User Manual Flying Saw

applications & TOOLS

SIMOTION Flying Saw V1.4

SIEMENS

Application number: A4027118 -A0414

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Qualified personnel

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e.g.:

- Trained and authorized to energize and de-energize, ground and tag circuits and equipment according to applicable safety standards.
- Trained or instructed according to the latest safety standards in the care and use of the appropriate safety equipment.
- Trained in rendering first aid.

There is no explicit warning information in this documentation. However, reference is made to warning information and instructions in the Operating Instructions for the particular product.

Reference regarding export codes

AL: N

ECCN: N

Foreword

Standard SIMOTION application

A standard SIMOTION application comprises the following components:

- One or several software objects or code blocks with defined interfaces that can be simply integrated into other software projects – without requiring any significant programming – in order to fulfill a precisely defined technology task there. **(Core functions)**
- A software project based on a demonstration case to show the functionality and possible uses of the standard application - including the associated WinCCflex screen for demonstration. **(Demonstration project)**
- A document to describe the functionality, background information and handling of the standard application. Further, its use as demonstration model is explained. **(Description)**

Document structure

The documentation of this application is sub-divided into the following main section:

Section	Description	Note
A	Section A will provide you with everything that you require to obtain an overview of this standard application. This Section explains the prerequisites and the objective when using this application. Some of the uses of this standard application are explained as well as situations where this application cannot be used.	
B	Section B is interesting if you wish to use this standard application for demonstration purposes. Here, you are provided with information about how you can download this application from your PC/PG to the demonstration case step-by-step and how it then used.	
C	Section C provides you with all of the necessary steps to integrate the core functions of the standard application into your user project. Preparations and parameterizing operations are also explained. Further, you are also told how to integrate the core functions into your application step-by-step. In addition, tips are provided on how to use the core functions.	
D	Section D is interesting if you wish to expand/adapt the functionality of the core functions provided for your particular application.	
E	Section E “Appendix” provides you with detailed information including a detailed fault/error description, a description of a test program for the core standard application functions as well as references. A feedback sheet is also provided which you can use to give us your comments and suggestions on this document.	

List of contents

Section A: Prerequisites and objectives

Content

Section A will provide you with everything that you require to obtain an overview of this standard application. The prerequisites and the objective for using this standard application are presented.

The applications shown will give you a good understanding for what this standard application can be used for. Further, some applications will be listed for which this standard application cannot be used. In addition, the performance limits of this standard application will be shown.

Objective

Section A of this document should provide the user with the following information:

- The objective and purpose of this standard application
- List several applications
- Indicate the performance limits of this standard application.

Subjects discussed

Chap.	Title	Contents
1	Basic information	The necessary prerequisites to use the standard “flying saw” application. The use of this application. Software components and code blocks of the standard “flying saw” application.
2	Uses	Tasks and properties of the core functions of the standard “flying saw” application Exclusions and restrictions Hardware components required
3	Structure and function	Type of design and physical quantities for which the “flying saw” core function can be used. Type of cams that the “flying saw” core functions calculate and used. Operating states at the FlyingSaw FB.
4	Program environment and interfaces	Call environment of the FlyingSaw FB Description of the interfaces and the parameters of the FB_BGD_TEMPLATE_FlyingSaw()

1 Basic information

1.1 Prerequisites

1.1.1 Target group

The standard application is conceived for all programmers and users who wish to quickly and simply implement a flying saw using SIMOTION.

1.1.2 Knowledge base

In order to use this technology template, you should be able to use SCOUT and technology objects and technology function calls in SIMOTION.

This document does not provide an introduction into these subjects and is solely restricted to providing information and data on how to use this standard application.

1.1.3 Technical environment

This standard application can only be used, without having to make any changes, in conjunction with SIMOTION D and the SINAMICS demonstration case.

1.2 Objective and purpose of this standard application

1.2.1 Task description

Using SIMOTION, a material web, fed using the material feed mechanism is to be cut into identical parts and sections. As a result of the characteristics of the material, the material cannot be cut at once across the whole width of the web with just one cut. In order that the motion of the material web does not have an impact on the cut, either the material web must be stopped during the cut, or the cutting device must be moved in synchronism with the material web – i.e. the material web is cut "on the fly".

Why flying processing/machining?

"Flying" processing/machining is required, if

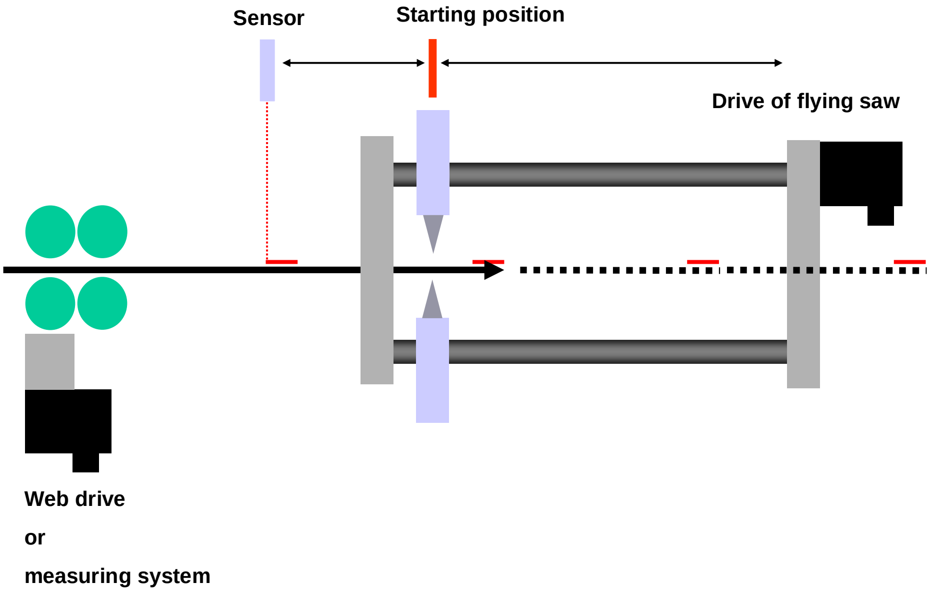
- If the flow of products were to be stopped due to a sub-process (generally a thermal process) this would result in a reduction in quality or even waste.
- Stopping the product flow cannot be justified as a result of the energy demand when decelerating and accelerating.
- The individual processing/machining steps are too different so that a standard delay time cannot be justified from a cost-effective perspective.

Principle design of a "flying saw"

The material is fed-in as an endless web (e.g. plastic, sheet steel or fiber board) using a conveyor belt that runs with a constant velocity.

The position of the cut on the material web is either sensed using a print mark using a sensor or is specified by the control after a cut length has been passed that can be adjusted. The synchronous position is simultaneously defined. From this point onwards, the shears slide of the flying saw synchronously follows the material at the position to be cut and the cut can be started. After the cut has been completed, the shears slide is returned to its starting position where it waits for the next cut position.

Fig. 1-1: Principle of operation of the “flying saw”



1.2.2 Solution using the standard “flying saw” application

The standard “flying saw” application discussed here can be used to implement such applications, and to develop a functioning "flying saw" as quickly as possible.

The standard application already includes, as core function, a pre-configured motion control of the flying saw axis. This can be adapted to the particular application using the appropriate parameters. The core function is responsible for completely controlling the flying saw axis.

The user program only has to control the material feed and to supply the core function with the correct parameters.

Additional function of the standard application

Further, using this standard application, after the material has been cut with the cutting device, a gap can be created between the individual cut pieces.

This function can also be set at the core function and commissioned by simply entering the appropriate parameters.

1.2.3 Advantages of the standard "flying saw" application

When the standard “flying saw” application is used, it offers users the following advantages:

Programs can be quickly generated

When the standard “flying saw” application is used, it is simple to quickly implement a "flying saw" functionality when programming with SIMOTION.

The core functions provided in the standard application can be transferred into the application to be generated quickly and simply by copying. The description of this standard application explains the additional configuring steps that are necessary.

Automatic motion control

The core functions of the standard “flying saw” application can be used to realize all of the flying saw axis motion control using SIMOTION technology functions. The user only programs a execution sequence that corresponds to the actual behavior of the machine function to be implemented.

Possibility of adaptation

The standard “flying saw” application includes all of the source codes in a commented form. This means that the existing core functions can be quickly and simply expanded by the user's own particular functions.

This description also provides you with an explanation of the background required to expand the core functions.

1.3 Components included in the standard application

The standard “flying saw” application is implemented as SIMOTION project.

It is a program that can be executed for a (demonstration) machine for the SIMOTION D and PC demonstration case with WinCCflex for visualization.

The program fulfills the following tasks:

- Operating mode manager for the complete (demonstration) machine
- The control of the (demonstration) machine
- The core functions of the "flying saw" functionality with absolute gearing
- All of the machine functions that are relevant for the demonstration case environment are simulated
- The (demonstration) machine is displayed on the WinCCflex screen

This means that the user immediately sees which program modules are required to implement his particular flying saw application; these program modules are sub-divided into program groups and are appropriately designated.

This means that the core functions of the standard “flying saw” application can be quickly and simply integrated into user projects.

2 Uses

2.1 Applications

2.1.1 Controls that are permitted

The standard “flying saw” application has only been tested for use in the following control system:

- SIMOTION D 435

However, it can also be used – without any significant additional costs – also in the SIMOTION P or SIMOTION C controls.

2.1.2 Tasks that can be implemented using the core functions

These core functions are used to control flying equipment and mechanisms to

- Cut
- Perforate
- Emboss
- Seal
- Saw
- Drill
- Paint
- etc.

The core “flying saw” function completely handles the motion control of the flying axis used for cutting/sawing. The functionality associated with the material feed is implemented outside the core functions in the user program.

Definition

In the following text, the **“flying saw”** term is used to represent all of the other conceivable machine versions.

The term **“saw”** is used for all parts of the machine where direct contact is made to the material when “cutting”.

