Bool	TRUE	AUTO: Step control mode by transition	
	EXT_ERR		SCT_TAC	Bool	FALSE	AUTO: Step control mode by transition/transition	n and operator confir
	T_OFROCA		211 RUNHOLD	Bool	FALSE	Response of the RUN-Seg to the "Hold" comman	d: 0: Hold/1: Abort
	S_ERRCA		3 SELFCOMP	Bool	TRUE	Self "Complete"	
	- MSG_LOOK		20 SELFRESET	Bool	FALSE	Self "Reset" (only in MANUAL)	
	- P CONT		INSTROUT	Book	TRUE	AUTO: Instruction output	
	PARAM		CYCLEVEC	Bool	FALSE	AUTO: Cyclic execution	
	- P BA_EN		TIMEMON	Bool	FALSE	AUTO: Time monitoring	
	- PACQUIRE		EXT_ERR	Bool	FALSE	External error	
	BA_ID		T_OFROCA	Book	FALSE	AUTO: Confirm all operator requests for transiti	ons
	BA_NA		S_ERRCA	Bool	FALSE	AUTO: Confirm all runtime errors for steps	
	TEP_NO		MSG_LOOK	Bool	FALSE	1: Messages locked	
	r help.		-			Admin	0835 X0R

3. Select **SFC>Properties.** The "Properties SFC type" dialog box appears.

4. In the "Options" tab, under the "SIMATIC BATCH" area, click on the "category" drop-down list, and select "EPH".

roperties SFC type	<
General AS Operating Parameters Options Version	
SIMATIC BATCH Category None Category None Derived from None EPH interface: EPH (derived) EPH (interface) EOP WinCC	
Create block icon:	
SIMATIC IT MES-relevant Control strategy selection	
Ventilate	
OK Cancel Help	

5. Navigate to the "AS Operating Parameters" tab. Click on the "Operating mode:" drop-down list, and select "AUTO". Click "OK" to close the SFC editor.

6.4 Expanding the Plant Hierarchy

Properties SFC type		×
General AS Operating Parameters	Options Version	
General AS Operating Parameters (C Defaults Step control mode: T Command output Cyclic operation Time monitoring Start options Autostart Use default operating parameter	Operating mode: MAN MAN AUTO U restart © Initialize SFC © Retain SFC state	
ОК	Cancel	Help

Result

You have succesfully created the "Ventilate" type with all the required configuration.

6.4 Expanding the Plant Hierarchy

Introduction

This chapter will guide you to expand the plant hierarchy.

Prerequisites

- The **SBGS_MP** project is open in SIMATIC Manager.
- Plant View is activated.

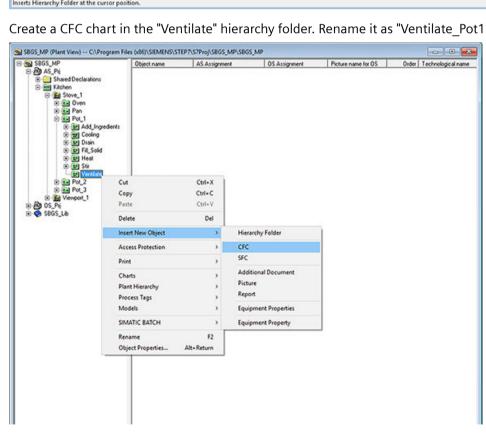
6.4 Expanding the Plant Hierarchy

Procedure

1. In the "SBGS MP" window, right-click "Pot 1", and select Insert New Object>Hierarchy folder. A new hierarchy folder gets created. Rename it as "Ventilate".

🗟 File Edit Insert PLC		≗ 1-⊞ m 🗈	< No Filter >	- 7 2 8 7		- 8
SBGS_MP Object name			AS Assignment	OS Assignment	Picture name for OS	Order Technolo
AS_Pri AS_Pri Add_Ingredients Drain			AS\CPU 410-5H\S7 Prog		Add_Ingredients	5
			AS\CPU 410-5H\S7 Prog		Drain	7
E B Stove_1		Fil_Sold	AS\CPU 410-5H\S7 Prog		Fil_Solid	2
E Oven		Meat .	AS\CPU 410-5H\S7 Prog		Heat	4
B-B-Pan B-B-Pan		E Stir	AS\CPU 410-5H\S7 Prog		Stir	1
E Del	Cut	Ctrl+X				
E E Pot	Сору	Ctrl+C				
E B OS_Pij	Paste	Ctrl+V				
B SBGS_Lb	Delete	Del				
_		Uei				
	Insert New Object	,	Hierarchy Folder			
	Access Protection	•	CFC			
	Print	•	SEC			
	Charts		Additional Document			
			Picture			
	Plant Hierarchy	,				
	Process Tags	•	Report			
	Models	•	Equipment Properties			
	SIMATIC BATCH	•	Equipment Property			
	Rename	F2				
	Object Properties	Alt+Return				

2. Create a CFC chart in the "Ventilate" hierarchy folder. Rename it as "Ventilate Pot1".



This "Ventilate_Pot1" chart is required for the instance of the SFC type. Now create a "Val_Ventilate" folder in the "Ventilate" folder as shown below.

6.4 Expanding the Plant Hierarchy

a Eile Edit Insert PLC ⊻iew Options ₩						- 8
🗅 🚔 🚼 🛲 👗 🗞 📾 💼 🛯 😐 🔍 으 으느 🗠	🏤 🦆 🔠 🏥	< No Filter >	- 🕺 🚳 🦻	ē⊟ III \?		
	Object name	AS Assignment	OS Assignment	Picture name for OS	Order	Technol
	falVel_Venilate ∰Venilate_Pot1	ASICPU 410-5HIS7 Prog ASICPU 410-5HIS7 Prog		Val_Ventlate	1 0	
	<					
	•					

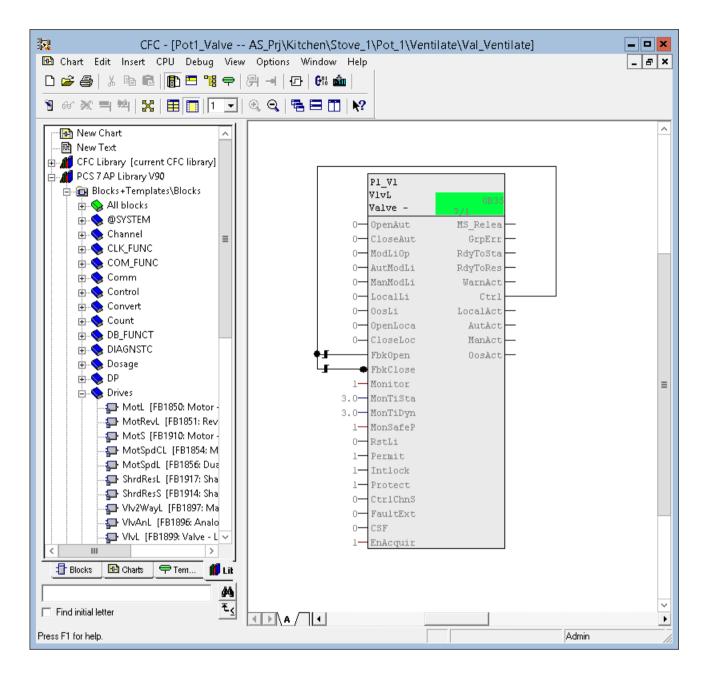
6.4 Expanding the Plant Hierarchy

3. Create the "Pot1_Valve" CFC chart in the "Val_Ventilate" subfolder. In this chart, you configure the valve required to ventilate Pot_1.

📓 Eile Edit Insert PLC View Options 🗋		< No Filter >	• y % ® ?			- 8
SBGS_MP	Object name	AS Assignment	OS Assignment	Picture name for OS	Order	Technok
AS_Pri	Pot1_Valve	AS\CPU 410-5H\S7 Prog			0	
Kitchen Stove_1						
Oven Oven						
eie∎ Pan ⊡-te∎ Pot_1						
⊕ ∰ Drain ⊕ ∰ Fil_Sold						
€ E Hest						
⊕-sz Stir ⊝-sz Ventilate						
S Val_Ventilate						
⊕ 💼 Pol_2 ⊕ 💼 Pol_3						
E Viewport_1						
🐵 🎒 OS_Pri 🕀 😪 SBGS_Lib						
0 🕹 2002_00						
	<	ш				

4. Open the "Pot1_Valve" chart. Place a Valve block (VIvL - FB 1899) with the name P1_V1. To simulate the feedback messages, interconnect the CTRL output with the FB_OPEN input and interconnect it inverted with the FB_CLOSE input (CTRL must first be made visible). The following screen is as shown below

6.4 Expanding the Plant Hierarchy

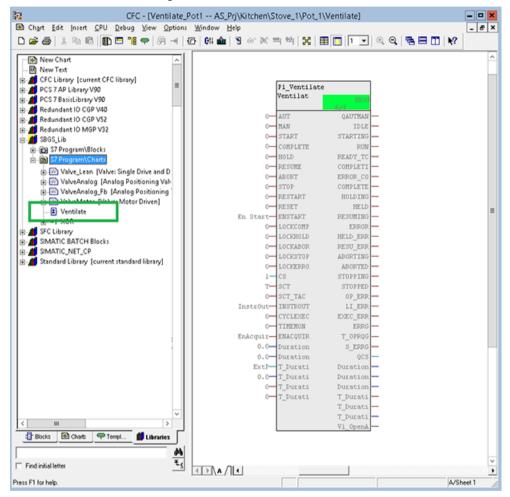


6.5 Instantiating the SFC Type "Ventilate" at Pot_1

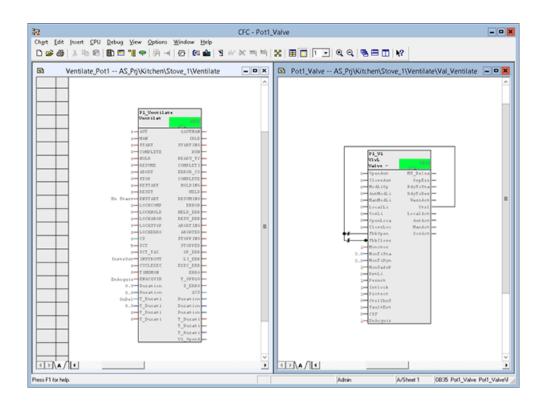
Procedure

 Open the chart "Ventilate_Pot1". You will find the previously created type "Ventilate" under "Libraries > SBGS_Lib > Charts > Ventilate". Place this block in a chart and name it as "P1_Ventilate".

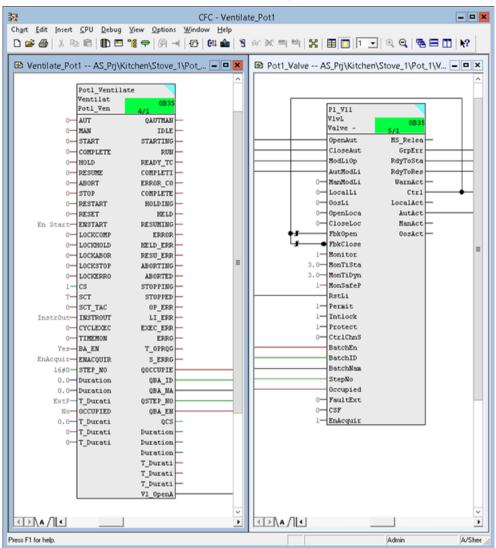
You then have the following screen:



2. Now, open the "Pot1_Valve" chart as well and arrange the two windows side-by-side using the 📋 icon as shown below.



- 3. The valve P1_V1 must now be interconnected to P1_Ventilate.
 - To do this, select the outputs V1_OpenAut and V1_CloseAut (must be set to visible) from P1_Ventilate and interconnnect them with the associated valve inputs OpenAut and CloseAut of the P1_V1valve. All the relevant interconnections to the valve are now created automatically (eight in total).
 - In order for all the batch-relevant information that SIMATIC BATCH writes to the block instance of "Ventilate" to actually arrive at the corresponding valve, the (five) batchrelevant outputs must be interconnected with the valve. First, the following parameters must be set to visible:
 - On the valve P1_V1: BatchEn, BatchID, BatchName, StepNo, OCCUPIED
 - On the "Ventilate" P1_Ventilate phase: QBA_EN, QBA_ID, QBA_NA, QSTEP_NO, QOCCUPIED
 - Interconnect the five outputs of P1_Ventilate (QBA_EN, QBA_ID, QBA_NA, QSTEP_NO, QOCCUPIED) to the inputs of the P1_V1 valve (BatchEn, BatchID, BatchName, STEP_NO, OCCUPIED).
 - Within the "P1_Ventilate" block, Interconnect the "T_Duration_PTIME" output with the "Duration_AI" input. This is important for display in the OS faceplate and for reading the process values by SIMATIC BATCH. The process value input on "P1_Ventilate" is called "Duration_AI" (Actual Value Input).



- Check the interconnection based on the following picture.

Note

Creating instances of the "Ventilate" SFC type at Pot_2 and 3:

The "Ventilate" equipment phase is also inserted at Pots 2 and 3. The procedure is the same as that for Pot 1. Start again with Chapter 6. Create a new "Ventilate" hierarchy folder under the Pot_X hierarchy folder. Insert the same equipment phase at Pots 2 and 3. Note that the "Ventilate" type is configured only once.