2.1.3 Properties and features of the core “flying saw” functions

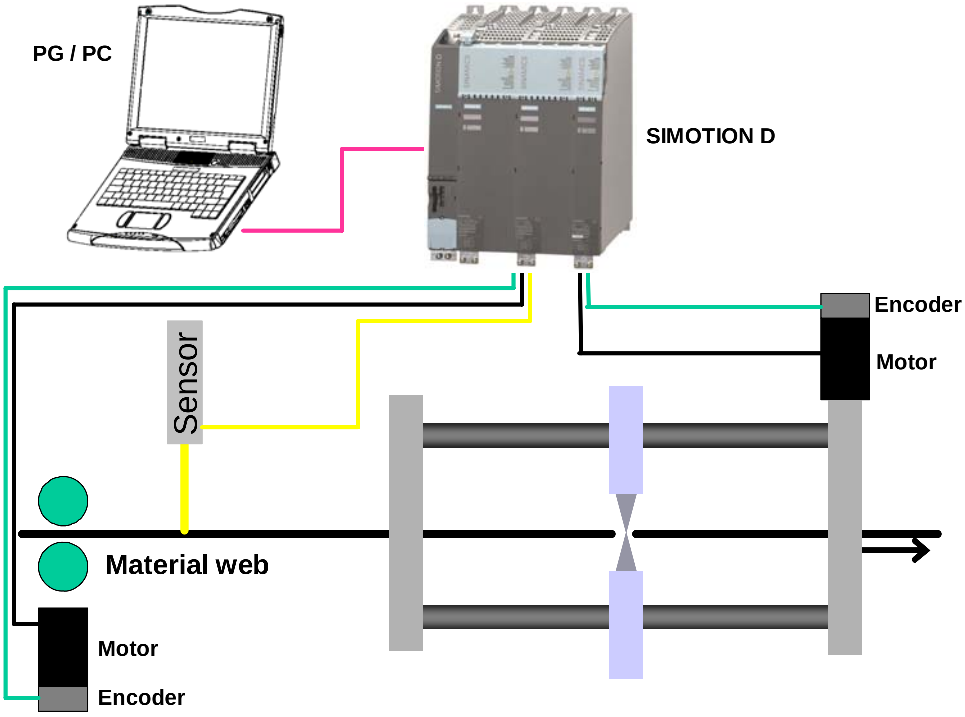
The following properties and features were taken into account when implementing the core functions, and can also be used in a user program that you generate yourself:

- **Precisely synchronizing at a specific position**
  The "flying" axis is accelerated to the velocity of the material web so that this reaches this velocity above a position on the material that can be specified.
- **Flying axis**
  The "flying" axis and the material move at the same velocity while sawing/cutting.
- **The starting position of the "flying" axis can be set**
  The starting position of the "flying" axis between two cuts can be set using a parameter at the core function.
- **"Cutting" at a print mark**
  The synchronous position is detected using a measuring probe and print mark.
- **"Cutting" to length**
  The synchronous position is calculated from the distance that the material has moved through.
- **Immediate cut**
  A cut is initiated by an operator function independently of the distance that the material has moved. (This function is only possible for "cut" to length!)
- **Creating a gap**
  After a cut has been made, the cutting unit additionally moves the cut material in the direction in which the material is moving until a certain distance is reached to the rest of the material. This distance can be specified. The cutting unit only returns to its starting position after this operation has been completed.
- **Asymptotic synchronizing**
  The “flying” axis is accelerated to the velocity of the material web without overshoot in velocity.
- **Gearing Ratio**
  Ratio between measured and effective velocity of the material web.

2.2 Application environment

The standard “flying saw” application can be used in the following hardware environment:

Fig. 2-1 Application environment of the standard “flying saw” application



SIMOTION D used to control the material feed of the material web and to control the "flying" axis.

3 Structure and function

3.1 Design of the "flying saw"

3.1.1 General design

The "flying saw", which is based on the "flying saw" core function comprises a spindle axis that is mounted on the cutting unit.

3.1.2 Physical quantities that can be parameterized

The following physical quantities of the “flying saw” (designations in white) are used in the “flying saw” core function:

Fig 3-1 Physical quantities for the standard “flying saw”

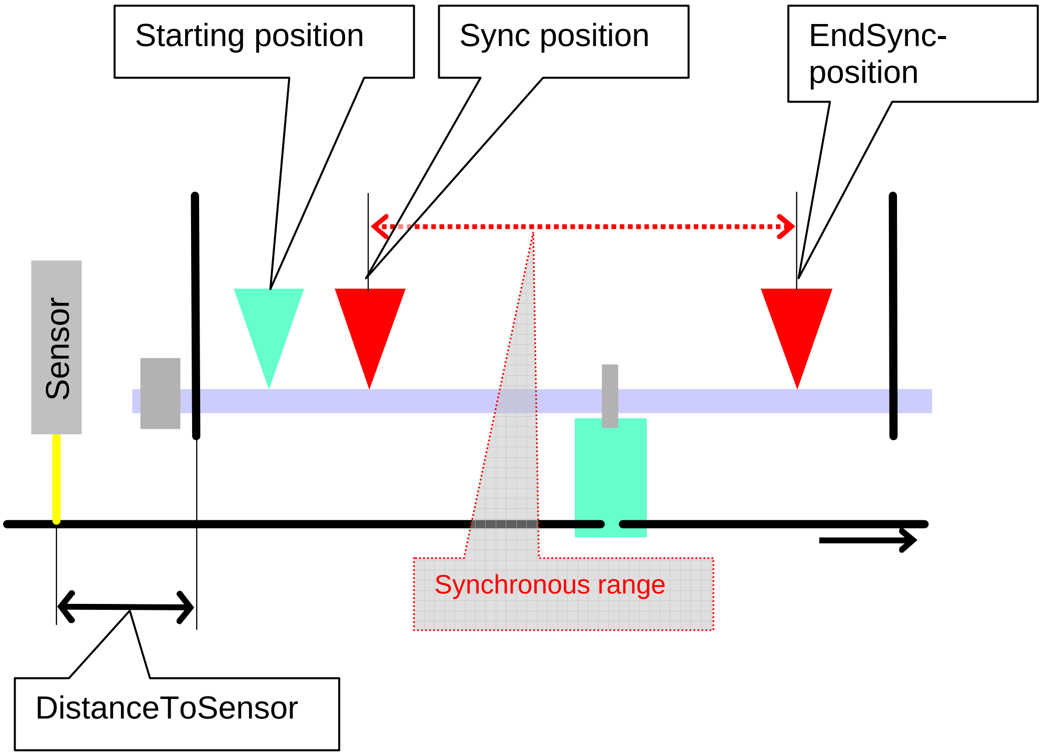


Table 3-1: Explanation of the parameterizable physical quantities

Physical quantity	Description
DistanceToSensor [mm]	Distance (clearance) between the axis zero of the "flying saw" and the sensor to sense the material and print mark
StartPos [mm]	Starting position of the cutting unit referred to the axis zero point of the "flying saw".
SyncPos [mm]	Position where the cutting unit reaches the specified material position and material velocity. Starting point of the synchronous range
EndSyncPos [mm]	End point of the synchronous range. If, at this particular position, sawing/cutting has still not been completed, then it is now interrupted.
EndPos [mm]	End point (end position) of the traversing range of the "flying saw" (software limit switch)
ToStartposVelocity [mm/s]	Velocity for travel to the starting position
ToBackposVelocity [mm/s]	Velocity with which the flying saw returns to its starting position
GapLength [mm]	Length of the gap after the cutting unit has made a cut. This gap is to be additionally created between the cut material and the material web.
GapVelocity [mm/s]	Superimposed velocity with which the gap is to be created
GearingRatio	Ratio between measured and effective velocity of the material web.
AccelerationCut [mm/s²]	Acceleration value for synchronization motion
AccelerationBack [mm/s²]	Acceleration value for positioning motion back to the starting position
AccelerationGap [mm/s²]	Acceleration value for the higher-level positioning to create the "gap"

Synchronous range

The synchronous range is located between **SyncPos** and the **EndSyncPos**. The material is cut within this range.

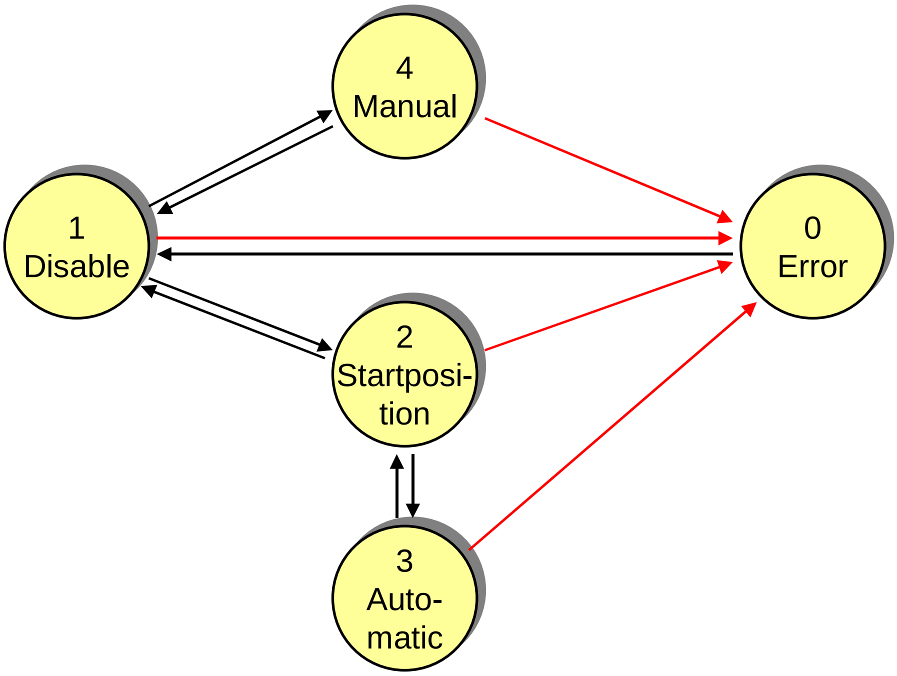
3.2 Operating states of the "FlyingSaw-FB"

The “FlyingSaw FB” automatically controls the “flying saw” axis to implement the required level of functionality.

This functionality is sub-divided into five operating states so that the sequences at the “flying saw” are implemented as a result of the states or also as a result of the transitions between the states.

This means the user only influences the “flying saw” by specifying the required operating mode with the required parameters.

Fig. 3-2 Operating modes



A differentiation is made between the following operating modes:

- **Error (0)**
  The “FlyingSaw FB” has detected an error and brought the flying saw axis into a safe state. The fault is still available and the user can evaluate it.
  The flying saw axis is stopped and is in the “disable” state.
- **Disable (1)**
  The “FlyingSaw FB” is already being used but is in the safety operating state. All of the faults/errors present have been successfully acknowledged.
  After a reset, the flying saw axis is in the disabled and stopped state.
- **Starting position (2)**
  The flying saw axis moves to the starting position or is located at the

starting position and is ready to synchronize to the material web.
The flying saw axis waits in the “enable” state.

- **Automatic (3)**
  The flying saw axis has been synchronized to the material web and cuts the material as specified.
- **Manual (4)**
  The flying saw axis is in the manual mode and the user can manually move the shaft.
  The flying saw axis waits in the “enable” state.

These operating modes are available to users to implement their "flying saw" functionality in a user program and can be signaled to the "FlyingSaw FB“ using input parameters.

The “FlyingSaw FB” indicates the currently reached status using an output parameter.

Section B: The application example as demonstration system

Contents

All of the necessary steps to commission the standard “flying saw” application as demonstration system are explained in Section B.

Preparations and parameterizing operations are also explained. Further, you are told how you can use the WinCCflex Pro man-machine interface (screen) of the application example step-by-step.

Objective

Section B of this document provides the reader with the following

- The prerequisites to use this standard SIMOTION application as demonstration system
- Preparations and parameterizing operations are explained
- Describes the steps necessary when presenting this standard application.
- Provides tips for using this standard application.

Subjects discussed

Chap.	Title	Contents
5	Installing the hardware and software	Safety information and instructions Components and their interconnections required for the presentation Installation of standard SIEMENS software Downloading the user program in SIMOTION D435 Downloading drive parameters in SINAMICS
6	Operator control of the application example	Brief instructions on how to use the demonstration system Detailed operating instructions

4 Installing the hardware and software

4.1 Regarding your safety

4.1.1 Safety information and instructions

Pictograms, signal words and text

Every piece of safety information/instruction in this document is designated by text graphics – comprising pictogram and signal word, and supplemented by explanatory text. A clear classification according to the degree of the potential hazard is provided as a result of the combination of pictogram and signal word. Safety information/instructions are provided in front of the information regarding activities to be executed.

Classification

There are **three different stages** regarding safety information/instructions. These are designated **by the same pictogram**. They differ by the signal word.

⚠ **Danger**

This safety information/instruction indicates an immediate hazard. If the information/instruction is not carefully followed, this results in severe bodily injury or even death.

⚠ **Warning**

This safety information/instruction indicates a potential hazard. If the information/instruction is not carefully followed, this can result in severe bodily injury or even death.

⚠ **Caution**

This safety information/instruction indicates a potentially hazardous situation, which can result in slight to average bodily injury. This pictogram/text word can also warn about potential material damage.

4.1.2 Responsibilities of the operator

Correct use

The correct use of the application components exclusively relates to the open-loop and closed-loop control of test set-ups that were adapted to the power/performance of the application components. In order that the application functions perfectly, the required standard SIMATIC components as well as also the necessary hardware and software components must be installed.

The company/person operating the system may only make changes to the application components after having received written authorization from the suppliers.

Misuse

The following are considered to be misuse:

- Inadmissible loads applied to the application components.
- Any application deviating from the use specified above, or applications that go beyond the specified use.
- Non-observance of the safety information and instructions.
- If faults that could have a negative impact on the safety are not immediately resolved/removed.
- Any changes/modifications to equipment/devices that are used to ensure perfect function and operation, unrestricted use as well as active or passive safety.
- If recommended hardware and software components are not used.
- If the application components are not in a perfect technical condition are not operated conscious of safety and hazards, and not taking into account all of the instructions provided in the documentation.

The manufacturer assumes no liability for incorrect use (misuse).

Responsible for monitoring

The company or person operating the system is responsible in continually monitoring the overall technical status of the application components (defects and damage that can be externally identified as well as changes in the operating behavior).

The company/person operating the system is responsible in ensuring that the application is only operated in a perfect state. He must check the state of the application components before they are used and must ensure that any defect is removed before commissioning.

Qualification of personnel

The operating company/person may only deploy trained, authorized and reliable personnel. In so doing, all safety regulations must be carefully observed.

Personnel must receive special instructions regarding the hazards/dangers that can occur.

4.2 Hardware structure and mounting/installation

Overview

Fig. 4-1 Hardware components (without power cable!)

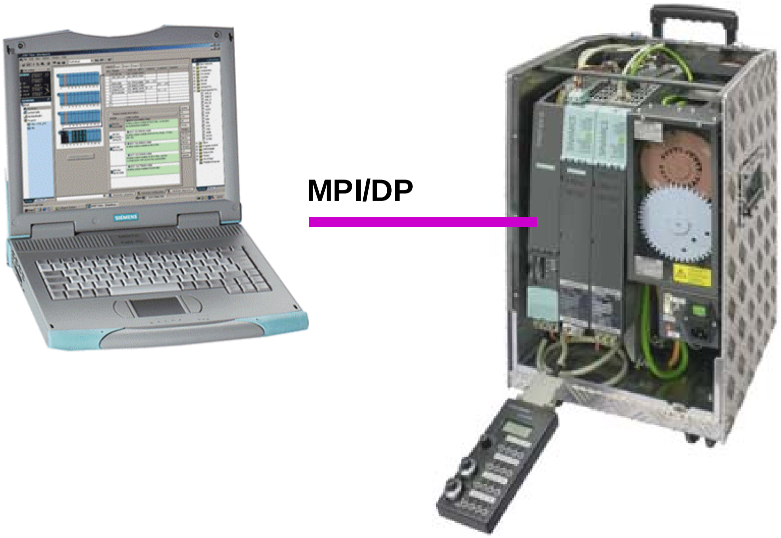
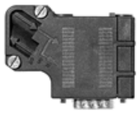


Table 4-1 Hardware components

Hardware element	Diagram	Order No./MLFB and functions
Training case, SIMOTION D435 with SINAMICS S120		
SIMOTION D demonstration and training case		6ZB2 470-0AE00 The SIMOTION D training case comprises standard components (SIMOTION D435, two SINAMICS axes with motors) and has two axes. These are used to demonstrate the application. The case is already pre-configured and connected-up. It only has to be connected to the HMI system via PROFIBUS.
Communications		
PROFIBUS connector up to 12 Mbit/s		6ES7972-0BA41-0XA0 The connector is used to establish a connection between the HMI system and the SIMOTION D435 training case
PROFIBUS cable		6XV1830-0EH10 (sold by the meter, from 20m) The cable is used to establish a connection between the HMI system and the SIMOTION D435 training case
HMI system		
PG/PC with MPI interface		- The PG/ PC is used as the HMI display screen.

Procedure

Please proceed as follows to configure and install the hardware components for the application example:

Table 4-2 Hardware configuration and mounting

No.	Action	Comment
1	Connect the MPI/DP interface of your PG/PC to the righthand MPI/DP interface (contact X136) of the SIMOTION D435 using a PROFIBUS cable and switch the terminating resistors in the two terminating connectors of the cable to “On”.	Do not use the standard MPI cable, supplied with the PG/PC to connect the PG/PC to the SIMOTION D435! The connection should be operated with a 12Mbit/s baud rate. Under all circumstances, a PROFIBUS cable must be used between the PG/PC and SIMOTION D435 with the terminating resistors switched-in. If this is not done, communication problems can occur between the PG/PC and the SIMOTION D435.
2	Connect the SIMOTION D training case to the power supply.	
3	Power-up all of the equipment/devices.	

4.3 Installing the standard SIEMENS software

Minimum required releases

Table 4-3 Versions

Component	Version.
STEP 7	V5.4 + SP2
SIMOTON SCOUT	V4.1.1.6
WinCCflex Advanced	2007 Hotfix 4

Installation

Please install the following

- Step 7 V5.4 incl. SP2
- SIMOTION SCOUT V4.1.1.6
- WinCCflex 2007 Hotfix 4 Advanced (with the option: **Integration in Step 7**)

Please follow the instructions of the installation programs.

4.4 Downloading the user program and parameterizing the drive in the SIMOTION D demonstration case

4.4.1 De-archiving the SIMOTION project

- Open SIMOTION SCOUT
- De-archive the SIMOTION project and open it using SIMOTION SCOUT

4.4.2 Resetting SIMOTION D435 to the factory settings

In order to obtain a fixed starting point for the description on how to download the user program into the demonstration case, restore the factory setting at the demonstration case as described below:

- Power-down the demonstration case
- Set the mode switch SIMOTION D435 to setting 3 (MRES)
- Power-up the demonstration case

- When RDY lights green and STOP lights orange, set the SIMOTION D435 mode switch to the 0 position (RUN)
- RDY and RUN are green

Once the factory setting has been restored, the SIMOTION D435 has PROFIBUS address 2 and the baud rate is 1.5 Mbit/s.

Fig. 4-2 Mode selector switch, SIMOTION D435

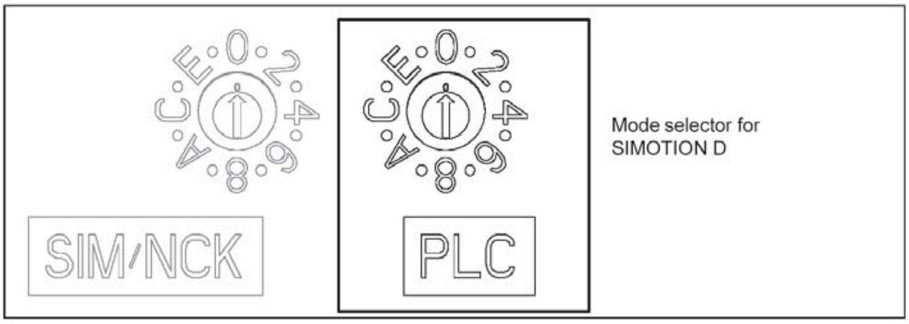


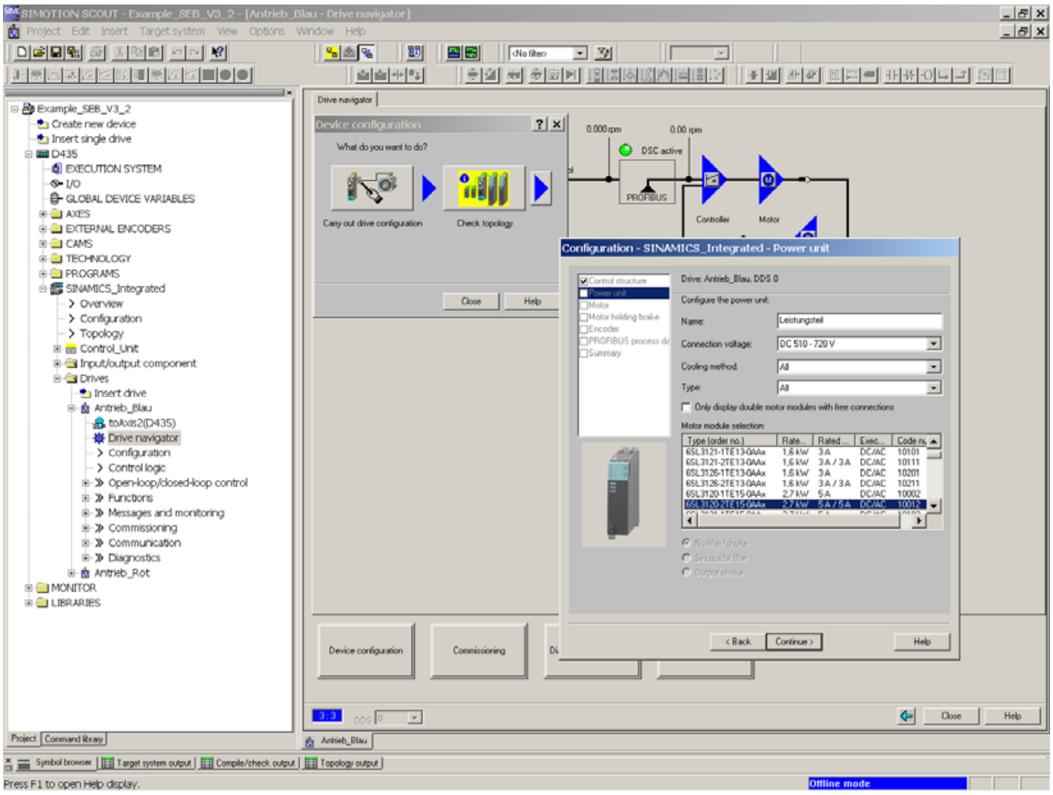
Fig. 2-5 Mode selector

4.4.3 Re-configuring the double-axis motor module from 3A/3A to 5A/5A

This application example is configured as standard using a 3A/3A motor module. However, there are demonstration cases in the field, which are still equipped with a 5A/5A motor module. The hardware should be carefully checked before the project is downloaded! If a 3A/3A motor module is not used in the demonstration case, then the project can be re-configured by following the subsequent instructions:

- Go offline
- In the project tree, open the “Drive Navigator”
- A selection window opens when the “Device configuration” button is pressed
- Open the Configurator by pressing the “Execute drive configuration" button
- Scroll in the selection menu of the power unit by pressing the “Continue” button
- Select the power unit being used from the list – refer to the serial number on the front of the double motor module, e.g. 6SL3120-2TE15-0AA0 (5A/5A)
- Press “Continue” and acknowledge the alarm messages
- Press the “Continue” button – without making any additional changes – until the “Complete” button appears; also press this
- Close the Device Configurator
- In the Expert list of the red and blue drives (select the particular drive -> righthand mouse key -> Expert -> Expert list), reduce parameter p210 from 600V to 345V
- Compile and save the project, go online and load the project into the target system

Fig. 4-3: Re-configuring the motor module



Configuration - SINAMICS_Integrated - Power unit

☑ Control structure
□ Power unit
□ Motor
□ Motor holding brake
□ Encoder
□ PROFIBUS process da
□ Summary