- 4. Export the plant hierarchy from AS to OS so that required tags/pictures/faceplates are updated, to do the same,
 - In Plant view right click SBGS_MP > Plant Hierarchy > Update in the Multiproject, refer the following images:

27 🕾 X	6 6 💼 🔍 🐾 🛛	🎭 🖫 🏥 🏢 🖻	< No Filter >	V 183 🚳 🖣	980
GS_MP AS_P	Cut	Ctrl+X	e UNC path	Path on 'Computer'	Comp
31	Copy	Ctrl+C			
3 S	Paste	Ctrl+V			
- 1	Delete	Del			
H	Multiproject				
	PLC				
1	PCS 7 License Information				
:	Shared Declarations	•			
	Plant Hierarchy	•	Settings		
1	Process Tags	•	Check Consistency		
	Models	•	Open Check Log		
1	SIMATIC BATCH	•	Create/Update Block Ice	ons	
1	Rename	F2	Open Block Icons Log		
	Object Properties	Alt+Return	Cancel Assignment		
			Create/update diagnost	tic screens Ctrl+Al	t+D
			Display Diagnostic Scre	ens Log	
			Advanced Diagnostics	Settings Ctrl+Alt	+W
			Configured Objects		
			Update in the Multiproj	iqet	
			Clear Shortcut	45	

Plant Hierarchy - Update in Multiproject
○ Merge the PH of all projects in the multiproject ⓒ Export the PH of one project in other projects Select the project to be used as a template: AS_Pri OS_Pri
OK Cancel Help

6.6 Compiling and Downloading AS, OS, and Batch

Plant Hierarchy - Update in Multi	project (Target Projects)
Select the projects into which the PH is to be exported:	
⊠05_Prj	
ОК	Cancel Help

6.6 Compiling and Downloading AS, OS, and Batch

Procedure

1. Compile the changes made to AS data in the CFC Editor and then download this data to PLCSIM using a "delta download".

Note

The Runtime OS must be deactivated.

- 2. Then compile changes of the OS.
- 3. Open the Batch configuration dialog in the plant view in your project.
- 4. Select "Batch types". Generate, Propagate the Batch types, merge the Batch instances and download the process cell.

6.7 Expanding a Recipe

6.7 Expanding a Recipe

Procedure

To expand a recipe:

- 1. Start Runtime on the OS.
- 2. Start the Batch Control Center and right click "Kitchen > Update process cell". The "Updating the process cell" window appears. Now, click "OK"

Updating the process cell				×
Assignment Preview				
Assignment Preview Current process cell Image: Current proc	New process cell Data types Units of measure Classes Instances	edited	Current Logic op.: Kitchen Values without assignment Assigned values	
Show deleted objects			< >	
OK			Cancel <u>H</u> elp	

- 3. After you complete the update of Batch process cell data, the new "Ventilate" equipment phase you configured is available in the "Pot1" unit as a recipe function.
- 4. Open the "Template_Recipe_Getting_Started" master recipe and save it with the name "Recipe_Ventilate".

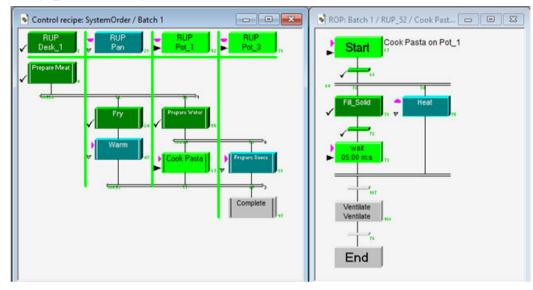
Note

If you cannot edit the recipe, activate the "Allow editing of recipes with "release revoked" status" in the Options - Project settings dialog box of Batch Control Center.

- 5. Open the recipe "Recipe_Ventilate".
- 6. Under "RUP Pot_1", open ROP "Cook Pasta".
- 7. Click " 🛄 " icon to add a new recipe phase after the simultaneous branch.
- 8. Double click on the "NOP".
- 9. "Properties of NOP.." appears.

6.7 Expanding a Recipe

- 10. In the "General" tab, click on the "Phase" drop-down list and select "Ventilate (EPH)".
- 11. Switch to "Parameters" tab, and enter "20" in the "Value" column. Click "OK".
- 12. Save and validate the recipe. Close the Recipe Editor.
- 13. Release the recipe for production. Create, release, and then run a new batch with the "Recipe_Ventilate" recipe.



6.7 Expanding a Recipe

Creating an Equipment Phase using CMT, EMT & EPHT

7.1 Task definition and implementation concept for "Cooling"

Introduction

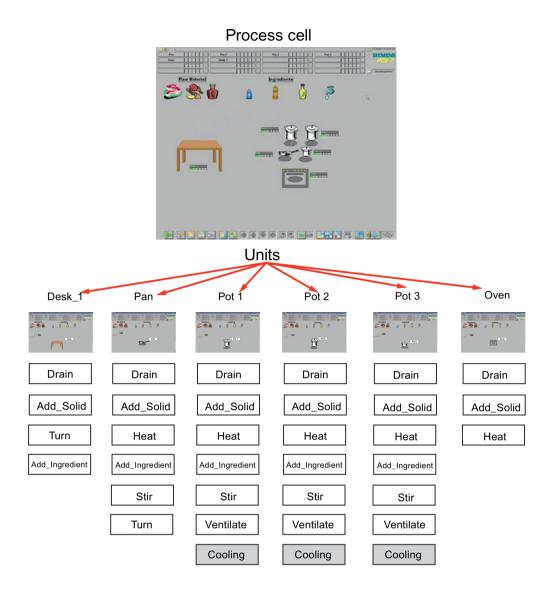
This section guides you to define and implement the tasks for the "Cooling" phase. In this application example, the technological engineering shall be used.

Procedure

An additional equipment phase is required for the existing three pots, so you need to add a "Cooling" equipment phase. Two cooling valves (Cooling Water Supply and Return valve) must be opened for a selectable time.

The same equipment phase "Cooling" shall be used for Pot 1-3.

7.1 Task definition and implementation concept for "Cooling"

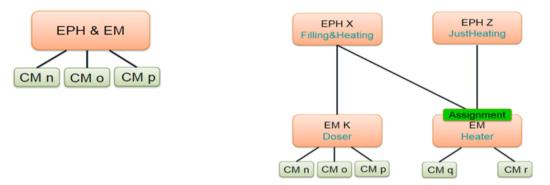


Overview of EPHT, EMT & CMT

Before PCS 7 Version 9.0, phase and equipment module logic was usually combined in one SFC Type.

The equipment phase (EPH) that is examined here in more detail forms the counterpart to a recipe phase. It is controlled directly by the recipe system and must therefore provide a compatible command/status model. This is ensured by the operating state logic of the SFC. The equipment phase controls the EM assigned to it in a coordinated manner. If you integrate one or more phases in an equipment module, this is designated in ISA-88 as "recipe aware". The

control strategies of an equipment module then correspond to the phases. This has been the approach implemented in SIMATIC BATCH for years.



Things possible from Beginning of PCS 7 Version 9.0:

- Separation of Equipment Phase (EPH) and Equipment Module (EM) logic
- Control of several EMs by one EPH
- Use of one EM through multiple EPHs
- Integrated EM allocation logic (Assignment)

In this use case, the Type-Instance-Concept shall be used, starting with the Control Module Type (CMT) in the master data library, followed by the Equipment Module Type (EMT) and Equipment Phase Type (EPHT).

7.2 Creating Control Module Type in Master Data Library

Overview

Two valves are needed for the "Cooling" phase, which shall be instances of the same valve CMT, so the creation of a Valve CMT will be explained in this Chapter.

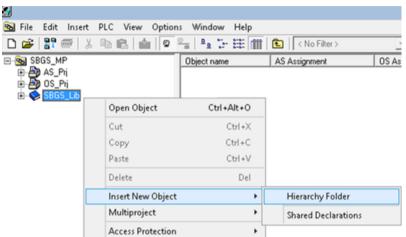
Prerequisite

• Plant view is activated.

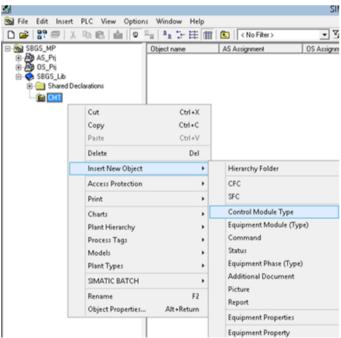
Procedure

Creation of a new Control Module Type (CMT):

- 1. Open your edited BATCH Getting Started project "SBGS_MP" in "SIMATIC Manager".
- 2. Right-click the "SBGS_Lib" Master Data Library and select Insert New Object > Hierarchy Folder. A new folder "Process cell (...)" is created.



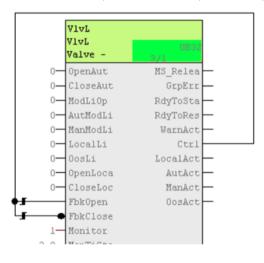
- 3. Rename the "Process cell (...)" folder to "CMT".
- 4. Right-click the "CMT" in Master Data Library and select **Insert New Object > Control Module Type**. The "CM" CMT is created; rename the "CM" to " Valve_CMT".



5. Open the CMT "Valve_CMT", insert the "VlvL" block from the "SBGS_Lib" library and rename it to "VlvL".

- 🚱 New Chart - 🕅 New Text	Walve_CMT	Attribute	Attribute value	
CFC Library [current CFC library]		Assigned chart		
PCS7AP Library V90		Name	Valve_CMT	
PCS 7 BasisLibrary V90		Comment		
Redundant IO CGP V40		Operating icon		
Redundant IO CGP V52		Optional		
Redundant IO MGP V32		Set as default option	6	
SBGS_Lib		Author	S8Gettingstarted	
- 2 S7 Program(1)\Blocks		Version		
All blocks		Function identifier		
B SYSTEM		Sampling time (ms)	1000	
(i) Channel		Function		
COM_FUNC Gottel Gott				
Drives MotL (FB1850: Motor - La GM MotRevL (FB1851: Reversil GM MotRevL (FB1851: Reversil GM MotSpdCL (FB1854: Moto	le		VivL VivL Valve -	3/1
- P MotSpdL [FB1856: Dual sp			0- Openkut	MS_Rel
- P Viv2WayL (F81897: Manife	ld		0- CloseAut	GrpN
- P VIvAnL [FB1896: Analog P	101		0- ModLiOp	RdyTod
- D Vivi. (F81899: Valve - Large	1		0- AutHodLi	RdyToF
WvMotL [F81900: Motoriz	b		0- ManModLi.	WarnA
😥 🔦 Genrator			0-LocalLi	Ct
IMPULS			0-OosLi	LocalA

6. Interconnect output "Ctrl" with inputs "FbkOpen" and "FbkClose", then invert "FbkClose".



Note

To simplify the configuration, we do not use driver blocks in this example.

± 🜩 Valve_CMT	Attribute	Attribute value Ar	signmen
	Assigned chart	v	alve_CMT
	Name	Valve_CMT V	alve_CM
	Comment		-
	Operating icon		
	Optional		
	Set as default option		
	Author	SBGettingstarted	
	Version		
	Function identifier		
	Sampling time (ms)	1000	
	Function		
			_
		VivL VivL	7
		VivL Valve - and	
		Vivi Valve	
		Vivi Valve	
		VivL Valve - HS_Relea O O OpenAut HS_Relea O CloseAut GrpErr O HodLiOp RdyToSta	
		Vivi - Valve - O- OpenAut HS_Reles - O- CloseAut GrpErr O-Hodliop RdyToSta O-AutHodli RdyToSte	
		Vivi Valve - O- OpenAut MS_Relea - O- CloseAut GrpErr O- Hodilop PdyToSta - O- AutHodil MarnAct -	
		Viol Valve - C - OpenAut HS_Relea - C - CloreAut GrpErr - C - Hodilop PdyToSta - C - AutHodii RdyToRes - C - HanHodii RdyToRes - C - HanHodii Ccri	
		Vivi Valve - O OpenAut MS_Reles - O CloseAut GrpErr O Hodliop EdyToSta O AutHodli RdyToStes - O HanNodli WarnAct - O Localli Ctrl O Ossi LocalAct -	
		Vivi Valve - O- OpenAat NS_Relea - O- CloseAut GrpErr - O- Hodilop RdyToSta - O- AatModil RdyToSta - O- AatModil WarnAct - O- Localii Ctri O- Localii LocalAct - O- OpenLoca AatAct -	
		Vivi Valve - O OpenAut MS_Reles - O CloseAut GrpErr O Hodliop EdyToSta O AutHodli RdyToStes - O HanNodli WarnAct - O Localli Ctrl O Ossi LocalAct -	

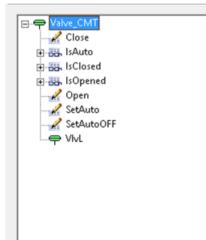
7. Drag & drop the valve block "VlvL" on top of Valve_CMT.

8. Right Click on CMT "Valve_CMT" and insert commands and status, rename the same in the name field according to the following table (we need four commands and three status). Command:

Description
Set Valve to Auto Mode
Switch Off Auto Mode
Open the Valve
Close the Valve
-

Status:

Status Name	Description
Is Auto	Is Valve in Auto mode?
Is Opened	Is Valve Opened?
Is Closed	Is Valve Closed?



- 9. This example will show how to write the logic to set the valve to Auto mode:
 - Select the Command "SetAuto", select "Properties" from the context menu.
 - Select 1st row in Processing tab, click on Browse and select "ModLiOp.Value", then press Apply and Close and enter "1".
 - Select 2nd row and Click on Browse and select "AutModLi.Value", then press Apply and Close and enter "1".