Drive: Antrieb_Blau, DDS 0

Configure the power unit:

Name: Leistungsteil

Connection voltage: DC 510 - 720 V

Cooling method: All

Type: All

□ Only display double motor modules with free connections

Motor module selection:

Type (order no.)	Rate...	Rated ...	Exec...	Code n...
6SL3121-1TE13-0AAx	1,6 kW	3 A	DC/AC	10101
6SL3121-2TE13-0AAx	1,6 kW	3 A / 3 A	DC/AC	10111
6SL3126-1TE13-0AAx	1,6 kW	3 A	DC/AC	10201
6SL3126-2TE13-0AAx	1,6 kW	3 A / 3 A	DC/AC	10211
6SL3120-1TE15-0AAx	2,7 kW	5 A	DC/AC	10002
6SL3120-2TE15-0AAx	2,7 kW	5 A / 5 A	DC/AC	10012

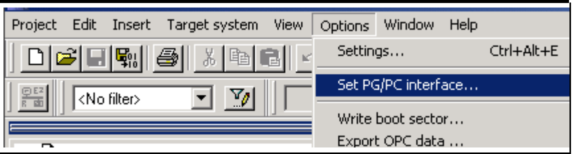
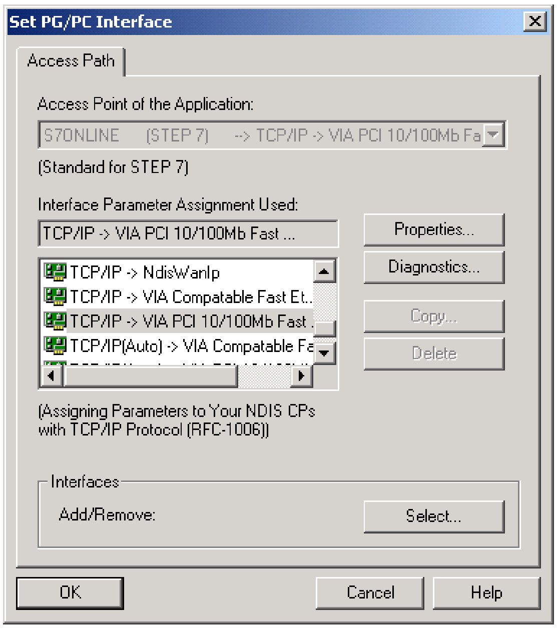
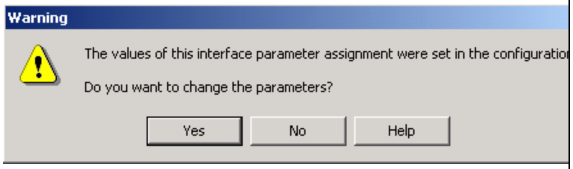
● No filter/choke
○ Sinusoidal filter
○ Output choke

< Back | Continue > | Help

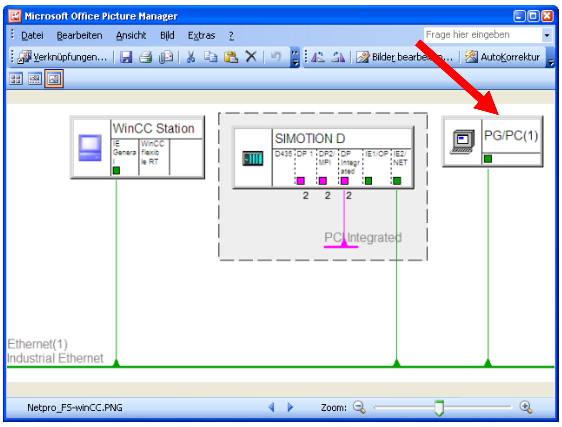
4.4.4 Setting the Ethernet interface of the PG/PC

Setting the PG/PC interface

Table 3-5: Setting the PG/PC interface

No.	Action	Comment
1	In SIMOTION SCOUT open the interface configuration using **OPTIONS → SET PG/PC INTERFACE...**	 Project Edit Insert Target system View Options Window Help Settings... Ctrl+Alt+E Set PG/PC interface... Write boot sector... Export OPC data ... <No filter>
2	In the “Interface Parameter Assignment Used” area, select your Ethernet card/interface of the PG/PC using the interface setting “TCP/IP → ......”. (e.g. "TCP/IP → VIA PCI 10/100 Fast Ethernet Adapter“)	Set PG/PC Interface Access Point of the Application: S7ONLINE (STEP 7) --> TCP/IP -> VIA PCI 10/100Mb Fa (Standard for STEP 7) Interface Parameter Assignment Used: TCP/IP -> VIA PCI 10/100Mb Fast ... TCP/IP -> NdisWanIp TCP/IP -> VIA Compatible Fast Et... TCP/IP -> VIA PCI 10/100Mb Fast ... TCP/IP(Auto) -> VIA Compatible Fa (Assigning Parameters to Your NDIS CPs with TCP/IP Protocol (RFC-1006)) Interfaces Add/Remove: Access Path Properties... Diagnostics... Copy... Delete Select... OK Cancel Help
3	Acknowledge (possible) warning with **Yes.**	Warning The values of this interface parameter assignment were set in the configuratio Do you want to change the parameters?
4	Acknowledge your change with **OK**	
5	Now return to SIMOTION SCOUT and open the network configuration **NETPRO** using the button or the menu **PROJECT → OPEN NETPRO** .	

6 Open Properties by double-clicking on the **PG/PC(1).**

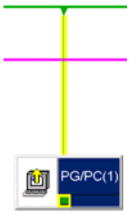

Microsoft Office Picture Manager
Datei Bearbeiten Ansicht Bild Extras ?
Frage hier eingeben
Verknüpfungen... Bilder bearbeiten... AutoKorrektur
WinCC Station
SIMOTION D
PG/PC(1)
PC Integrated
Ethernet(1)
Industrial Ethernet
Netpro_FS-winCC.PNG
Zoom:

7 Under the “Assignment” tab (this is already automatically selected), the ETHERNET interface used must be listed under “Assigned”. If this is already the case, then select this and set the checkmark for S7ONLINE access **active**.

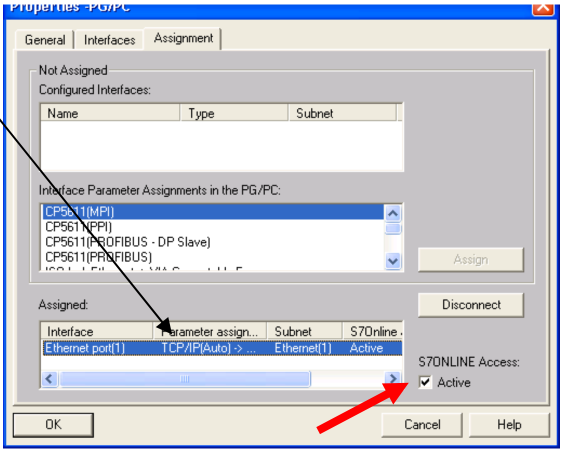
In this case, you skip steps 8 and 9!

Acknowledge your entry with **OK.**

Under certain circumstances, the Ethernet line of the PG/PC will have a ”yellow border”.



If the ETHERNET interface used is still not listed under “Assigned” then execute steps 8 and 9 (but only then!).



Properties -PG/PC

General | Interfaces | Assignment

Not Assigned

Configured Interfaces:

Name	Type	Subnet

Interface Parameter Assignments in the PG/PC:

CP5611(MPI)
CP5611(PPI)
CP5611(PROFIBUS - DP Slave)
CP5611(PROFIBUS)

Assigned:

Interface	Parameter assign...	Subnet	S7Online ...
Ethernet port(1)	TCP/IP(Auto) -> ...	Ethernet(1)	Active

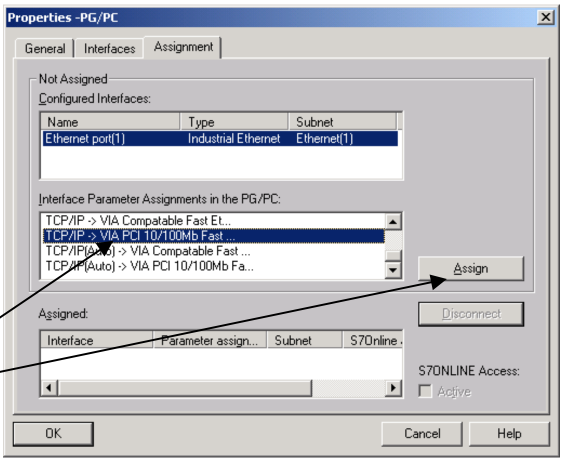
S7ONLINE Access:
☑ Active

8 The ETHERNET interface is still not “assigned”:

The configured interface of the control is listed under “Configured Interfaces” and all of the available interfaces of the PG/PC are under “Interface Parameter Assignments in the PG/PC”.

Select the ETHERNET interface to be used under “Interface Parameter Assignments in the PG/PC” (just the same as set in “Set PG/PC interface”) and press the **Assign** button.

If a warning is displayed, then acknowledge this with OK.



Properties -PG/PC

General | Interfaces | Assignment

Not Assigned

Configured Interfaces:

Name	Type	Subnet
Ethernet port(1)	Industrial Ethernet	Ethernet(1)

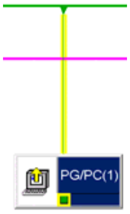
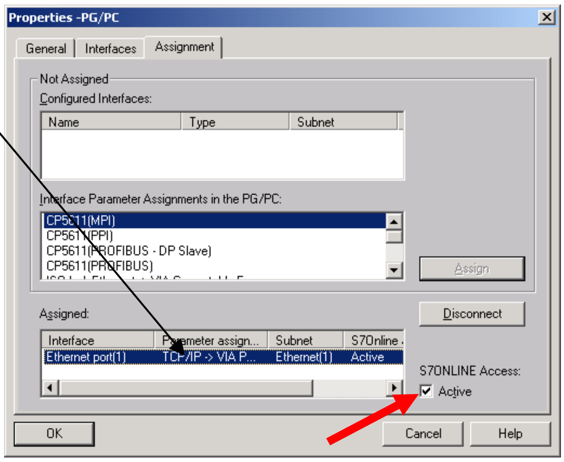
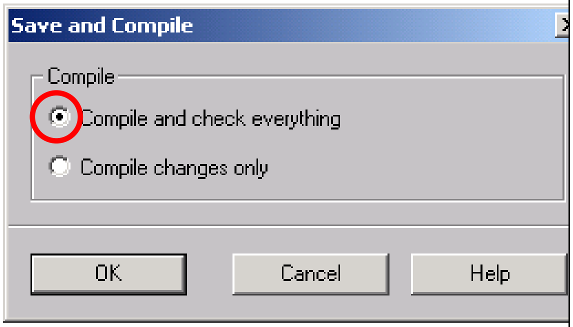
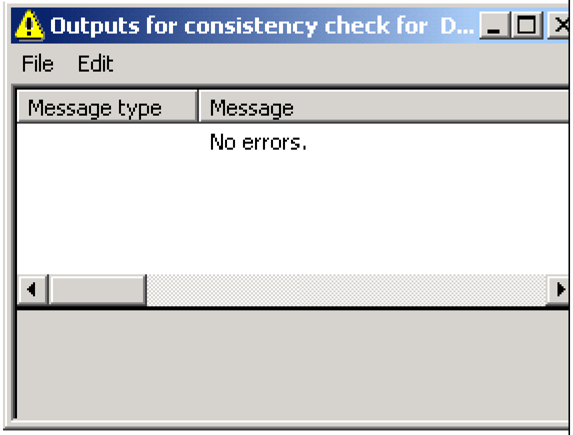
Interface Parameter Assignments in the PG/PC:

TCP/IP -> VIA Compatable Fast Et...
TCP/IP -> VIA PCI 10/100Mb Fast ...
TCP/IP(Auto) -> VIA Compatable Fast ...
TCP/IP(Auto) -> VIA PCI 10/100Mb Fa...