Initialization	Processing	Termination		
1	utModLi.Value	2	:=	TRUE
2	NodLiOp.Value	•	:=	TRUE
3 🔽			:=	
4			:=	
5 🔽			:=	
6			:=	
7 🔽			:=	
8			:=	
9 🔽			:=	
10 🔽			:=	
<u>C</u> lose	Apply	Browse	 Help	

10. Add the remaining commands in Processing tab according to the following table:

Command	Command Logic
SetAutoOFF	AutModLi.Value=0
	ModLiOp.Value=0
Open	OpenAut.Value=1
	CloseAut.Value=0
Close	OpenAut.Value=0
	CloseAut.Value=1

Implement the remaining commands "SetAutoOFF", "Open" and "Close" according to the following Image:

SetAutoOFF:

Initialization	Processing Termination	
	ModLi.Value	:= FALSE
2 🗸 Mod	dLiOp.Value	:= FALSE
3 🗸		:=
4		:=
5 🔽		:=
6		:=
7		:=
8		:=
9		:=
10		:=

Open:

lization Processing Termination		
1 🔽 OpenAut.Value	:= TRUE	<u> </u>
2 CloseAut.Value	:= FALSE	
3 🔽	:=]	
4 17		
5 🔽	(a)	

Close:

Initialization Processing Termination		
1 OpenAut.Value	:= FALSE	<u> </u>
2 CloseAut.Value	:= TRUE	
3 🔽	(m)	
4	2	
5 🔽	(=	

- 11. Write the logics to get the status of the valve block. This example will show how to get the auto mode status of the valve (Is Valve in Auto Mode?).
 - Select status "IsAuto", select "Properties" from the context menu
 - Select 1st row in "Condition" tab
 - Click on Browse and select "AutAct.Value", then press Apply and Close and enter "1"

Condition OS comment		
1 AutAct.Value	- TRUE	
2		
3		&

12. Add the remaining statuses in the "Condition" tab according to the following table:

Status Name	Status Logic
Is Opened	FbkOpenOut.Value = 1
Is Closed	FbkCloseOut.Value = 1

Is Opened:

Condition OS comment		
1 FbkOpenOut.Value	= TRUE	
2	•	
3	•	&
4		

Is Closed:

Condition OS comment		
1 FbkCloseOut.Value	= V TRUE	
2	▼	
3	•	&
4		

13. Click Valve_CMT and then change the Sampling time to 1000 ms:

Attribute	Attribute value
Assigned chart	
Name	Valve_CMT
Comment	
Operating icon	
Optional	
Set as default option	
Author	SBGettingstarted
Version	
Function identifier	
Sampling time (ms)	1000
Function	
Function name	
Basic requirement	
Туре	Valve_CMT

Configuration of CMT is completed.

7.3 Creating Equipment Module Type in Master Data Library

Overview

For implementation of the Cooler equipment, we will create an Equipment Module Type (EMT) "Cooler_EMT" in this chapter.

Prerequisite

• Plant view is activated.

Procedure

To create a new Equipment Module Type (EMT):

- 1. Open your edited BATCH Getting Started project "SBGS_MP" in "SIMATIC Manager".
- 2. Right-click the "SBGS_Lib" Master Data Library and select Insert New Object > Hierarchy Folder. The "Process cell(...)" folder is created.
- 3. Rename the "Process cell(...)" to EMT.

4. Right-click the "EMT" in Master Data Library and select **Insert New Object >Equipment Module (Type).** The "EM" EMT is created; rename the "EM" to "Cooler_EMT".

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<u>S</u>						:
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SBGS_MP SBGS_MP SBGS_Pri SBGS_Lib SBGS_Lib CmdStatt CmdStatt CMT	Declarations	Object name			AS Assignment	OS Assig
EMT	Cut Copy Paste	Ctrl+ Ctrl+ Ctrl+	C			
	Delete		el			
	Insert New Object		•		Hierarchy Folder	
	Access Protection		•		CFC	
	Print		•		SFC	
	Charts		•		Control Module Type	
	Plant Hierarchy		•		Equipment Module (Type)	
	Process Tags Models Plant Types		* * *		Command Status Equipment Phase (Type)	
	SIMATIC BATCH		•		Additional Document	
	Rename Object Properties	Alt+Retu	F2		Picture Report	
	objectropercom				Equipment Properties	
					Equipment Property	

5. Open the EMT "Cooler_EMT", Rename the EMT Block to "Cooler_EMT". This name will be visible on your OS.

To change the EMT Block name, select the block right click select Object properties; enter "Cooler_EMT" into the name field.

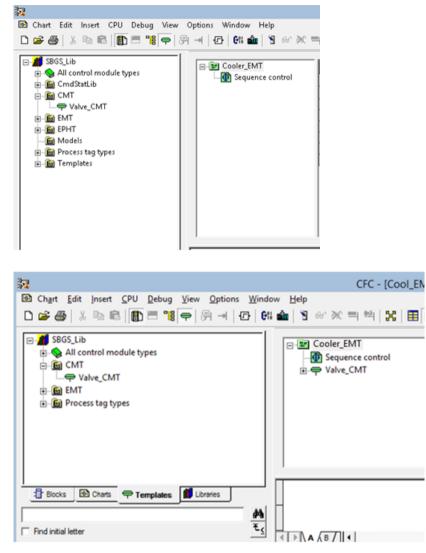
6. Set Sampling time to 1000 ms.

Attribute	Attribute value	Assignment
Assigned chart		Cooler_EMT
Name	Cooler_EMT	Cooler_EMT
Comment		
Author	SBGettingstarted	
Version		
Function identifier		
Sampling time (ms)	1000	
Туре	Cooler_EMT	

7. To add configured CMTs into an EMT, there is a new tab named "Templates" under catalogue as shown below:

R			
🖸 Chart Ed	it Insert CP	U Debug Vi	ew Options
🗅 🚅 🚑 🛛	X 🖻 🖬 🛛	🗈 🗏 🗧	· 🖓 🗝 🖸
New C			
🕂 🗠 🍫 All blo			
BIT_LG			
COMP			
🕂 💊 Chann			
E Contro			
Dosage	e		
Drives	OP		
Genrat			
tenation of the second of the			
EuropicA			
EogicA			
H MATH			
HATH			
🕂 🚫 Math			
🗄 💊 Monito	or		
🕂 🚫 Operat			
🕀 💊 Report	:		
🕀 🚫 SHIFT			
🖶 🔷 WRD_L			
🕂 🔆 🕁 Other l	olocks		
🗄 - 💼 S7 Prog	gram(1)		
Blocks	Charts 9	Templ	Libraries
			<i>4</i> 4
Find initial lett	ter		₹
Press F1 for help.			

8. Drag & drop "Valve_CMT" from catalogue "Templates" tab on top of "Cooler_EMT":



9. When CMT is moved into the EMT, a copy of the CMT Blocks is stored within the chart of the EMT.

Because this is not desired, the CMT must be declared as a "Basic requirement". To do this, you set the "Basic requirement" property of the CMT.

Cooler_EMT	Attribute	Attribute value	A
- 🌐 Sequence control	Assigned block		
⊕ ♥ Valve_CMT	Name	Valve_CMT	
-	Comment		
	Role(s)	EMT\\Cooler_EMT\CWSupVlv EMT\\Cooler_EMT\CWRetVlv	
	Operating icon		
	Optional		
	Set as default option		
	Author	SBGettingstarted	
	Version		
	Function identifier		
	Function		
	Function name		
	Basic requirement		
	Туре	Valve_CMT	î
	Support type instance behavior		

Then following prompt appears click Yes & refresh the Sheet (Press F5):

	Technological I/Os (254:61167)
Å	Please note that the associated blocks will be implicitly deleted. Should the control module now be labeled as a basic requirement?
<u> </u>	No

10. Insert two "Control Module Assignment"-roles to the EMT since we need two valves for our equipment module type:

Select "Insert New Object > Control Module Assignment" from the context menu of EMT "Cooler_EMT".



Rename the Control Module Assignment "Role" according to following table:

Role	Description
CWSupVlv	Cooling Water Supply Valve
CWRetVlv	Cooling Water Return Valve

। ⊻iew Options Window Help ≌ि ि ि ि ि ि ि की की ि ि ि ि की	= *4 🗙 🎟 📰 1 💌 @
Cooler_EMT CWRetVIV CWSupVlv Sequence control CWalve_CMT	Attribute Assigned control module Role Comment

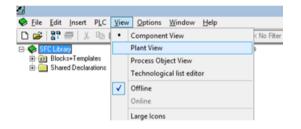
11. Assign the Valve_CMT to the role "CWSupVlv ", "CWRetVlv ": Select Roles "CWSupVlv" and "CWRetVlv" and Drag and drop it to "Valve_CMT".

View Options Window Help	<=≈ ¥ X ≡≡ 1 •
Cooler_EMT Sequence control Valve_CMT Valve_CMT (CWRetVIV) Valve_CMT (CWSupVIv)	Attribute Assigned control module Role Comment

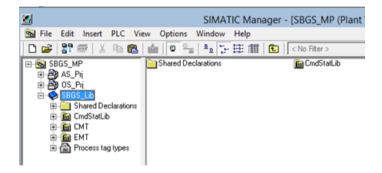
12. Internal commands for controlling the SFC are not permanently coded in the program package but instead they are implemented as part of the SFC library. In this way, Commands can be modified, and new commands can be created.

In order to add the prepared commands to the Master Data Library (MDL), open SFC library and change the view to plant view and copy the complete "CmdStatlib" folder to MDL folder.

u contra la	Open Project	
User projects Libraries Sar	nple projects Multiprojects	
Name	Storage path	^
Redundant IO CGP V40	C:\Program Files (x86)\SIEMENS\STEP7\S7libs\red_io_1	
Redundant IO CGP V52	C:\Program Files (x86)\SIEMENS\STEP7\S7libs\red_io52	
Redundant ID MGP V32	C:\Program Files (x86)\SIEMENS\STEP7\S7libs\red_io_0	
SBGS_Lib	D:\UserData\Anil\POT\multiprj\Batch_GS_Multi\Library_	
SFC Library	C:\Program Files (x86)\SIEMENS\STEP7\S7libs\sfclib	
SFC Library	C:\Program Files (x86)\SIEMENS\STEP7\S7libs\sfclib_60	
SFC Library	C:\Program Files (x86)\SIEMENS\STEP7\S7libs\sfclib_61	
SIMATIC BATCH Blocks	C:\Program Files (x86)\SIEMENS\STEP7\S7libs\batch	=
SIMATIC_NET_CP	C:\Program Files (x86)\SIEMENS\STEP7\S7libs\simation	
Standard Library	C:\Program Files (x86)\SIEMENS\STEP7\S7libs\stdlib30	
stdlibe (V2)	C\Program Files (v863\SIEMENS\STEP7\S7libs\stdlibs	~
<	III	>
Selected		
ser projects:		
braries: 1		
ample projects:		
		Browse
ultiprojects:		2101136
ОК	Cancel	Help
		rrop



SIMATIC Manage	r - SBGS_MP
File Edit Insert PLC View Options Window Help □ <	· · · · · · · · · · · · · · · · · · ·
SFC Library (Plant View) C:\Program Files (x86)\SIEMENS	💁 SBGS_MP (Plant View) C:\Program Files (x86)\Siemens\S 🖃 🗖 🗙
SFC Lbray Dbject name AS Assignment DS Image: Construction of the construline of t	SBGS_MP Script States
Press F1 to get Help.	B PLCSIM.TCPIP.1 Admin

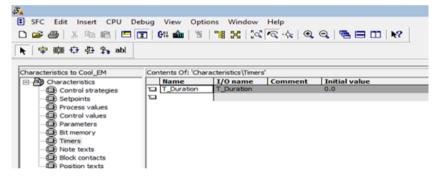


13.Open the EMT "Cooler_EMT" from MDL, right click on the EMT block and select "Open SFC Type" to add a Set point and a Timer.

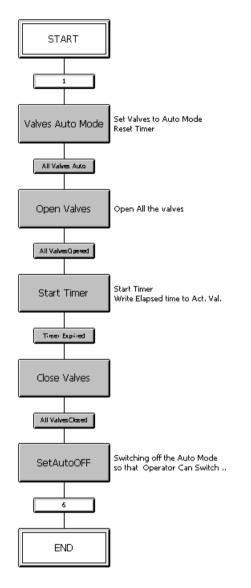
In order to add Set point, click on View > Characteristics > Setpoints, enter the name and other parameters according to the following table:

Name	Data Type	Initial Value	Low Limit	High limit		
Duration	Real	10.0	10.0	600.0		
ř.				SFC - [Cool		
E SFC Edit Insert CPU Debug View Options Window Help D 🖝 ∰ 从 🗈 🛃 🖻 04 🎰 🦉 🅦 🔀 24 🔍 🔍 🔍 🔍 🗒 🗮 🖿 🔲 №?						
▶ 中 韓 夺 夺 \$p abl						
	Contents Of: 'Characteristics\Setpoin					
	Name Display na Duration Duration	me Data type 1/0 name REAL Duration	Comment Low limit 10.0	Initial value High limit 10.0 600.0		

In order to add Timer in Characteristics view, click on Timers and enter the name "T_Duration"



14. Insert the Steps in SFC Type and rename the steps and transitions according to the following Image:



15. Now Insert the commands which have been created in CMT "Valve_CMT" into Action Table of Steps. Example:

- Step 1: "Valves Auto Mode"

To set valves into Auto mode, double click on step "Valves Auto Mode"; change to "Actions (technological)" tab, then click on the pencil symbol of the 1st row. Right Click on Actions > Insert Commands > CWRetVlv > "SetAuto".

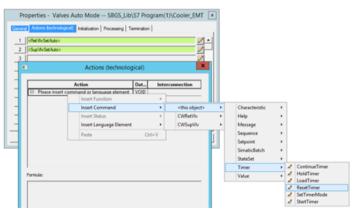
Actions (tec	hnological)		x				
Action	Dat	Interconnection					
Please insert command or language e	lement VOID	1		1			
	Insert Fu	nction	*				
	Insert Co	mmand	•	<this object=""></this>	•		
In		tus	+	CWRetVIv	•	2	Close
	Insert La	nguage Element		CWSupVlv		_	Open
					-	2	SetAuto
	Paste	(Ctrl+V	•			

Similarly, set the 2nd valve into Auto mode: Click on pencil symbol on row number 2 > right click on Actions > Insert Commands > CWSupVlv > "Set Auto". Then click Apply > Close.:

P	Properties - Valves Auto Mode SBGS_Lib\S7 Program(1)\Cool_E	× TN
Genera	Actions (echnological) Initialization Processing Termination	
1	<retvivsetauto></retvivsetauto>	2-
2	<supvivsetauto></supvivsetauto>	2
3		2
4		2
5		2
6		2
7		2
8		2
9		2
10		2 -
Qo	se Apply ← ↑ ↓ → Brint	Help

Similarly reset the Timer:

Click on pencil symbol on row number 3 > right click on Actions > Insert Commands > <this object> > Timer > ResetTimer, select Timer object "T_Duration" from dropdown list > Click Apply > Close.



Action	Data type	l	Interconnect	tion
ResetTimer	VOID			
🗆 🖉 ResetTimer				
E TimerName	TIMER_OBJECT	T_Duration		-
formula: <resettimer> = ResetTime</resettimer>	*O			

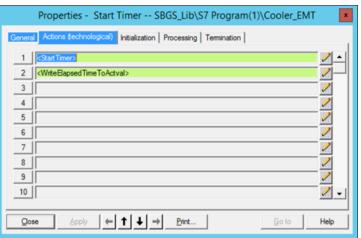
F	Properties - Valves Auto Mode SBGS_Lib\S7 Program(1)\Cool_EMT
Gener	al Actions (technological) Initialization Processing Termination
1	<retwvsetauto></retwvsetauto>
2	<supwvsetauto></supwvsetauto>
3	<resettimer></resettimer>
4	
5	
6	
7	
8	
9	
10	<u>/</u> •
Qo	see Apply ← ↑ ↓ → Print So to Help

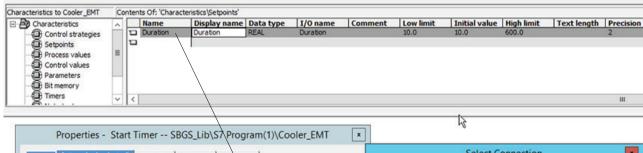
Complete all the steps as shown in the following pictures

- Step 2: "Open Valves".

	Properties - Open Valves SBGS_Lib\S7 Program(1)\Cool_EMT	×
Genera	Actions (echnological) Initialization Processing Termination	
1	<retvivopen></retvivopen>	2-
2	<supwvopen></supwvopen>	
3		2
4		2
5		2
6		2
7		
8		2
9		2
10		<u>- N</u>
Qos	se Apply ← ↑ ↓ → Brint Go to	Help

- Step 3: "Start Timer": In this step Timer needs to be started. While timer is running, write the actual time to EMT output (later referenced by the calling EPHT).





<starttimer></starttimer>				Name Duration HL	Data type REAL	1/0	Comment High Limit
E Actio	ons (technolog	jical) - StartTimer	×	Duration_LL Duration Duration_AI	REAL REAL REAL	IN IN IN	Low Limit Setpoint Automatic Input Actual Value Input
Action	Data type	Interconnection		Duration_CS Duration_ENOP	DWORD BOOL	IN_OUT	Enable Control Strategies Enable Setpoint Operator Input
⊟- StartTimer	VOID			Duration_ENOPP Duration_OP	BOOL	IN_OUT	Enable Setpoint Operator Input Prepa Setpoint Operator Input
□- StartTimer				Duration_OPP	REAL	IN_OUT	Setpoint Operator Input Prepare
E- TIME0	REAL	•••		Duration_A0	REAL	OUT	Actual Value Output
E- TimerName	TIMER_OBJECT	T_Duration	-	Duration_Q	REAL	OUT	Active Setpoint
es- ninervanie		2		Duration_QP Duration_ERR	BOOL	OUT	Valid Setpoint Prepare Setpoint Input Error
				ОК			

Action	Data type	Interconnection				
⊟- StartTimer	VOID					
🖃 🚀 StartTimer						
E- TIME0	REAL	Duration_Q				
⊟− TimerName	TIMER_OBJECT	T_Duration				
=ormula: <starttimer> = StartTimer(</starttimer>	(Duration_Q, T_Dur	ation);				

WriteElapsedTimeToActual

Action		Dat_	Int	erconnection					
Please insert comman ⁴	Insert Function Insert Command Insert Status Insert Language E	lement	> < < <	<this object=""> CWRetVIv CWSupVIv</this>	> > >	Characteristic Help Message	> > >		
ormula:	Paste Delete action		Ctrl+V			Sequence Setpoint SimaticBatch StateSet Timer Value	>	111111	DisSetpointOpBooIP DisSetpointOpPrepared DisSetpointOperation EnSetpointOpBooI0
Please insert command or lar	guage element>			Go To	Help			111111	EnSetpointOpBoolP1 EnSetpointOpPrepared EnSetpointOperation SetActualValueBit SetActualValueNum

Action	Data type	Interconnection	
- SetActualValueNum			
🖃 🚀 SetActualValueNum			
E SetpointName	SETPOINT		
🖻 Value	INT		
mula: ietActualValueNum> = SetActual	Valuation (2.2)-		

Action	Data type	Interconnection	
 'riteElapsedTimeToActivate 			
🖃 🚀 SetActualValueNum	8		
E SetpointName	SETPOINT		1
🖻 Value	INT		
mula: etActualValueNum> = SetActual	Valuetium(7, 7);		
mula:			

Action	Data type	Interconnect	ion	
WriteElapsedTimeToActi Image: SetActualValueNum				
□ SetpointName	SETPOINT			2
8- Value	INT		in the	100
	Insert Fu	nction >	IXI	ABS
	Insert Co	ommand >	+	ADD
	Insert St	atus >	O.	AND
	Insert La	nguage Element >	4	EQ
				GE
	Paste	Ctrl+V	5	GT
	Insert In	put >		LE
ormula:			è	LT
	Delete in		*	MUL
<pre>WriteElapsedTimeToActivatee> =</pre>	SetActualValueN	lum(?, ?);	80	NAND
			0	NE
			-	NEG
			314	NOR
			p	NOT
Close Apply		Go T	1	OR
			*	SQRT
			Ē	SUB
			-1	XOR

Note

SUB Function has to be inserted in Value field.

Action	Data type	Ir	terconnect	ion	2
E WriteElapsedTimeToActivation					
E 🖉 SetActualValueNum					
SetpointName	SETPOINT				-
🖻 - Value	INT				
⊟- – SUB					
₽-IN1	INT				
⊟– IN2	INT				
				-1	
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SFC Edit Insert CPU Debug 같 좋 않 있 말 같 한 가 abl 다 형 다 한 한 가 가 abl Xs to Cooler_EMT - CWRetWy_AcSofeOrMsk - CWRetWy_AcSofeOrMsk - CWRetWy_AcSofeVotMsk - CWRetWy_AcSofeVo	Contents Off 'I' Contents Off 'I' Mame gai TARGE gai SFC_CC gai Durato gai Durato gai Durato gai Durato gai T_Dura gai T_Dura	Interface UN_OUT Interface UN_OUT ISTEP INTROL INO	Data Type Word DWord DWord Bool Bool Real Real Bool Bool Bool	Initial Value 16#0000 16#0000000 16#0000000 16#0000000 16#0000000 16#0000000 TRUE 10.0 0.0 FALSE	Commer SFC Contr BATCH: C Enable Co Enable Se Enable Se Enable Se Setpoint C Setpoint C Time in s Reset
SFC Edit Insert CPU Debug 学会》》和 配 图 图 图 图 中韓 章 子 子 子 abl 中韓 印 OVRetWy AcSafeOrMsk P CWRetWy AcSafeOrMsk P CWRetWy AcSafeOrMsk P CWRetWy AcSafeOrMsk P CWRetWy AcSafeOrMsk P D NOUT P DITERSOR P DITERSOR P DITERSOR P DITERSOR P DITERSOR P DITERSOR P DITERSOR	Contents Of: 'i' Contents Of: 'i' At ame an TARGE an SFC (C) an BA_CO an Duratio an Duratio an Duratio an Duratio an Duratio an Duratio an Duratio an T_Dura an T_Dura an T_Dura an T_Dura	Interface VIN_OUT Interface VIN_OUT ISTEP INTROL INTROL In_CS IN_ENOPP INTROP IN_OPP INTROP IN_OPP INTROP INTROL	Data Type Word DWord DWord Bool Real Real Real Bool Bool Bool Bool Bool Bool Bool	Initial Value 15=0000 15=0000000 15=0000000 15=0000000 15=0000000 15=0000000 16=0000000 16=0000000 16=0000000 16=0000000 16=0000000 16=0000000 16=0000000 16=0000000 16=0000000 16=00000000 16=00000000 16=00000000 16=00000000 16=00000000 18=00000000 18=00000000 18=00000000 18=000000000 18=000000000 18=000000000 18=000000000 18=000000000000000000000000000000000000	Commen Step num SFC Contr BaTCH: C Enable Se Enable Se Setpoint C Setpoint C Setpoint C Imme in s Reset Input Puls
SFC Edit Insert CPU Debug	Contents Of: 'I' Contents Of: 'I' Contents Of: 'I' Rame Part TARCE Part SFC_CC Part SFC_CCC Part SFC_CCC Part SFC_CCC Part SFC_CCC Part SFC_CCC Part SFC_CCC Part SFC_CCCC Part SFC_CCCC Part SFC_CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC	terface (IN_OUT INTROL NTROL NTROL NTROL NTROL NTROL NTROL NCS n_ENOP n_OP N_OP	Data Type Word DWord DWord Bool Real Real Real Bool Bool Bool Bool Bool Bool Bool	Initial Value 16#0000 16#0000000 16#0000000 16#0000000 16#0000000 16#0000000 TRUE 10.0 0.0 FALSE	Commer Step num SPC Cont BatCH: C Enable Se Enable Se Setpoint (Setpoint (Time in S Reset Input Puls
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SFC Edit Insert CPU Debug	Contents Of: 'I' Contents Of: 'I' Rame Part Race Part SFC, CC Part	ick role - ck Q interface UN_OUT' ISTEP NITROL VITROL INTROL I	Data Type Word DWord DWord DWord Bool Bool Real Real Bool Bool Bool Bool Bool Inte	Initial Value 15=0000 15=0000000 15=0000000 15=0000000 15=0000000 15=0000000 15=0000000 16=0000000 16=0000000 16=0000000 16=0000000 16=0000000 16=0000000 16=0000000 16=0000000 16=00000000 16=00000000 16=00000000 16=00000000 16=00000000 18=00000000 18=00000000 18=00000000 18=000000000 18=000000000 18=000000000 18=000000000 18=000000000000000000000000000000000000	Commen Step num SFC Conte Bable Co Enable Co Enable Se Setpoint (Setpoint (Time in s Reset Input Puls
SFC Edit Insert CPU Debug	Contents Of: 'ir Contents Of: 'ir Aname gar TARGE gar SFC_CC gar BA_CCO gar Durato gar Durato	terface VIN_OUT ISTEP NITROL ISTEP NITROL ISTEP NITROL ISTEP NITROL ISTEP NITROL ISTEP INTROL INO	Data Type Word DWord DWord DWord Bool Bool Real Real Bool Bool Bool Bool Bool Inte	Initial Value 15=0000 15=0000000 15=0000000 15=0000000 15=0000000 15=0000000 15=0000000 16=0000000 16=0000000 16=0000000 16=0000000 16=0000000 16=0000000 16=0000000 16=0000000 16=00000000 16=00000000 16=00000000 16=00000000 16=00000000 18=00000000 18=00000000 18=00000000 18=000000000 18=000000000 18=000000000 18=000000000 18=000000000000000000000000000000000000	Commer Step num SFC Conte BatChi: C Enable Se Enable Se Setpoint C Setpoint C Time in s Reset Input Puls

▶ 中韓 ↔ 掛 \$ abl		votent	s Of: 'Interf	inter l'Ol III'				
B-B Interface	-		Name	ave loos		Data Type	Initial Value	Co
	Action	a la dedededede la la	Duration_EF T_Duration_ T_Duration_ T_Duration_ CWSupWv_	QERR Q0 PTIME OpenAut CloseAut ModLiOp AutModLi RstLi AcRequest AcRequest	teEla	Bool Bool Real Struct Struct Struct Struct Struct Struct Struct Struct Struct Struct Struct Struct	Actval	Set Erro Out Tim 1=0 1=0 1=0 Link Res Res X
	Act	ion		Data type	2	Interconn	ection	٦.
B	WriteElapsed		ToActval	VOID			eccion .	-
	E / SetAc							-
	E- Setpo	intN	ame	SETPOINT	Durat	tion		T
	E- Value			REAL				
	8	SUE	3					
	Ę	- IN1	E III	REAL	T_Du	ration_TIME0	\	
	Ė	- IN2		REAL			*	

Action	Data type	Interconnection
WriteElapsedTimeToActval	VOID	
🗆 🚀 SetActualValueNum		
SetpointName	SETPOINT	Duration
Value	REAL	
⊟ SUB		
₽- IN1	REAL	T_Duration_TIME0
⊟− IN2	REAL	T_Duration_PTIME
ormula:		

- Step 4: "Close Valves": In this step Close both valves:

	Properties - Close Valves SBGS_Lib\S7 Program(1)\Cool_EMT	×
Genera	Actions (technological) Initialization Processing Termination	
1	<retvvclose></retvvclose>	<u>-</u>
	<supwvclose></supwvclose>	
3		2
4		2
5		//
6		2
7		/
8		2
9		2
10		2-
Qos	e Apply ← ↑ ↓ → Print Go to	Help

- Step 5: "SetAutoOFF": In this step, deactivate the Auto mode so that operator can switch the valves to Manual mode and operate manually.