Assigned:

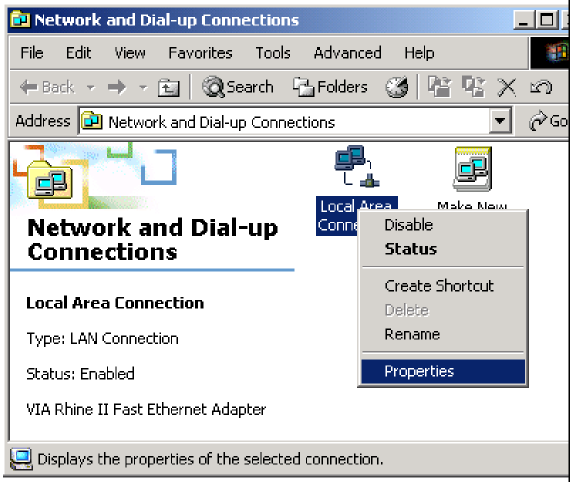
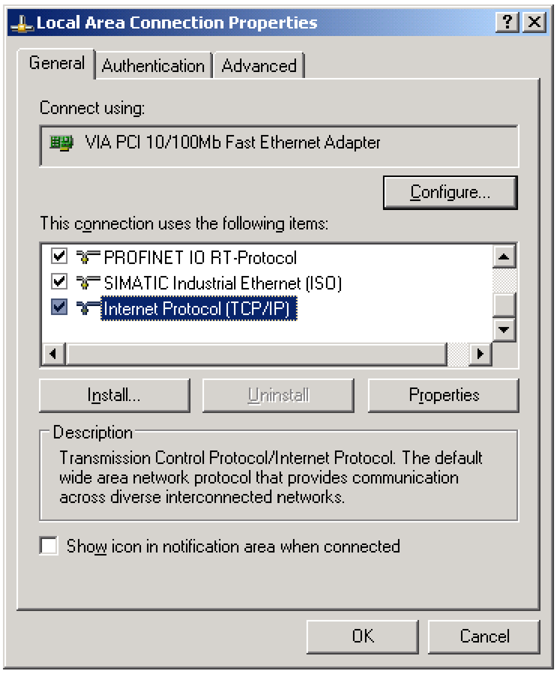
Interface	Parameter assign...	Subnet	S7Online ...

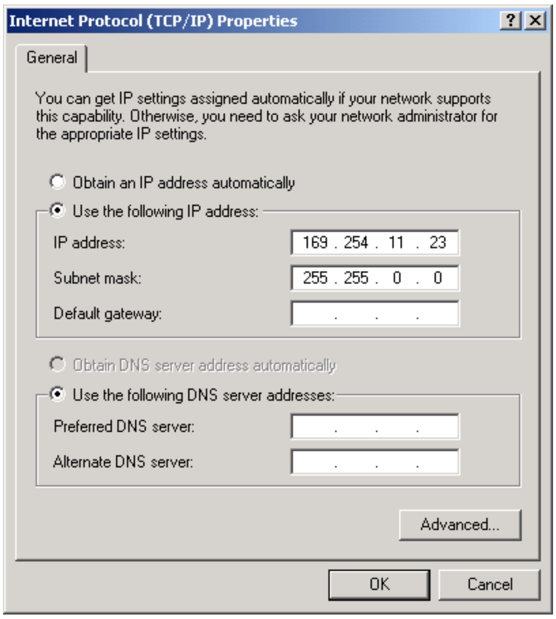
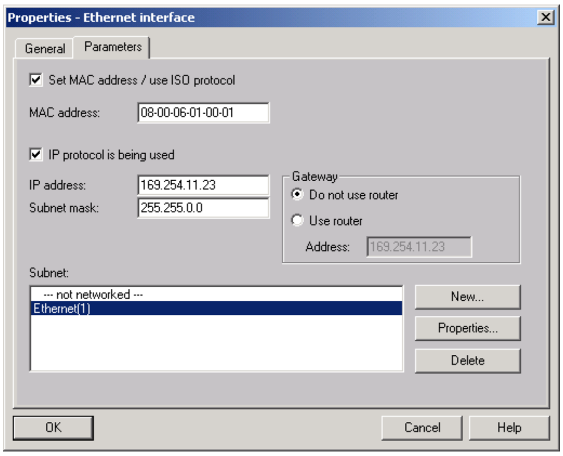
S7ONLINE Access:
□ Active

9	The interface of the control is now assigned the interface of the PG/PC. Select this and if it has still not been set, then set the checkmark for S7ONLINE access **Active**. Acknowledge your entry with **OK.** Under certain circumstances, the Ethernet line of the PG/PC will have a "yellow border".  	 Properties -PG/PC General | Interfaces | Assignment Not Assigned Configured Interfaces: Name | Type | Subnet Interface Parameter Assignments in the PG/PC: CP5611(MPI) CP5611(PPI) CP5611(PROFIBUS - DP Slave) CP5611(PROFIBUS) Assign Assigned: Disconnect Interface | Parameter assign... | Subnet | S7Online... Ethernet port(1) | TCP/IP -> VIA P... | Ethernet(1) | Active S7ONLINE Access: ☑ Active OK Cancel Help
10	Please select "Compile and check everything" (button) and acknowledge with **OK**	 Save and Compile Compile ● Compile and check everything ○ Compile changes only OK Cancel Help
11	If any references are made to alarms, then please close.	 Outputs for consistency check for D... File Edit Message type | Message No errors.
12	Before you load the project, please close NETPRO and set the Ethernet address of your PG/PC. Refer to the next Section	

Setting the Ethernet address of the PG/PC

Table 3-6: Ethernet address

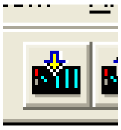
No.	Action	Comment
1	Open the window Network and Dial-up Connections of your PG/PC and select the network connection to SIMOTION D435 and open its properties. (righthand mouse click → Properties – or select the symbol and then File → Properties).	 Network and Dial-up Connections File Edit View Favorites Tools Advanced Help Back Search Folders Address Network and Dial-up Connections Go Local Area Conne Make New Disable Status Create Shortcut Delete Rename Properties Network and Dial-up Connections Local Area Connection Type: LAN Connection Status: Enabled VIA Rhine II Fast Ethernet Adapter Displays the properties of the selected connection.
2	In the window “This connection uses the following items” select “Internet Protocol (TCP/IP)” and open its properties.	 Local Area Connection Properties General Authentication Advanced Configure... Install... Uninstall Properties OK Cancel Connect using: VIA PCI 10/100Mb Fast Ethernet Adapter This connection uses the following items: ☑ PROFINET IO RT-Protocol ☑ SIMATIC Industrial Ethernet (ISO) ☑ Internet Protocol (TCP/IP) Description Transmission Control Protocol/Internet Protocol. The default wide area network protocol that provides communication across diverse interconnected networks. ☐ Show icon in notification area when connected

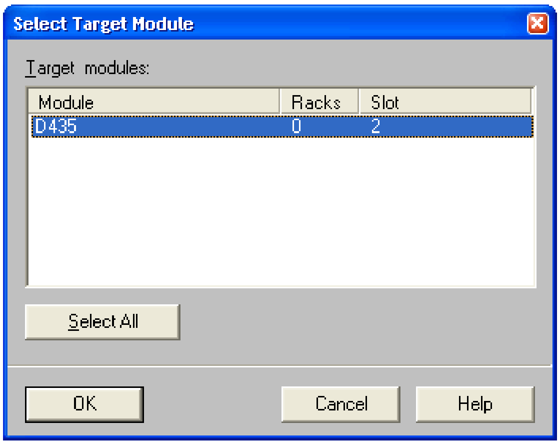
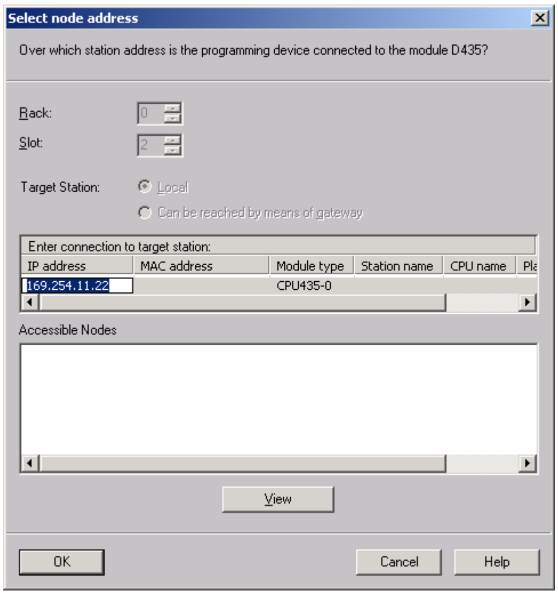
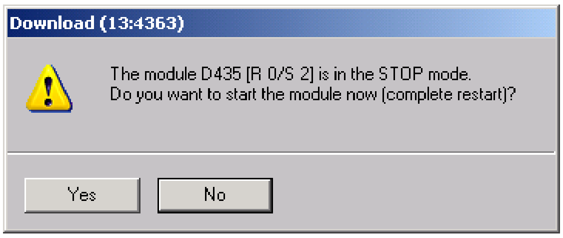
3	The Ethernet interface IE2 (X130) of SIMOTION D435 has, as standard, the IP address 169.254.11.22. Select “Use the following IP address” and enter the IP address **169.254.11.23**. Enter 255.255.0.0 as “Subnet mask”.	 Internet Protocol (TCP/IP) Properties General You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings. ○ Obtain an IP address automatically ● Use the following IP address: IP address: 169 . 254 . 11 . 23 Subnet mask: 255 . 255 . 0 . 0 Default gateway: . . . ○ Obtain DNS server address automatically ● Use the following DNS server addresses: Preferred DNS server: . . . Alternate DNS server: . . . Advanced... OK Cancel
4	The address set above must be identical to the address for the PG/PC. Check this address by selecting the PG/PC interface in Netpro and, if required, modify this.	 Properties - Ethernet interface General Parameters ☑ Set MAC address / use ISO protocol MAC address: 08-00-06-01-00-01 ☑ IP protocol is being used IP address: 169.254.11.23 Subnet mask: 255.255.0.0 Gateway ● Do not use router ○ Use router Address: 169.254.11.23 Subnet: --- not networked --- Ethernet(1) New... Properties... Delete OK Cancel Help
5	Acknowledge your changes by pressing twice on **OK.**	