	Properties - SetAutoOFF SBGS_Lib\S7 Program(1)\Cooler_EMT	×
Genera	Actions (technological) Initialization Processing Termination	
1	<cwretviv setautooff=""></cwretviv>	<u>_</u> _
2	<cwsupviv setautodff=""></cwsupviv>	
3		
4		2
5		2
6	1	2
7		2
8		2
9		2
10		<u>/</u> -
۵	reApply ← ↑ ↓ → Print Go to	Help

16.Now insert the status conditions, which have been created in CMT, into the "Condition (Technological)" tab of the transitions.

Example: Transition "All Valves Auto":

 Condition 1: Check if both valves are in Auto mode: Click on "Condition (Technological)" tab then click on spectacle symbol. Right click on "Please insert status of function", then "Insert Function > "& AND". Rename the Condition name as "IsAuto" Right Click on IN1 > "Insert Status" > CWRetVlv > IsAuto, Right Click on IN2 > "Insert Status" > CWSupVlv > IsAuto Apply and Close

My condition	BOOL BOOL BOOL	
E & AND E IN1	BOOL	
⊡… IN2	BOOL	
rmula: My condition> = (&)	
Close	Apply	Go To He

Condition	Dat	Interconnection
⊡ ·· IS Auto	BOOL	
E-& AND		
⊡ IN1	BOOL	
Ė∾ IN2	BOOL	
ormula:		
ormula: <my condition=""> = (</my>	&)	

Condition	Dat	In	terconnection	í.		
⊡- IS Auto	BOOL					
E-& AND						
₽ IN1			, +			
Ė~ IN2	Insert Functio		, [
_	Insert Comm	and	<u></u>			
	Insert Status		>	<this object=""></this>	>	
	Insert Langua	age Element	>	CWRetVIv		s Auto
	Paste		Ctrl+V	CWSupVlv	/	s Closed s Opened
	Insert Input		>			
	Delete input					
ormula:					Help	1
	Apply		Go To	Help		
Condition (tecl		Auto		nep	×	
		Auto Dat		rconnection	×	
	hnological) - IS A				×	
Co IS Auto IS Auto	hnological) - IS A	Dat BOOL			×	
Co IS Auto B- & AND P- IN1	hnological) - IS A ndition	Dat BOOL BOOL			×	
Co IS Auto & AND IN1 	hnological) - IS A	Dat BOOL BOOL uto			×	
Co 	hnological) - IS A ndition	Dat BOOL BOOL			×	
IS Auto S Auto S Auto IN1 IN1	ndition	Dat BOOL BOOL uto BOOL			×	

Cond	ition	Dat	Intercon	nection		
E- IS Auto		BOOL				
E-& AND						
Ģ− IN1		BOOL				
	WRetVIv.Is Auto					
⊡- IN2	Insert Function					
			,			
	Insert Comma	nd	<u> </u>			-
	Insert Status		>	<this object=""></this>	>	
	Insert Languag	e Element	>	CWRetVIv	>	
	Paste		Ctrl+V	CWSupVlv	>	is Auto
						Is Closed
	Insert Input Delete input Apply		Go To	Help	H	Be Is Opened
<is auto=""> = (CW Close</is>	Delete input Apply	to	}	Help	H	
Close	Delete input Apply	to Dat	Go To	Help		
Close	Apply		Go To	J		
Close Condition (tech	Apply	Dat	Go To	J		
Close Condition (tech	Apply	Dat	Go To	J		
Close Condition (tech Condition (tech Condition (tech Con Con Con Con Con Con Con Con Con Con	Delete input Apply nological) - IS Au	Dat BOOL BOOL	Go To	J		
Close Condition (tech Condition (tech Condition (tech Con Con Con Con Con Con Con Con Con Con	Delete input Apply nological) - IS Au dition	Dat BOOL BOOL	Go To	J		
Condition (tech Con S Auto S A	Delete input Apply nological) - IS Au dition	Dat BOOL BOOL 0 BOOL	Go To	J		

Condition	Dat	Interconnection
∃… IS Auto	BOOL	
E-& AND		
	BOOL	
E Bo CWRetVIv.Is Auto		
Ġ- IN2	BOOL	
CWSupVIv.Is Auto	1	
rmula:		
ormula: IS Auto> = (CWRetVlv.Is Auto() & CW	SupVIv.Is Auto)())

Properties - All Valves Auto SBGS_Lib\S7 Pr	rogram(1)\Cool_EMT
General Condition (technological) Condition OS Comment	
1 <lsauto> TRUE</lsauto>	
Corresponding row in the "Condition" tab:	1 💌
Qose Apply ← ↑ ↓ → Print	Go to Help

Complete rest of the conditions as shown in the figures below.

- Condition: 2: "All Valves Open"

Condition (technolog	ical) - Al	I Valves Opened
Condition	Dat	Interconnection
□ All Valves Opened	BOOL	interconnection
B- & AND	BUUL	
E-IN1	BOOL	
CWRetVlv.lsOpened		
E- IN2	BOOL	
E BB CWSupVIv.IsOpened	0000	
1		
Formula:		
<all opened="" valves=""> = (CWRetVlv.IsOpene</all>	d() & CWS	SupVly.IsOpened())
1		
dian for the		the second secon
Close Apply		Go To Help

- Condition 3: "Timer Expired"

Condition	Dat	Interconnectio	n				
Please insert statu	Insert Function	,	D				
	Insert Status	•	<this object=""></this>	•	Characteristic	•	1
	Insert Language Element	+	CWRetVIv	•	ControlStrategy		
	Paste	Ctrl+V	CWSupVlv	-	Help	-	
					Sequence	•	
					Setpoint	•	
					SimaticBatch	•	
					StatelsEn	•	
mula:					StatelsState	- × .	
					Timer		IsTimerExpired
				-	Value	•	IsTimerRunning

Condition	Data type	Interconnection	
⊟- IsTimerExpired	BOOL		
B box IsTimerExpired			
⊟− TimerName	TIMER_OBJECT	T_Duration	-
iormula:			

- Condition 4: "All Valves Closed"

Condition (technolo	gical) - /	All Valves Closed
Condition	Dat	Interconnection
E- All Valves Closed	BOOL	
E-& AND		
P− IN1	BOOL	
CWRetVIv.IsClosed		
Ė− IN2	BOOL	
CWSupVIv.IsClosed		
Formula:		
<all closed="" valves=""> = (CWRetViv.IsClosed</all>	() & CWSu	pViv.IsClosed())

Open properties SFC type and select AS operating parameter tab.

Pro	operties SFC type
General AS Operating Parameters Option	s Version
Step control mo <u>d</u> e:	Operating mode:
 Command output Cyclic operation Time monitoring 	SFC startup after CPU restart Initialize SFC Retain SFC state
Start options <u>A</u> utostart Use default operating parameters whe	en S <u>F</u> C chart starts
ОК	Cancel Help

In SFC Type Properties, in "AS Operating Parameters" tab set Operating Mode to Auto, in Options tab set WinCC block icon to value 2:

	Properties SFC	C type	X
General AS Operating Parameters	Options Version	\searrow	
SIMATIC BATCH <u>Category</u> None	•	Allow operator instructions	
Derived from interface:	_		
WinCC			
Create block icon:	2		
SIMATIC IT			
Control strategy selection			
ОК		Cancel	Help

7.4 Creating Equipment Phase Type in Master Data Library

Overview

EPHT is responsible for acquiring and controlling of the generic equipment modules used by this recipe phase and for transfer of the parameters from SIMATIC BATCH to EMT and vice versa.

For more information on "generic equipment modules" refer: Task definition and implementation concept for "Cooling" (Page 193)

Prerequisite

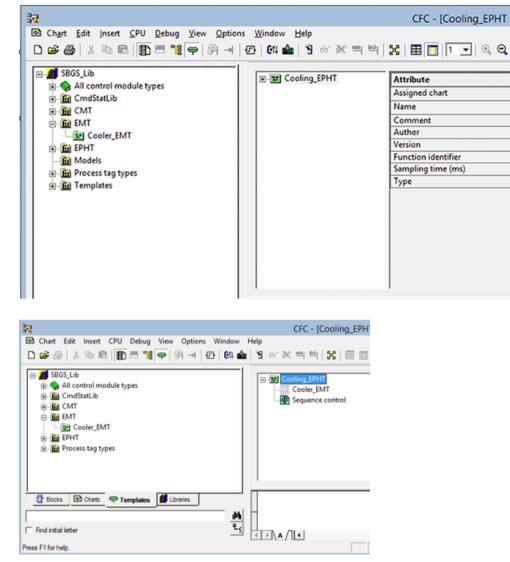
• Plant view is activated

Procedure

To create a new Equipment Phase Type (EPHT)

- 1. Open your edited BATCH Getting Started project "SBGS_MP" in "SIMATIC Manager".
- 2. Right-click the "SBGS_Lib" Master Data Library and select Insert New Object > Hierarchy Folder. The "Process cell(...)" folder is created.
- 3. Rename the "Process cell(...)" folder to "EPHT".
- 4. Right-click the "EPHT" in Master Data Library and select **Insert New Object > Equipment Phase (Type).** The EPHT is created, rename the default name EPH to "Cooling_EPHT".
- 5. Open the Cooling_EPHT; Rename the EPHT Block to "Cooling_EPHT". This name will be visible later on your OS. To change the EPHT Block name, double click on the block header; enter "Cooling_EPHT" into the name field. To change the SFC type name, select "Open SFC Type" from context menu of the "Cooling_EPHT" block; in "SFC" menu, select "Properties" and you can find "Cooling_EPHT" in the name field.
- 6. Change the Sampling time to 1000 ms.

7. From the "Template" tab of the catalogue, drag & drop the EMT "Cooler_EMT" to "Cooling_EPHT":



8. Insert Equipment Module Assignment: Right click on Cooling_EPHT, from context menu select "Insert New Object > Equipment Module Assignment":

		(CFC - [Cooling_EPHT SBGS_Lib\EPHT]
& ≫ = ₩ 5	⊈ ■ • •, •	9. 🖷 🗖 🕅 🏘	
Cooling_EPHT	Attri	oute	Attribute value
EN	Insert New Object	•	Control Module
Sequence	Copy as path		Control Module (Basic Requirement)
	Сору	Ctrl+C	Equipment Module
	Delete Element	Del	Equipment Phase
	Convert to Equipment M	odule	Parameter
	Samp	ling time (ms)	Signal
	Туре		Message
			Control Module Assignment
			Equipment Module Assignment
		_	

9. Rename the Equipment Module Assignment "Role" to "Cooler" and assign the role by drag and drop of "Cooler_EMT" onto the role "Cooler", or alternatively select role "Cooler" and from dropdown list of Attribute "Assigned equipment module" select Attribute value "Cooler_EMT":

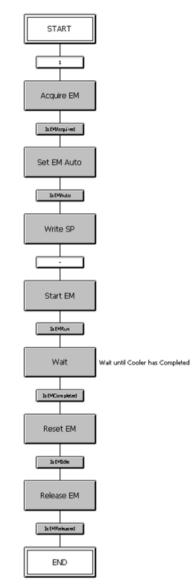
		CFC - [Cooling_EPHT SBGS_Lib\EPHT]
w Help		
🌢 🎖 er 🛪 = 백 🔀 🔳 🗉	💽 🍳 🤤 🖷 🔳 📋	\?
Cooling_EPHT	Attribute	Attribute value
- Cooler_EMT	Assigned chart	
- Cooler_EMT (Cooler)	Name	Cooling_EPHT
- 🕂 Sequence control	Comment	
	Author	
	Version	
	Function identifier	
	Sampling time (ms)	1000
	Type	Cooling_EPHT

10. Open the SFC type "Cooling_EPHT"

11. Create a set point "Duration" and set the values according to the following table.

Set point	Initial value	Low limit	High limit	Data type
Duration	10.0	10.0	600.0	Real

12. Design the EPHT according to the following image: EPHT is used to control EMT, transfer the SP to the EMT and to receive the actual value from the EMT.



- 13. To control EMs or perform actions on EMs, suitable commands need to be passed and actual values and set points need to be exchanged between EPHT and EMT
 - Acquire EM

Close

Apply

To add an action to the step "Acquire EM", open this step, switch to the "Actions (technological)" tab click on the pencil symbol

From the context menu select "Insert Command > Cooler > EM_Acquire > EMAQAcquire" and select Type "Now" from drop down list:

Cition Dat Interconnection and or language element Insert Function Insert Command Cooler Insert Status Cooler EM.Acquire # EMAQAcquire! Paste Ctrl+V EM.Setpoint # EMAQAcquire! Paste Ctrl+V EM.State > SetEMAQAcquire! SetEMAQAcquire! SetEMAQAcquire! # SetEMAQAcquire! Actions (technological) - Cooler EMAQAcquire X B- Cooler EMAQAcquire X B- Cooler EMAQAcquire Y B- Cooler EMAQAcquire Y B- Type BYTE Now	Actions (ter Actions (ter Cooler EMAQAcquire ⊟- Cooler EMAQAcquire ⊡- 2 Cooler EMAQA	nin Insert Functio Insert Commu Insert Status Insert Langua Paste	n and ge Element I) - Cooler I	Ctrl+V	Cooler		EM_Parameter EM_Setpoint	,	2 E) 2 E) 2 E) 2 Se 2 Se	MAQAcquireld MAQAcquireL MRelease etEMAQAcquireld etEMAQPriority
Insert Function Insert Command Insert Status Cooler Insert Language Element Paste Ctrl+V EM_State EM_State EM_State EM_State EM_State SetEMAQAcquired SetEMAQAcquire SetEMAQAcquire SetEMAQAcquire SetEMAQAcquire SetEMAQAcquire SetEMAQAcquire SetEMAQAcquire SetEMAQAcquire SetEMAQAcquire Cooler EMAQAcquire	Actions (ter Action Cooler EMAQAcquire Cooler.EMAQA	Insert Functio Insert Commu Insert Status Insert Langua Paste	ge Element	Ctrl+V	Cooler		EM_Parameter EM_Setpoint	,	2 E) 2 E) 2 E) 2 Se 2 Se	MAQAcquireld MAQAcquireL MRelease etEMAQAcquireld etEMAQPriority
Insert Command <th< td=""><td>Action - Cooler EMAQAcquire - Cooler.EMAQA</td><td>Insert Commi Insert Status Insert Langua Paste hnological Dat</td><td>ge Element</td><td>Ctrl+V</td><td>Cooler</td><td></td><td>EM_Parameter EM_Setpoint</td><td>,</td><td>2 E) 2 E) 2 E) 2 Se 2 Se</td><td>MAQAcquireld MAQAcquireL MRelease etEMAQAcquireld etEMAQPriority</td></th<>	Action - Cooler EMAQAcquire - Cooler.EMAQA	Insert Commi Insert Status Insert Langua Paste hnological Dat	ge Element	Ctrl+V	Cooler		EM_Parameter EM_Setpoint	,	2 E) 2 E) 2 E) 2 Se 2 Se	MAQAcquireld MAQAcquireL MRelease etEMAQAcquireld etEMAQPriority
Insert Status Cooler EM_Acquire EM_Acquire EM_Acquire EM_DAcquire EM_Acquire SetEMAQAcquire SetEMAQAcquire Actions (technological) - Cooler EMAQAcquire SetEMAQAcquire SetEMAQAcquire SetEMAQAcquire SetEMAQAcquire SetEMAQAcquire Cooler EMAQAcquire Cooler EMAQAcquire Cooler EMAQAcquire Cooler EMAQAcquire Magnetic Set Set Set Set Set Set Set Set Set Set	Action - Cooler EMAQAcquire - Cooler.EMAQA	Insert Status Insert Langua Paste hnological Dat.	ge Element	Ctrl+V EMAQAcq	Cooler		EM_Parameter EM_Setpoint	,	2 E) 2 E) 2 E) 2 Se 2 Se	MAQAcquireld MAQAcquireL MRelease etEMAQAcquireld etEMAQPriority
Insert Language Element Paste Ctrl+V EM_Setpoint EM_Setpoint EM_State > SetEMAQAcquired > SetEMAQAcquire > Cooler EMAQAcquire > Cooler EMAQAcquire >	Action - Cooler EMAQAcquire - A Cooler.EMAQA	Insert Langua Paste hnological Dat) - Cooler I	Ctrl+V EMAQAcq	uire		EM_Parameter EM_Setpoint	,	2 E) 2 E) 2 E) 2 Se 2 Se	MAQAcquireld MAQAcquireL MRelease etEMAQAcquireld etEMAQPriority
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Paste Ctrl+V EM_Setpoint 2 EM_State 2 SetEMAQAcquire 2 Actions (technological) - Cooler EMAQAcquire X Action Dat Interconnection 3 B- Cooler EMAQAcquire YOID B- Cooler EMAQAcquire YOID	Action - Cooler EMAQAcquire - A Cooler.EMAQA	hnological	-	EMAQAcq		ľ			2 E) 2 Se 2 Se	MRelease etEMAQAcquireld etEMAQPriority
Actions (technological) - Cooler EMAQAcquire × Actions (technological) - Cooler EMAQAcquire × SetEMAQWaitTmMax	Action - Cooler EMAQAcquire - M Cooler.EMAQA	Dat.	-			ĺ	EM_State	•	🧷 Se	etEMAQPriority
Actions (technological) - Cooler EMAQAcquire	Action - Cooler EMAQAcquire - A Cooler.EMAQA	Dat.	-							
Actions (technological) - Cooler EMAQAcquire	Action - Cooler EMAQAcquire - 2 Cooler.EMAQA	Dat.	-						2 54	etEMAQWaitTmMax
Action Dat Interconnection B- Cooler EMAQAcquire VOID B- & Cooler.EMAQAcquire VOID	Action ⊡- Cooler EMAQAcquire ⊡- & Cooler.EMAQA	Dat.	-							
Action Dat Interconnection B- Cooler EMAQAcquire VOID B- X Cooler.EMAQAcquire VOID	Action - Cooler EMAQAcquire - A Cooler.EMAQA	Dat.	-							
Action Dat Interconnection B- Cooler EMAQAcquire VOID B- & Cooler.EMAQAcquire VOID	Action - Cooler EMAQAcquire - Cooler.EMAQA	Dat.	-							
Action Dat Interconnection B- Cooler EMAQAcquire VOID B- X Cooler.EMAQAcquire VOID	Action - Cooler EMAQAcquire - Cooler.EMAQA	Dat.	-							
Action Dat Interconnection B- Cooler EMAQAcquire VOID B- & Cooler.EMAQAcquire VOID	Action - Cooler EMAQAcquire - Cooler.EMAQA	Dat.	-							
Action Dat Interconnection Cooler EMAQAcquire VOID P. Cooler.EMAQAcquire	Action - Cooler EMAQAcquire - Cooler.EMAQA	Dat.	-							
Action Dat Interconnection B- Cooler EMAQAcquire VOID B- & Cooler.EMAQAcquire VOID	Action - Cooler EMAQAcquire - Cooler.EMAQA	Dat.	-							
Action Dat Interconnection ⊡ Cooler EMAQAcquire VOID □ - A Cooler.EMAQAcquire VOID	Action - Cooler EMAQAcquire - 2 Cooler.EMAQA	Dat.	-			1				
E- Cooler EMAQAcquire VOID □- Cooler.EMAQAcquire	E- Cooler EMAQAcquire			Interconne	ction					
E- Cooler EMAQAcquire VOID □- Cooler.EMAQAcquire	E- Cooler EMAQAcquire			Interconne	ection					
E - Cooler.EMAQAcquire	E 🖉 Cooler.EMAQA	VOID								
			·							
E Type BYTE Now	⊟⊢Туре									
		BYTE	Now		<u>•</u>					
	Formula:									
rm da:										
	<cooler emaqacquire=""> = Co</cooler>									

Help

Complete the remaining steps according to the figures below:

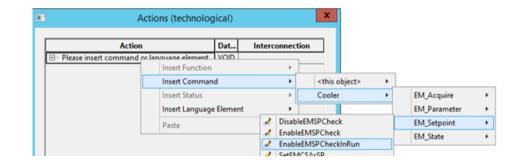
- "Set EM Auto".

Action	10	Dat	Interconnection							
Please insert command or language e			inter connection							
		Inse	ert Function							
		Inse	ert Command	•	<this object=""></this>	•				
		Inse	rt Status	>	Cooler	•	EM_Acq	uire	•	
		Inse	ert Language Element	•			EM_Para	meter	•	
		Past	te	Ctrl+V			EM_Setp		÷.,	
							EM_State		•	ResetEMU
										SetEMAD
										SetEMCo
										SetEMHo
rmula:										 SetEMRe SetEMRe
										 SetEMRes
										SetEMSta
										🖌 SetEMSta
										SetEMSto
	ochnolo Dat	ogica	I) - SetEMAuto	ion	×					
Action	Dat	ogica		ion	×					
Action		ogica		on						
Action	Dat	ogica		ion	×					
Action	Dat	ogica		ion	×					
Action	Dat	ogica		ion	×					
Action	Dat	ogica		ion	×					
Action	Dat	ogica		ion	×					
Action	Dat	ogica		ion	×					
Action	Dat	ogica		ion	×					
Action	Dat	ogica		ion	×					
Action - SetEMAuto Cooler.SetEMAuto	Dat	ogica		ion						
Action - SetEMAuto - ?? Cooler.SetEMAuto Formula:	Dat	ogica		ion						
Action - SetEMAuto Cooler.SetEMAuto	Dat	ogica		ion						
Action - SetEMAuto - ?? Cooler.SetEMAuto Formula:	Dat	ogica		ion	×					
Action - SetEMAuto - ?? Cooler.SetEMAuto Formula:	Dat	ogica		ion						

 "Write SP": In this set point step we need to perform multiple actions. The following actions are performed.

Actions (1	technological)			x				
Action	Dat	Interconn	ection	1				
Please insert command or langu	Insert Function	1	+	1				
	Insert Comma	nd	•		<this object=""></this>	•		
	Insert Status		÷		Cooler	•	EM_Acquire	•
	Insert Languag	e Element					EM_Parameter	•
	Paste		2 Disab	leEM	SPCheck		EM_Setpoint	•
					SPCheck		EM State	•
					SPCheckInRun	-	-	
			🖌 SetEN	ICSA	sSP			

Actions (technological)) - Coo	ler EnableEMSPChec	k ×
Action	Dat	Interconnectio	n
E- Cooler EnableEMSPCheck	VOID		
Cooler.EnableEMSPCheck			
J			
Formula:			
<cooler enableemspcheck=""> = Cooler.Enal</cooler>	bleEMSP	Check()	
Glose Apply		<u>G</u> o To	Help



	Actions (technological) - Cool	er Enab	leEMSPCheckInRun
	Action	Dat	Interconnection
	Cooler EnableEMSPCheckInRun	VOID	
	E Cooler.EnableEMSPCheckInRun		
Ì	 Formula: <cooler enableemspcheddinrun=""> = Cooler.Enal</cooler>		herkinDun()
		muur talf tu	
ļ	<u>C</u> lose Apply		<u>Go</u> To Help

Actions (technolog	jical)			×			
Action	Dat	Interc	onnec	tion			
Please insert command or language element Insert Function			•	<u> </u>			
Insert Comman	d		•	<this object<="" th=""><th>b →</th><th></th><th></th></this>	b →		
Insert Status			+	Cooler	•	EM_Acquire	•
Insert Language	Element		<u> </u>			EM_Parameter	
Paste		1		leEMSPCheck	[EM_Setpoint	•
		- 1		eEMSPCheck eEMSPCheckInRu	_	EM_State	•
		- 5		ICSAsSP	/m		
		2	SetEN	ControlStrategy			
1		2		/SPBool			
Formula:		2		ISPDEST			
		- 1		/SPDInt /SPInt			
		5	SetEN				
		- 0		ISPPO			
		2		ISPReal			
Ciner Apply		. 2	SetEN	ISPSOURCE			

Characteristics to Cooling_EPH D Characteristics - D Control strategies - D Setpoints - D Process values		ts Of: 'Characteristics'/Setpoints' Name Display name Duration Duration	Data type REAL	I/O name Duration	Comment	Low li 10.0	mit Initial valu 10.0	e High limit 600.0	
Actions (technol	ogical) -	Cooler SetEMSPReal	X			Select C	onnection		
Action	Data type	Interconnection		Name Duration HL	Data type REAL	1/0	Comment High Limit		
B- Cooler SetEMSPReal B- A Cooler SetEMSPReal Cooler SetEMSPReal B- Value	VOID SETPOINT REAL	Cooler.Duration		Duration_LL Duration_Al Duration_CS Duration_ENOPP Duration_OPP Duration_OPP Duration_OPP Duration_AD Duration_QP Duration_QP Duration_ERR		N N N N UN_UN N UN_UN N UN_N T UU T UU T	Low Limit Setpoint Automatic I Actual Value Input Enable Control Strate Enable Setpoint Ope Enable Setpoint Operator In Actual Value Output Active Setpoint Valid Setpoint Prepa Setpoint Input Error	egies sator Input sator Input Prepi put put put Prepare	
formula: <cooler setemspreal=""> = Cooler.Set</cooler>	EMSPReal(C	coler.Duration,);	_	ОК					

Action	Data type	Interconnection
B Cooler SetEMSPReal	VOID	
🖃 🚀 Cooler.SetEMSPReal		
E- Setpoint	SETPOINT	Cooler.Duration
Ė− Value	REAL	Duration_Q
ormula: :Cooler SetEMSPR.eal > = Cooler.Se	tEMSPReal (Co	oler.Duration, Duration_Q)

	Properties - Write SP SBGS_Lib\S7 Program(1)\Cooling_EPHT
Genera	Actions (echnological) Initialization Processing Termination
1	<cooler enableemspcheck=""></cooler>
2	<cooler enableemspcheckinrun=""></cooler>
3	<cooler setemspreal=""></cooler>
4	<u> </u>
5	<u>/</u>
6	
7	
8	<u> </u>
9	<u> </u>
10	/ - <u>/</u> -
0	se Apply ← ↑ ↓ → Brint

	Actions (technolog	ical)	×				
C. New law	Action		nnection				
Please inservice	t command or language element Insert Function	+ UID					
	Insert Command	•	<this object=""></this>	•			
	Insert Status	•	Cooler	•	EM_Acquire	•	
	Insert Language Eleme	nt 🕨			EM_Parameter	•	
	Paste	Ctrl+V			EM_Setpoint		
					EM_State	•	ResetEMAuto
							SetEMAbort
							SetEMAuto
							 SetEMComplete SetEMHold
ormula:							 SetEMReset
							SetEMRestart
							SetEMResume
							SetEMStart

Actions (tech	nnological)) - Cooler SetEMStart	×
Action	Dat	Interconnection	
Cooler SetEMStart	VOID	interconnection	
E- Cooler SetEMStart			
Cooler.SetEMIStart			
Formula:			
<cooler setemstart=""> = Cooler.S</cooler>	etEMStart()		
<u>C</u> lose Apply	1	<u>G</u> o To	Help

 "Wait": In order to get the elapsed time: Drag and drop "Cooler" from "Block contacts" on top of Value field, then the "Select Connection" window appears; select "Cooler_Duration_AO" and press OK.