4.4.5 Downloading the hardware configuration after a factory setting

To download the hardware configuration, please proceed as follows

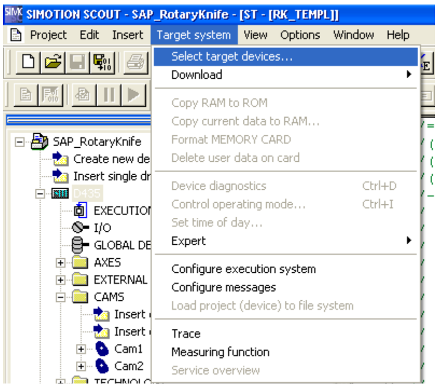
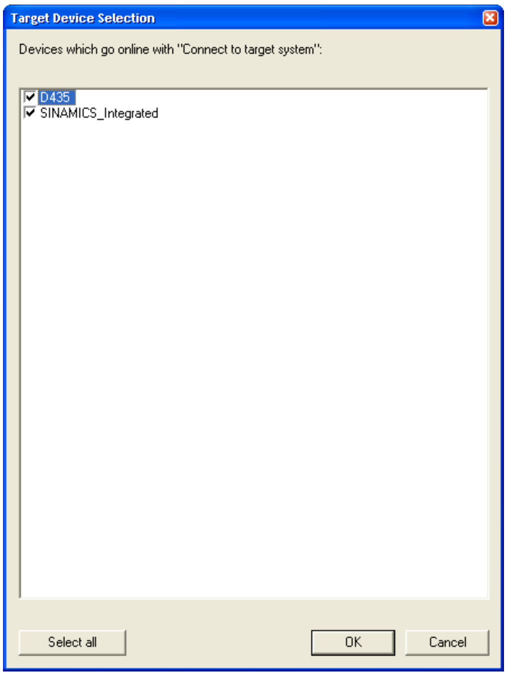
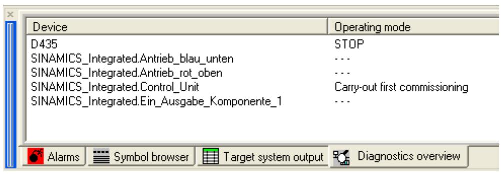
Table 4-4: Downloading the hardware configuration after a factory setting

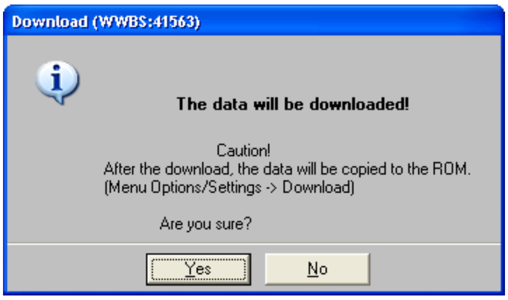
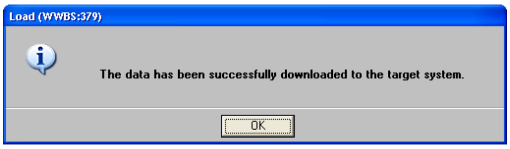
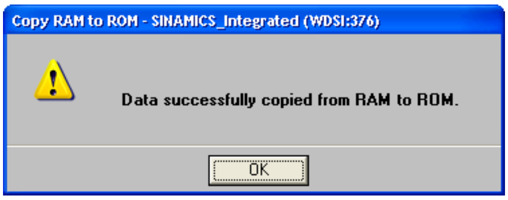
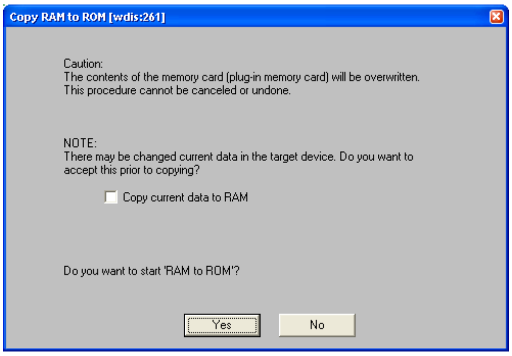
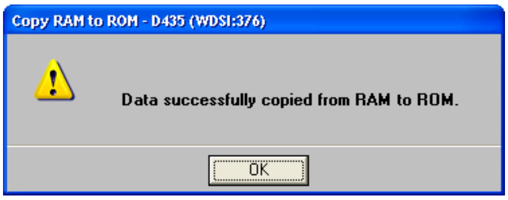
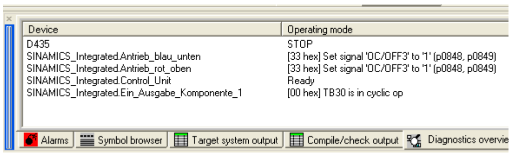
No.	Action	Comment
1	Now go into the hardware configuration and press the **Download to target module** button	

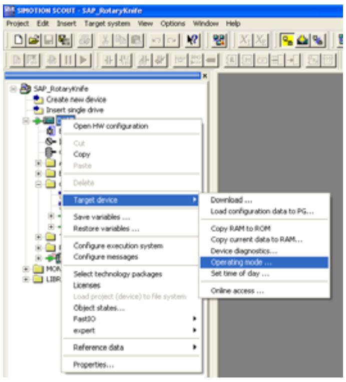
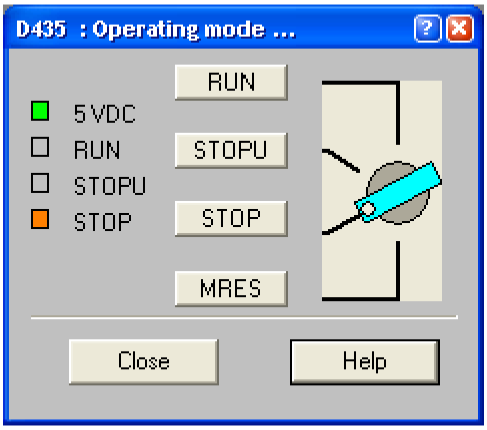
2	Acknowledge with **OK**	 Select Target Module Target modules: Module: D435, Racks: 0, Slot: 2
3	Acknowledge with **OK**	 Select node address Over which station address is the programming device connected to the module D435? Rack: 0 Slot: 2 Target Station: ● Local ○ Can be reached by means of gateway Enter connection to target station: IP address: 169.254.11.22, MAC address: , Module type: CPU435-0, Station name: , CPU name: , Pla Accessible Nodes
4	Press No and do not restart	 Download (13:4363) The module D435 [R 0/S 2] is in the STOP mode. Do you want to start the module now (complete restart)?
5	Close the hardware configuration and change to Scout	

4.4.6 Downloading the SIMOTION project of the standard application

Table 4-5: Downloading the SIMOTION project

No.	Action	Comment
1	Before you download the project, in the offline mode, please check under Target system/Select target devices	 SIMOTION SCOUT - SAP_RotaryKnife - [ST - [RK_TEMPL]] Project Edit Insert Target system View Options Window Help Select target devices… Download Copy RAM to ROM Copy current data to RAM… Format MEMORY CARD Delete user data on card Device diagnostics Ctrl+D Control operating mode… Ctrl+I Set time of day… Expert Configure execution system Configure messages Load project (device) to file system Trace Measuring function Service overview SAP_RotaryKnife Create new de Insert single dr D435 EXECUTION I/O GLOBAL DE AXES EXTERNAL CAMS Insert Insert Cam1 Cam2
4	Whether both SIMOTION D435 as well as also SINAMICS_Integrated are selected. Please acknowledge changes with **OK**.	Target Device Selection Devices which go online with "Connect to target system": ☑ D435 ☑ SINAMICS_Integrated
5	After establishing the ONLINE connection, the operating states of the devices accessed are displayed in the diagnostics overview.	Device / Operating mode D435 STOP SINAMICS_Integrated.Antrieb_blau_unten - - - SINAMICS_Integrated.Antrieb_rot_oben - - - SINAMICS_Integrated.Control_Unit Carry-out first commissioning SINAMICS_Integrated.Ein_Ausgabe_Komponente_1 - - - Alarms Symbol browser Target system output Diagnostics overview

6	After starting the download, you will be prompted as to whether you wish to “copy RAM to ROM“ after the download. Always answer this question with **Yes** as otherwise your program must be again downloaded after power ON/OFF. This copy operation only refers to the SIMOTION part of the project	 Download (WWBS:41563) The data will be downloaded! Caution! After the download, the data will be copied to the ROM. (Menu Options/Settings -> Download) Are you sure? Yes No
7	Once the download has been completed, please acknowledge with **OK**	 Load (WWBS:379) The data has been successfully downloaded to the target system. OK
8	Also acknowledge the data that has been successfully copied from the RAM to ROM with **OK**	 Copy RAM to ROM - SINAMICS_Integrated (WDSI:376) Data successfully copied from RAM to ROM. OK
9	The system now prompts you whether you wish to also copy the parameters of SINAMICS_Integrated from the RAM to the ROM. Also answer this with **Yes**	 Copy RAM to ROM [wdis:261] Caution: The contents of the memory card (plug-in memory card) will be overwritten. This procedure cannot be canceled or undone. NOTE: There may be changed current data in the target device. Do you want to accept this prior to copying? □ Copy current data to RAM Do you want to start 'RAM to ROM'? Yes No
10	Also acknowledge the data that has been successfully copied from the RAM to ROM with **OK**	 Copy RAM to ROM - D435 (WDSI:376) Data successfully copied from RAM to ROM. OK
11	After the download has been completed, you will see the adjacent diagnostics overview.	 Device — Operating mode D435 — STOP SINAMICS_Integrated.Antrieb_blau_unten — [33 hex] Set signal 'OC/OFF3' to '1' (p0848, p0849) SINAMICS_Integrated.Antrieb_rot_oben — [33 hex] Set signal 'OC/OFF3' to '1' (p0848, p0849) SINAMICS_Integrated.Control_Unit — Ready SINAMICS_Integrated.Ein_Ausgabe_Komponente_1 — [00 hex] TB30 is in cyclic op Alarms | Symbol browser | Target system output | Compile/check output | Diagnostics overvie

12	Now switch the SIMOTION D435 into the RUN state. To do this, click on the SIMOTION-CPU and with the righthand mouse key and target device/operating state, go to the operating state display.	 SIMOTION SCOUT - SAP_RotaryKnife Project Edit Insert Target system View Options Window Help SAP_RotaryKnife Create new device Insert single drive MON LIBR Open HW configuration Cut Copy Paste Delete Target device Save variables ... Restore variables ... Configure execution system Configure messages Select technology packages Licenses Load project (device) to file system Object states... FastIO expert Reference data Properties... Download ... Load configuration data to PG... Copy RAM to ROM Copy current data to RAM... Device diagnostics... Operating mode ... Set time of day ... Online access ...
13	Here, click on the **RUN** button The SIMOTION D435 is then in RUN and the demonstration case is now ready to be used for the presentation!	 D435 : Operating mode ... 🟩 5VDC □ RUN □ STOPU 🟧 STOP RUN STOPU STOP MRES Close Help

5 Operator control of the application example

The application can be used to present SIMOTION D with SINAMICS and get to know and test the functions of the CPU D435.

You will find brief instructions on how to demonstrate and present the application in the following **Chapter 5.1 Brief instructions to demonstrate.**

You will find a detailed description of all of the operator screens in **Chapter 5.2 Detailed operating instruction**

5.1 Brief instructions to demonstrate

Here, in these instructions you will only be shown and explained the steps necessary to demonstrate the application. Not all of the operator screens are discussed.. A detailed description of all operator screens is provided in **Chapter 5.2 Detailed operating instruction.**

Prerequisites

The following prerequisites must be fulfilled to use the application example:

- The SIMOTION project is provided online in SIMOTION D435.
- The parameterization for the applications has been downloaded into SINAMICS. (also included in the SIMOTION project!)
- All of the devices are powered-up.
- The SIMOTION D435 has been switched into the “Run” state using the online function of SIMOTION SCOUT.
- At least WinCCflex Advanced 2007 Hotfix 4 is installed on the PC/PG.