Rename the action with a suitable name denoting the operation you want to perform. For example ReadElapsedTimeFromCooler.

aracteristics to Cooling_EPH	Cont	ents Of: 'Chara	cteristics\Block contacts'									
- D Setpoints	^	Name	Display name Bl		0 name	Comment						_
- Process values		Cooler	Cooler Co	coler_EMT Co	xoler :		_		_	-		_
- Control values - Control values		-										_
- DE BR memory	-								S	elect	Connection	
- D BR memory - D Timers		-					x	Name	Data type	11/0	Comment	-
- D Note texts		A 10	ctions (technologi	ical) - Keads	apsedim	metromCooler	<u> </u>	Cooler_AF_State	BYTE	IN	Acquire state	
- Block contacts	v							Cooler_AF_RegPrev	BYTE	IN	Previous request type	
A	hand a		Action	Data type		Interconnection		Cooler_AF_TimeStamp	DINT	IN	Request timestamp (Unix-Time)	
	_	E Read	ElapsedTimeFromCoo		-		_	Cooler_AF_WaitTmAct Cooler_POSIND	REAL	IN	Waiting time actual value [s] Position text number	
			SetActualValueNum				_	Cooler_OPTIPN0	INT	IN	Information text number for operator	
								Cooler_QCS	INT	IN	Current control strategy	
			- SetpointName		Duration		*	Cooler_Duration_AO	REAL	IN	Actual Value Output	
		6	- Value	REAL	+			Cooler_Duration_ERR	BOOL	IN	Setpoint Input Error	
								country a serie Car un				

Action	Data type	Interconnection
B ReadElapsedTimeFromCooler	VOID	
🖃 🚀 SetActuaIValueNum		
E SetpointName	SETPOINT	Duration
⊡ Value	REAL	Cooler_Duration_AO
rmula: ReadElapsedTimeFromCooler> = Set/	Actual Value Nu	m(Duration, Cooler_Duration_AO);

Action Please insert command or language element	VOID Insert Function					
Please insert command or language element						
	inserc runction					
	Insert Command	•	<this object=""></this>	•		
	Insert Status	+	Cooler	•	EM_Acquire	
	Insert Language Element	· • `			EM_Parameter	
	Paste	Ctrl+V			EM_Setpoint	
nda:		_	-		EM_State	ResetEMAuto SetEMAbort SetEMAuto SetEMAuto SetEMComplete SetEMHold SetEMReset SetEMRestart

Action	Dat	Interconne	ction
⊡ ResetEM	VOID		
Cooler.SetEMRese	et 🛛		
Formula: <resetem> = Cooler.SetEMRes</resetem>	set()		
	set()		
Formula: <resetem> = Cooler.SetEMRes</resetem>	set()		
	set()		

Action Please insert command or = [· · · · ·	-			
[Insert Function	· · · · ·				
(d 🔸				
	Insert Status		<this object=""> ></this>		_	
		•	Cooler +	EM_Acquire	• 4	
	Insert Languag	e Element		EM_Parameter	· 5	EMAQAcquireld EMAQAcquireL
	Paste	Ctrl+V		EM_Setpoint		EMRelease
				EM_State		SetEMAQAcquireld
						SetEMAQPriority
					1	SetEMAQWaitTmM
Action	Dat		Interconnection			
	Dat		Interconnection			
E- Cooler_EMRelease					_	
E / Cooler.EMR	elease					
ormula: :Cooler_EMRelease> = C	iooler.EMRelease	0;			_	

Now we have completed the steps, status or condition needs to be configured as follows: Example: Check whether EM is acquired > transition "IsEMAcquired":

 Open transition, switch to "Condition (technological)" tab, click on spectacle symbol, from context menu select "Insert Status > Cooler > EM_Acquire > IsEMAQOwner":

Condition		D-t	Interne	nection	_					
Condition E Please insert status of	rfunction	Dat	Intercor	inection						
		Insert Fu	unction	•	_					
		Insert Co	ommand	•						
		Insert St	atus	•	<this object=""></this>					
		Insert La	inguage Element	•	Cooler	•	EM_Acquire	•	80.	IsEMAQAvailable
		Paste		Ctrl+V			EM_Setpoint EM_State	;	10- 10- 10-	IsEMAQConfigError IsEMAQDeactivated IsEMAQNotAvailable
									00-	IsEMAQOwner
mula:					_				10 10 10	IsEMAQSnatched IsEMAQTimeout IsEMAQWaiting

Condition	Dat	Interconnec	tion
IsEMAcquired	BOOL		
Cooler.IsEMAQOv	vner		
formula:			
Formula:	400uper0		
Formula: <1sEMAcquired> = Cooler.1sEM	AQOwner()		
	AQOwner ()		
	AQOwner()		

- "IsEMAuto"

Formula:

Close

<Cooler IsEMAutomatic> = Cooler.IsEMAutomatic()

Apply

Condition	Dat	Interconnectio	n		
E- Please insert status or.	function BOOI		1		
	Insert Function	,			
	Insert Command	•			
	Insert Status	•	<this object=""></this>		
	Insert Language E	lement >	Cooler	•	EM_Acquire
	Paste	Ctrl+V			EM_Setpoint
		🚜 IsEMA	borted		EM_State
			borting		
			utomatic		
		A ISEMB	ompleted		
Formula:			ompleting		
		IsEMD			
		IsEMEr			
Condition (technological) -	Cooler IsEMAuto			
Condition	Dat.	interconin			
Condition	BOOL				
⊟- sEMAutomatic	BOOL				
	100000000000000000000000000000000000000				
⊟- sEMAutomatic	100000000000000000000000000000000000000				

<u>G</u>o To

Help

– "IsEMRun"

Formula:

⊈lose

<IsEMRun> = Cooler.IsEMRun()

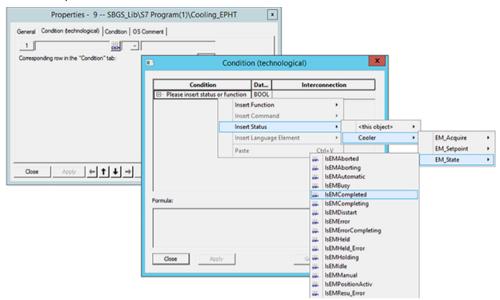
Apply

Please invoit struction BOOL Insert Function Insert Function Insert Strutus (M_Setpoint) (EM_Setpoint) (EM_Setpoint	Con	dition	Dat	Intere	onnection				
Insert Command Insert Language Element Cooler Paste Ctrl+V EM_State # IsEMAboried # IsEMAboring # IsEMAboring # IsEMAcompleting # IsEMCompleting # IsEMAtoring # IsEMAtoring # IsEMAtoring # IsE		status as fund	tion POOL			-			
Insert Status Insert Language Element Cooler EM_Steppint EM_State EMAborting EMAbo		Insert Funct	tion	•					
Insert Language Element Cooler Paste Ctrl+V EM_State # IsEMAborted # IsEMAborting # IsEMAborting # IsEMAborting # IsEMAborting # IsEMAborting # IsEMAborting # IsEMAborting # IsEMAborting # IsEMAcountic # IsEMAcountic # IsEMAted # IsEMAted # IsEMAted <t< td=""><td></td><td>Insert Comr</td><td>mand</td><td>•</td><td></td><td></td><td></td><td></td><td></td></t<>		Insert Comr	mand	•					
Paste Ctrl+V EM_State # IsEMAborted # IsEMAtomatic # IsEMAtomatic # IsEMAtomatic # IsEMAtomatomatomatomatomatomatom		Insert Status	5	•	<this object=""></this>	•			
Proce Condition Dat. Interconnection B- IsEMRun EMMain EMMain Condition Dat. Interconnection		Insert Lange	uage Element	•	Cooler	•	EM_Acquire	•	
EM_State # IsEMAboried # IsEMAboried # IsEMAboried # IsEMAcompleting # IsEMCompleting # IsEMCompleting # IsEMCompleting # IsEMAcompleting # IsEMAboried # IsEMAcompleting # IsEMAcompleting # IsEMAcompleting # IsEMAcompleting # IsEMAcompleting # IsEMAcompleting # IsEMAcompleting # IsEMAcompleting # IsEMAcoling # IsEMAcoling # IsEMAcoling # IsEMAcoling <td></td> <td>Paste</td> <td></td> <td>Ctrl+V</td> <td></td> <td></td> <td>EM_Setpoint</td> <td></td> <td></td>		Paste		Ctrl+V			EM_Setpoint		
mula: mula: mula:							EM_State	•	
mula: ## IsEMRcompleting ## IsEMCompleting ## IsEMCompleting ## IsEMCompleting ## IsEMEror ## IsEMTeror ## IsEMTeror ## IsEMTeror ## IsEMTeror </td <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>									
mula: # IsEMCompleted ## IsEMCompleting # IsEMCompleting ## IsEMTer # IsEMTer # IsEMTer # IsEMTer									
mula: ## IsEMCompleting ## IsEMCompleting ## IsEMCompleting ## IsEMEror ## IsEMEror ## IsEMHed ## IsEMHed ## IsEMHed ## IsEMHed ## IsEMMend ## IsEMMend ## IsEMMend ## IsEMMend ## IsEMMend ## IsEMMend ## IsEMResuming ## IsEMResuming ## IsEMResuming # IsEMResuming<									
Condition (technological) - IsEMRun Condition Dat Interconnection	er der								
Condition (technological) - IsEMRun Condition Dat. Interconnection	mula:					_			
Condition (technological) - IsEMRun Condition Dat Interconnection									
Close Apply Go To Help # IsEMHeld # IsEMAnual # IsEMResu.Error # IsEMRe									
Close Apply Go To Help ## IsEMHolding ## IsEMHolding ## IsEMHolding ## IsEMHolding ## IsEMHolding ## IsEMHolding ## IsEMHolding ## IsEMHolding ## IsEMHolding ## IsEMHolding ## IsEMHolding # IsEMResuming ## IsEMResuming ## IsEMRin # IsEMRin # IsEMRin Condition Dat. Interconnection ## ## ## B= IsEMRun # BOOL ## ## ##									22. IsEMHeld
Cose Apply Go To Help Pair IsEMMan Pair IsEMMan Pair IsEMMan Pair IsEMMan Condition (technological) - IsEMRun X Condition Dat. Interconnection B- IsEMRun BOOL									
Condition (technological) - IsEMRun Condition Dat. Interconnection - IsEMRun B- IsEMRun A ISEMRun									
Condition (technological) - IsEMRun Condition (technological) - IsEMRun Scondition Dat. Interconnection - IsEMRun B- IsEMRun BOOL	days.	Analy	1	C . 7	1	1			
Condition (technological) - IsEMRun Condition (technological) - IsEMRun B- IsEMRun B- IsEMRun BOOL	Close	Apply		Go To	Help				22. IsEMIdle
Condition (technological) - IsEMRun Condition Dat DistMRun B- IsEMRun BOOL	Close	Apply		Go To	Help				22. IsEMIdle 22. IsEMManual
Condition (technological) - IsEMRun Condition Dat. Interconnection B- IsEMRun BOOL	Close	Apply		Go To	Help				IsEMIdle IsEMManual IsEMPositionActiv
Condition (technological) - IsEMRun Condition Dat B-IsEMRun BOOL	Close	Apply		Go To	Help				IsEMIdle IsEMManual IsEMPositionActiv IsEMResu_Error
Condition (technological) - IsEMRun Condition Dat. Interconnection D-IsEMRun BOOL	Close	Apply		Go To	Help				IsEMIdle IsEMManual IsEMPositionActiv IsEMResu_Error IsEMResuming
IsEMRun BOOL	Close	Apply		Go To	Help				IsEMIdle IsEMManual IsEMPositionActiv IsEMResu_Error IsEMResuming IsEMRun
		Conditio		ical) - IsEM	Run	×			IsEMIdle IsEMManual IsEMPositionActiv IsEMResu_Error IsEMResuming IsEMRun
CoolerJsEMRun	Condit	Conditio	Dat	ical) - IsEM	Run	×			IsEMIdle IsEMManual IsEMPositionActiv IsEMResu_Error IsEMResuming IsEMRun
	Condit B- IsEMRun	Conditio	Dat	ical) - IsEM	Run	×			IsEMIdle IsEMManual IsEMPositionActiv IsEMResu_Error IsEMResuming IsEMRun
	Condit B- IsEMRun	Conditio	Dat	ical) - IsEM	Run	×			IsEMIdle IsEMManual IsEMPositionActiv IsEMResu_Error IsEMResuming IsEMRun
	Condit B- IsEMRun	Conditio	Dat	ical) - IsEM	Run	×			IsEMIdle IsEMManual IsEMPositionActiv IsEMResu_Error IsEMResuming IsEMRun
	Condit B- IsEMRun	Conditio	Dat	ical) - IsEM	Run	×			IsEMIdle IsEMManual IsEMPositionActiv IsEMResu_Error IsEMResuming IsEMRun
	Condit B- IsEMRun	Conditio	Dat	ical) - IsEM	Run				IsEMIdle IsEMManual IsEMPositionActiv IsEMResu_Error IsEMResuming IsEMRun
	Condit B- IsEMRun	Conditio	Dat	ical) - IsEM	Run	×			IsEMIdle IsEMManual IsEMPositionActiv IsEMResu_Error IsEMResuming IsEMRun

Go To

Help

- "IsEMCompleted"



Condition (techn	ologica	al) - IsEMCompleted	×
Condition	Dat	Interconnection	
E- IsEMCompleted	BOOL	Interconnection	
Cooler.IsEMCompleted	800L		
Contraction preced			
1			
Formula:			
<isemcompleted> = Cooler.IsEMCompl</isemcompleted>	leted()		
Close Apply		Go To	Help
		2010	

- "IsEMIdle"

Properties - 9 SBGS_Lib\S7	Program(1)\Cooling_EPHT	x		
General Condition (technological) Condition OS Com				
		1		
Corresponding row in the "Condition" tab:				
Corresponding row in the Condition tab.	Conditi	on (technological)	×	
	6 m			
	Condition	Dat Interconr		
		Insert Function	• —	
		Insert Command Insert Status	this object>	
		Insert Language Element	Cooler	EM_Acquire >
		Paste	Ctrl+V	EM_Setpoint
	L	10000	55. IsEMAborted	EM_State +
			IsEMAborting	
			IsEMAutomatic IsEMBusy	
			38. IsEMCompleted	
	Formula:		33. IsEMCompleting	
			UsEMDisstart	
			3. IsEMErrorCompleting	
			a. IsEMHeld	
]		IsEMHeld_Error IsEMHolding	
	Close Apply	Go To	66- IsEMIdle	
			a IsEMManual	
			3. IsEMPositionActiv	
	Condition (technological) - C	ooler IsEMIdle		
E- ISEM		Interconnection		
0.00	Cooler.IsEMIdle			
Formula:				
<cooler is<="" th=""><th>sEMIdle> = Cooler.IsEMIdle()</th><th></th><th></th><th></th></cooler>	sEMIdle> = Cooler.IsEMIdle()			
Qose	Agply	Go To Help		
		lis		

 "IsEMReleased": In this Status we need to check whether "Cooling_EPHT" is not owner of this EM anymore:

Condition	Dat	Interconnection		
Please insert status or function	BOOL		_	
	Ins	sert Function	X	ABS
	Ins	sert Command	+	ADD
	Ins	sert Status	8	AND
	Ins	sert Language Element	4	
			>=	EQ GE
	Pa	ste Ctrl+V	-5	GT
				LE
			1	LT
			*	MUL
			48	NAND
ormula:			0	NE
				NEG
			31Þ	NOR

E-I> NOT	OOL							
E-IN R								
	001							
1	nsert Function	· · · ·						
1	nsert Command	• _						
1	nsert Status	•	<this object=""></this>	•				
1	nsert Language Element	•	Cooler	•	EM_Acquire	•	60-	IsEMAQAvailable
1	Paste	Ctrl+V		-	EM_Setpoint	•		IsEMAQConfigError
					EM_State		60-	IsEMAQDeactivated
	nsert Input				and and		60-	IsEMAQNotAvailable IsEMAQOwner

Condition Dat Interconnection	
C 1 5110 1 1 1	
E- Is EM Released BOOL	
E-I- NOT	
E-IN BOOL	
Cooler.IsEMAQOwner	
Formula:	
<is em="" released=""> = (NOT Cooler.IsEMAQOwner())</is>	
1	
Gose Apply Go To Help	>

14. For usage of the "Cooling_EPHT" within SIMATIC BATCH recipes, a separate Interface SFC type can be created in the MDL, just providing the characteristics (control strategies, set points etc.), but no sequence logic. This SFC with type "EPH (interface)" calls the EPH with type "EPH (derived)", providing the sequence logic.

To do so, create a new SFC Type (EPH) in the chart folder (Component view) of the MDL and rename it to "Cooling" (this name will be listed in the SIMATIC BATCH recipe). Under properties of SFC type (EPH) options tab, set Category to "EPH (interface)", for "Create block icon" select value 2:

From "AS Operating Parameters" tab set "Operating mode" to "Auto".

Properties SF	C type	x
General AS Operating Parameters Options Version		
SIMATIC BATCH <u>Category EPH (interface) Cerived from interface: </u>	Allow operator instructions	
WinCC Create block icon: 2		
SIMATIC IT		
Control strategy selection		
ок	Cancel Help	

7.4 Creating Equipment Phase Type in Master Data Library

- 15. In SFC type "Cooling", create a new Set point "Duration" with Data type as real, Initial value and Low limit = 10 and High limit = 600.
- 16. Open the Properties of your previously created EPHT "Cooling_EPHT" in the MDL In the "AS Operating Parameters" tab, set Operating mode to "AUTO".
 In the "Options" tab set Category to "EPH (derived)" and in "Derived from interface" select "Cooling"; for "WinCC Create block icon" enter value '2' in order to create a block icon in OS.

Properties SFC type	x
General AS Operating Parameters Options Version	
SIMATIC BATCH Category EPH (derived) Derived from interface:	
WinCC Create block icon:	
SIMATIC IT	
Control strategy selection	
OK Cancel Hel	

Note

In real projects, sequences for Abort, Hold and Stop are to be implemented normally, e.g. Abort/ Hold/Stop will NOT be propagated automatically from EPHT to EMT, so EMT doesn't care about any Abort/Hold/Stop command to the calling recipe phase. Programming can be quite extensive! Same is not shown in this example.

7.5 Instantiating the CMT, EMT & EPHT in the Project

Overview

After creation of the required CMT, EMT and EPHT, these need to be instantiated in the Hierarchy folder of the Multiproject. In this section we will learn how to instantiate and configure these objects for control from SIMATIC BATCH.

Prerequisite

• Plant view is activated

Procedure

To instantiate the CMT/EMT/EPHT, just copy & paste the object or drag & drop from Master Data Library into Hierarchy folder of unit and rename the instances.

To Instantiate follow these steps:

- 1. In the Plant View open your edited BATCH Getting Started project "SBGS_MP" in "SIMATIC Manager".
- 2. Expand the Process Cell Kitchen which is in the AS_Prj.
- 3. Right-click on "Pot_1"; select "Insert New Object > Hierarchy Folder" from context menu and rename the same as "Cooling". In the folder Properties, select "Equipment phase" in the "ISA-88 Type Definition" tab. Repeat this step for Pot_2 and Pot_3.
- 4. Copy two instances of "Valve_CMT" from Master Data Library into the Cooling Hierarchy folder of Pot_1, Pot_2 and Pot_3 and rename the same as "Potx_CW_Supply" & "Potx_CW_Return" (replace x with pot number).
- 5. Now copy "Cooler_EMT" from Master Data Library into the Cooling Hierarchy folder of Pot_1, Pot_2 and Pot_3 and rename the same to "Pot1_Cooler", "Pot2_Cooler" and "Pot3_Cooler".
- 6. Finally copy "Cooling_EPHT" from Master Data Library into the Cooling Hierarchy folder of Pot_1, Pot_2 and Pot_3 and rename the same to "Pot1_Cooling", "Pot2_Cooling" and "Pot3_Cooling".

7. Export the plant hierarchy from AS to OS so that required tags/pictures/faceplates are updated, to do the same

Right Click on Multiproject "SBGS_MP" > Plant Hierarchy > Update in the Multiproject, refer following image:

2			SIMATIC Manager - [SBG
😼 File Edit	Insert PLC View Options Window Help)	
D 💣 🔐 🕯			3 < No Filter > 🔄 🏏 🕅 🗟 🎯 🔁 🖬
E SBGS MF E AS_P E AS_D E AS OS_P E SBGS	Cut Ctri Copy Ctri Paste Ctri	+C	age UNC path Path on 'Computer' Compu
	Plant Hierarchy	•	Settings
	Process Tags Models	•	Check Consistency Open Check Log
	SIMATIC BATCH Rename	• F2	Create/Update Block Icons Open Block Icons Log
	Object Properties Alt+Rete	ILU	Cancel Assignment
			Create/update diagnostic screens Ctrl+Alt+D Display Diagnostic Screens Log Advanced Diagnostics Settings Ctrl+Alt+W Configured Objects
			Update in the Multiproject
			Clear Shortcut

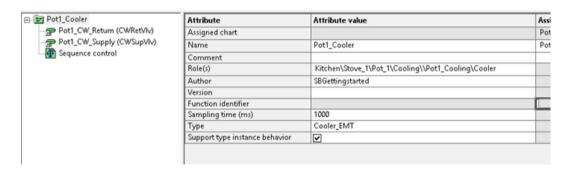
Plant Hierarchy - Update in Multiproject
 Merge the PH of all projects in the multiproject Export the PH of one project in other projects Select the project to be used as a template:
OK Cancel Help

Plant Hierarchy - Update in Multiproject (Target Projects)
Select the projects into which the PH is to be exported:
Image: Prij
OK Cancel Help

8. Open the EM from Project hierarchy folder

In our example open "Pot1_Cooler" and assign control modules for both valves of Pot_1; refresh the window by pressing F5 to see the connections:

Pot1_Cooler	Attribute	Attribute value	As
CWRetVIv	Assigned control module	Pot1_CW_Return	-
- P CWSupVlv	Role	Pot1_CW_Return	~
Sequence control	Comment	Pot1_CW_Supply	
		Pot2_CW_Return	=
		Pot2_CW_Supply	-
		Pot3_CW_Return Pot3_CW_Supply	*



9. To have the Batch information to CMs, we need to wire the following connections. Set following pins to visible in both EM and CMs (Valve block)* and connect the pins according to the following table; repeat the steps for all CMs and all EMs.

EMT			CMT(VALVE)		
QOCCUPIED			Occupied		
QBA_ID			BatchID		
QBA_NA		BatchNam			
QSTEP NO		StepNo			
QBA_EN			BatchEN		
1000 Cooler_EMT Cooler_EMT Cooler_EMT Cooler_EMT Cooler_EMT Cooler_EMT Cooler_EMT Cooler_EMT Cooler_EMT Cooler_ENT Cooler_T_Durati Cooler_T_Durati Cooler_T_Durati Cooler_T_Durati Cooler_T_Durati	RESU_ERR ABORTING ABORTED STOPPING STOPPED O_ERR LI_ERR EXEG T_OPRQG S_ERRG T_ORQG S_ERRG QCCUPIE QBA_ID QBA_ID QBA_EN QCS		3.0 MonTiSta 3.0 MonTiDyn 1 MonSafeP RetLi Permit 1 Protect 0 CtriChnS BatchID BatchID BatchID Cocupied 0 Cocupied	Function identifier Location identifier Sampling time (ms) Basic requirement Type Support type instance behavior < Ⅲ	1000 Valve_C

Note

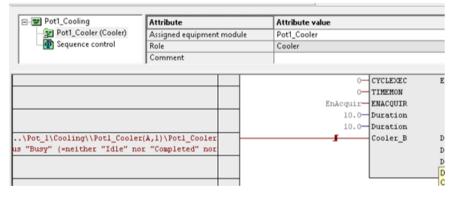
This could also be done in the MDL and synchronized to the complete Multiproject (see PCS 7 Compendium Part C for details).

10. Repeat the steps number 8 and 9 for Pot_2 and Pot_3

			by) interface bi	i e type nonn			rioject churt io
5	SIMATIC Manage	r - (SBG	S_MP (Component Vi	ew) D:\User\Anil\I	POT\Latest	\25-Feb-2020\Comple	ted\SBGS_MP\SBGS_M
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11. Instantiate (Copy) Interface SFC-type from Library Chart folder to Project chart folder.

12. Open the EPHT "Pot1_Cooling" from Project hierarchy of Pot_1. Assign the Equipment Module Type Pot1_Cooler. Refresh the window, then connections between the EPH & EM are visible.



13. Repeat step 12 for Pot_2 and Pot_3

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🕀 😥 Stár								
E E Ventilate								

14. Completed project looks like the following image

15. After engineering of CMs, EMs & EPHs, we need to compile and download AS charts and compile the OS to reflect the same in the AS and OS.

16. Compile and Download the Batch data

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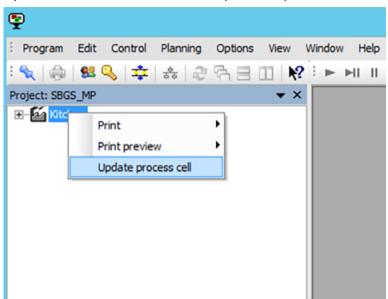
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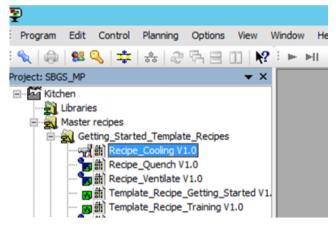
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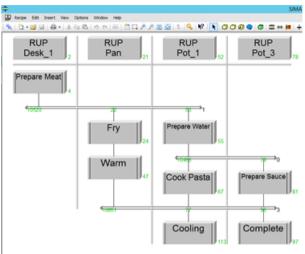


17. Open the BATCH Control Center and update the process Cell:

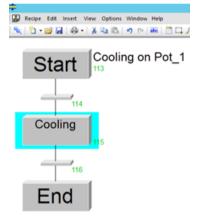
18. Open previously created "Recipe_Quench" and save as "Recipe_cooling"



19.Open the recipe "Recipe_cooling" and add new ROP under Pot_1, rename the same as "Cooling" and open it:

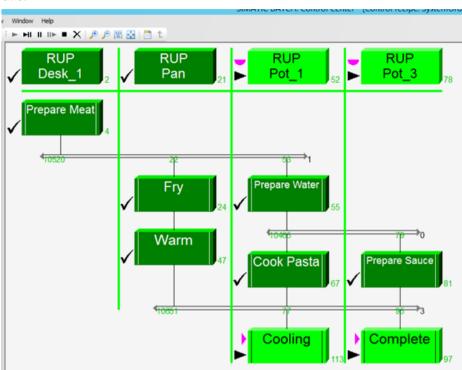


20. Within the ROP Cooling, add a Cooling phase and set the parameter "Duration" to 120 sec:



	Prop	erties of '	Cooling_115'		x
Transfer pa	arameters 🛔	Description terial	SIG SIG	Synchronization	
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ок			Print	Cancel Help	

- 21. Release the recipe for testing and create a new Batch, release and start it.
- 22. In WinCC and BATCH Control Center (BCC) the visualization of the running batch will look like this:



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Run		RUN					Т	~			
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