Note

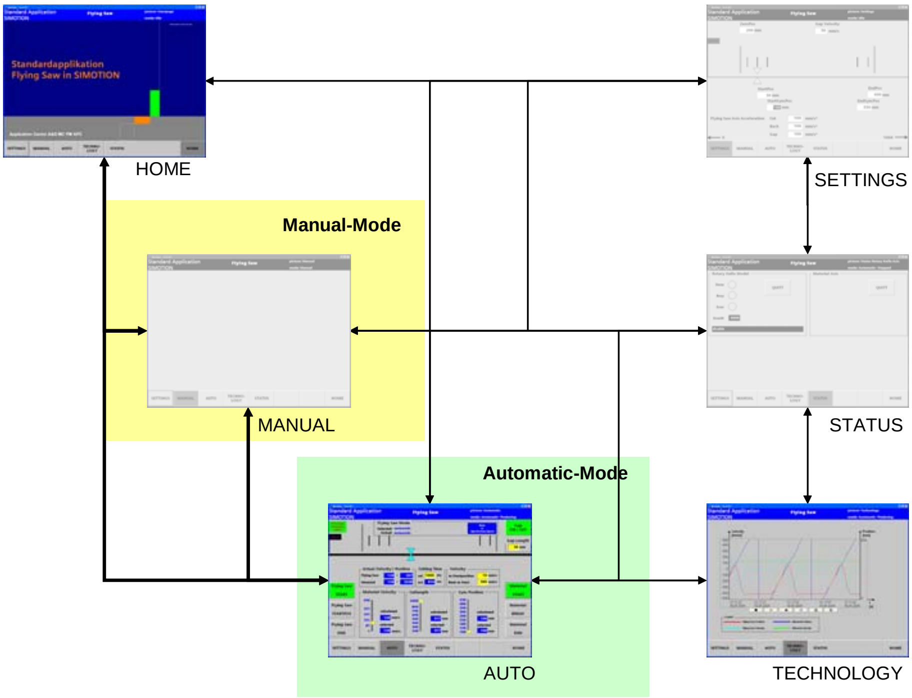
WinCCflex requires the appropriate authorization. Authorization for at least 256 power tags is required.

5.1.1 Structure overview

Please refer to the following diagram for the basic operator control structure with all of the operator areas of the application.

The **SETTINGS, STATUS and MANUAL** displays are not required when presenting the application and are therefore not described in the detailed Operating Instructions.

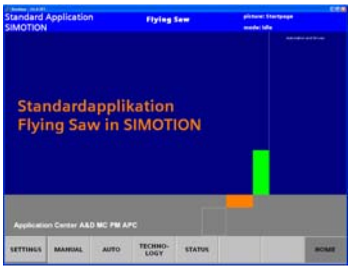
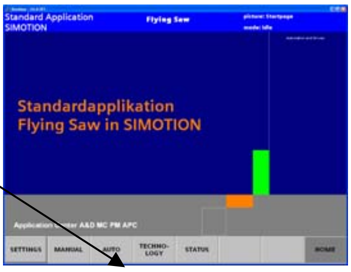
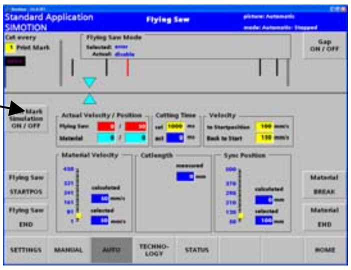
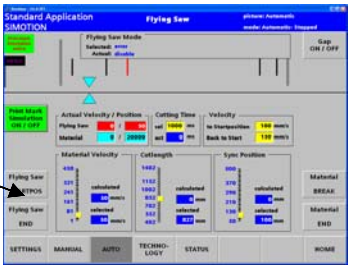
Fig. 5-1 Structure overview to demonstrate the application

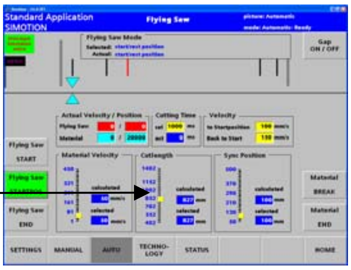
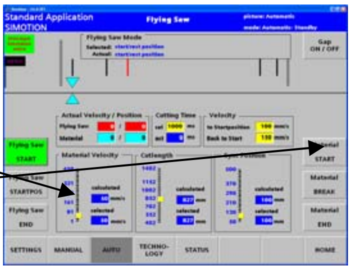
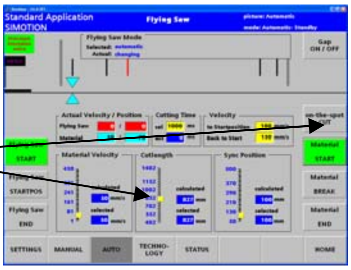
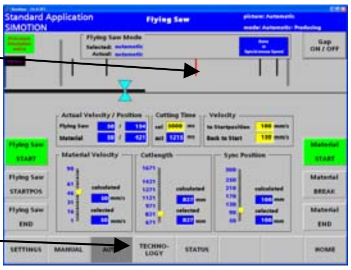
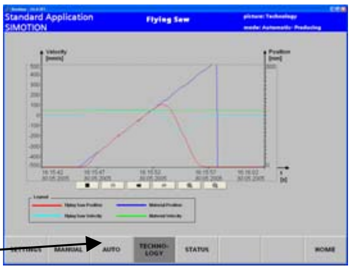
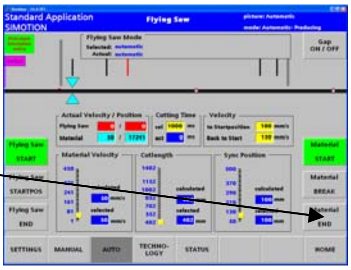


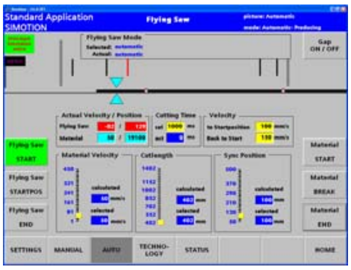
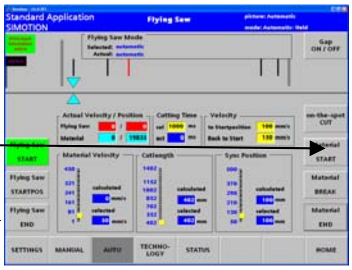
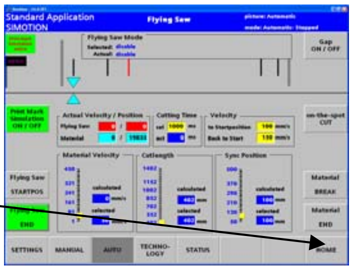
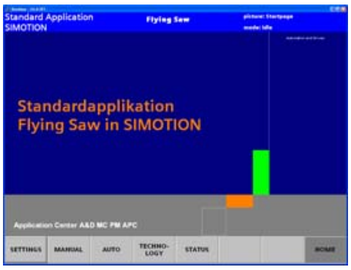
5.1.2 Brief instructions

Execute the following steps in the sequence as listed in the following table to demonstrate the application example:

Table 5-1: Brief instructions to demonstrate/present the “flying saw” application example

No.	Action	Comment
1	Call the following file "C:\Siemens\Step7\S7Proj\SAP_FlyingSaw\TDOP\PRO__00.fwd". As an alternative, you can also select the operator panel using Step 7. In the SIMATIC Manager, open the **SAP_FlyingSaw** project. You will find the HMI object **OP1** at the project level. Start the runtime from the context menu (righthand mouse key).	 Standard Application SIMOTION Flying Saw Standardapplikation Flying Saw in SIMOTION Application Center A&D MC PM APC SETTINGS MANUAL AUTO TECHNO-LOGY STATUS HOME
2	If the connection to the CPU was able to be established, the screen form appears at the top left - **mode: Idle**	Check that your PG/PC is set to PROFIBUS with 12 Mbit/s.
3	At the bottom left, please click on **AUTO** (3rd button from the left!)	 Standard Application SIMOTION Flying Saw Standardapplikation Flying Saw in SIMOTION Application Center A&D MC PM APC SETTINGS MANUAL AUTO TECHNO-LOGY STATUS HOME
4	First activate the print mark simulation by pressing the **Print Mark Simulation ON / OFF** button.	 Standard Application SIMOTION Flying Saw Flying Saw Mode Gap ON / OFF Print Mark Simulation ON / OFF Actual Velocity / Position Cutting Time Velocity Material Velocity Cutlength Sync Position Flying Saw STARTPOS Flying Saw END Material BREAK Material END SETTINGS MANUAL AUTO TECHNO-LOGY STATUS HOME
5	Next, activate the travel to the starting position using the button **Flying Saw STARTPOS**	 Standard Application SIMOTION Flying Saw Flying Saw Mode Gap ON / OFF Print Mark Simulation ON / OFF Actual Velocity / Position Cutting Time Velocity Material Velocity Cutlength Sync Position Flying Saw STARTPOS Flying Saw END Material BREAK Material END SETTINGS MANUAL AUTO TECHNO-LOGY STATUS HOME

6	Once the “flying saw” has reached its starting position, the **Flying Saw START** button is displayed to activate the “flying saw” Before you activate the “flying saw”, the required cut length should be selected using the **Cutlength** slider.	
7	Now you can start the material feed! Select the **Material Velocity** using the Material Velocity slider You can start the material feed by pressing the **Material START** button	
8	After the material web starts, the material enters the unit and the print mark simulation generates, after the length, set using the **Cutlength** slider switch, a print mark. The flying saw then makes a cut. You can immediately generate a print mark using the **on-the-spot CUT** button – which is also then cut by the flying saw.	
9	The red bar indicates how far the flying saw must travel with the material web with the current setting for one cut. Activate the technology screen by pressing the **TECHNOLOGY** button	
10	The following are displayed in the technology screen: • The actual material velocity • The actual velocity of the "flying saw" • The actual position of the "flying saw" • The position of the material referred to the actual cut • You can return to the automatic screen by pressing the **AUTO** button	
11	The material can be removed by pressing the **Material END** button	

12	After the last cut, the “flying saw” automatically moves to its starting position and waits for new material.	
13	Once the material has been completely removed from the screen area, then you can either allow new material to enter by pressing the **Material START** button and continue with **Step 8**, or end the “flying saw” by pressing the **Flying Saw END** button.	
14	After the “flying saw” has been ended, you can return to the welcome screen by pressing the **HOME** button	
15		 Standard Application SIMOTION Flying Saw Standardapplikation Flying Saw in SIMOTION Application Center A&D MC PM APC SETTINGS MANUAL AUTO TECHNO-LOGY STATUS HOME

Process screen

The process screen is the main screen in the automatic mode of the application example to control (operator control) the “flying saw”.

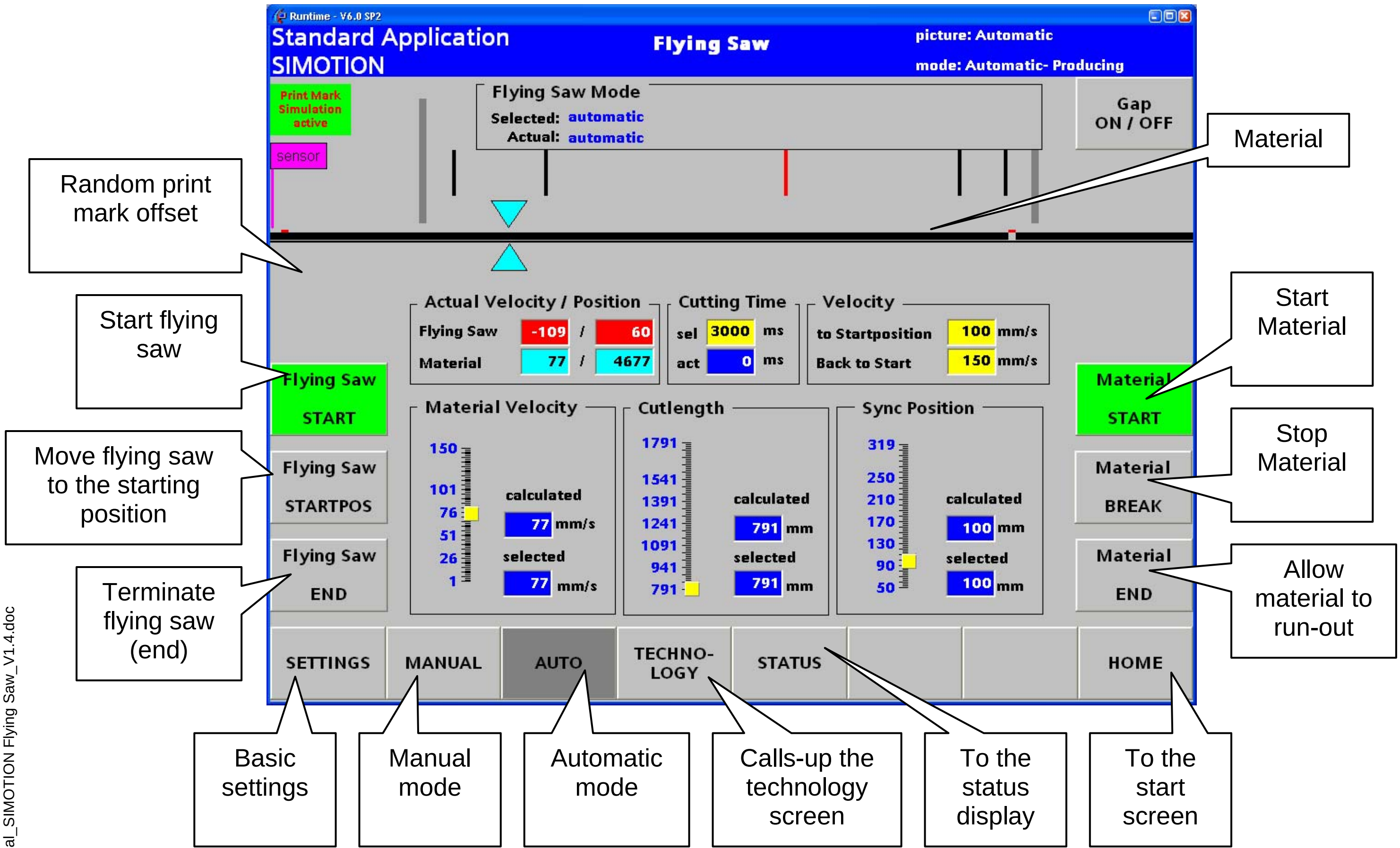
Fig. 5-2 Process screen in the automatic mode of the “flying saw”

Mode of the "FlyingSaw FB“

Position and velocity of the material and "Flying Saw“

Operating state (OMAG) application example

Flying Saw



Runtime - V6.0 SP2

Standard Application SIMOTION

Flying Saw

picture: Automatic

mode: Automatic- Producing

Flying Saw Mode

Selected: automatic

Actual: automatic

Actual Velocity / Position		
Flying Saw	-109 /	60
Material	77 /	4677

Cutting Time		
sel	3000	ms
act	0	ms

Velocity		
to Startposition	100	mm/s
Back to Start	150	mm/s

Material Velocity: calculated 77 mm/s; selected 77 mm/s

Cutlength: calculated 791 mm; selected 791 mm

Sync Position: calculated 100 mm; selected 100 mm

Random print mark offset

Start flying saw

Move flying saw to the starting position

Terminate flying saw (end)

Material

Start Material

Stop Material

Allow material to run-out

Basic settings

Manual mode

Automatic mode

Calls-up the technology screen

To the status display

To the start screen

The material and the “flying saw” can be started, terminated (exited) and monitored in the process screen.

The material (material web) is started, stopped (held) and terminated (exited) on the righthand side; the “flying saw” is started and exited on the lefthand side.

5.2 Detailed operating instructions

A detailed description of the application is provided in these instructions. This is necessary so that you can get to know and test the CPU functions.

Prerequisites

The following prerequisites must be fulfilled to use the application example:

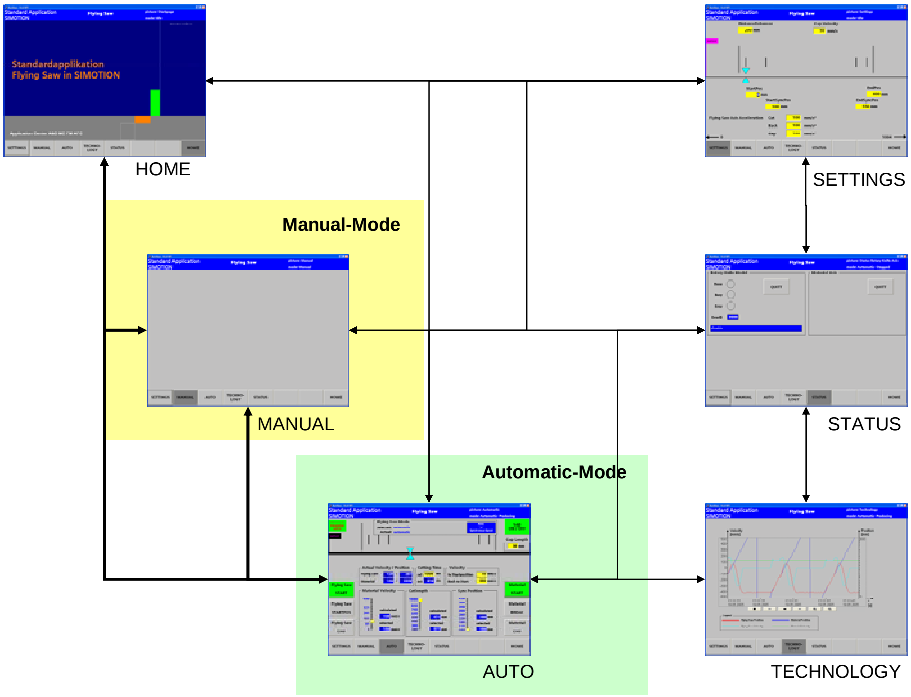
- The STEP7 project is available online in the S7-CPU.
- The parameterization for the application has been downloaded into SIMODRIVE.
- All of the devices are powered-up.
- At least WinCCflex Advanced 2007 Hotfix 4 is installed on the PC/PG.

Note WinCCflex requires the appropriate authorization. Authorization for at least 256 power tags is required.

5.2.1 Structure overview

Please refer to the following diagram for the basic operator control structure with all of the operator areas of the application.

Fig. 5-3 Structure overview



5.2.2 Start

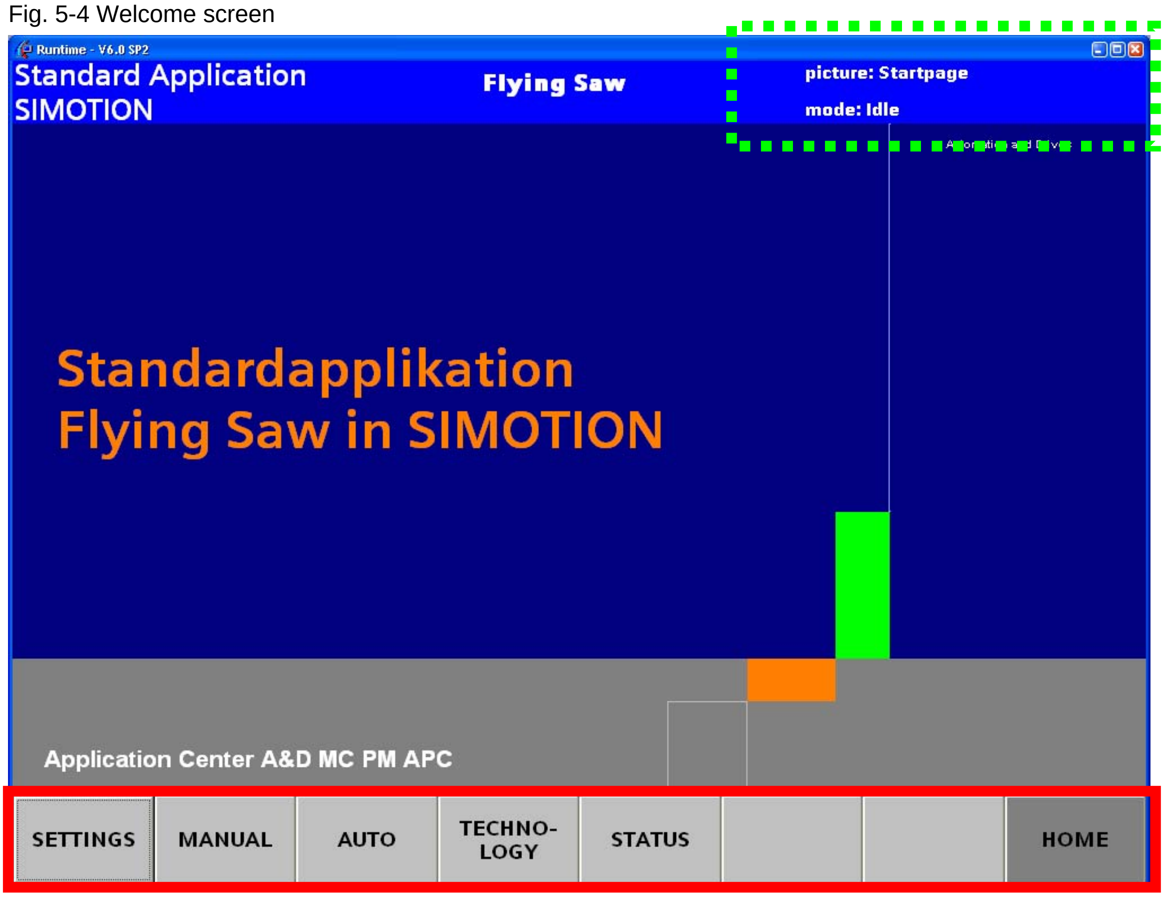
In the SIMATIC Manager, open the **SAP_FlyingSaw** project. You will find the HMI object **OP1** at the project level. Start the runtime from the context menu (righthand mouse key).

or

Call the following file C:\Siemens\Step7\S7Proj\SAP_FlyingSaw\TDOP\PRO__00.fwd".

The welcome screen is displayed

Fig. 5-4 Welcome screen



Runtime - V6.0 SP2

picture: Startpage

mode: Idle

General screen areas

The screen forms of the application are handled using buttons at the lower edge of each of the screen forms.

Refer to □

The name of the actual operator screen form and the presently valid mode are displayed in the upper righthand corner of the screen forms.

Refer to ⬚

The following functions can be selected using the individual buttons:

Table 5-2 General buttons to control/handle the screen forms

Button	Function
	You can access the pre-setting screen from every operator screen using the **SETTINGS** button.
	You can access the setting-up screen from every operator screen using the **MANUAL** button. If the application is in the IDLE or AUTOMATIC-STOPPED modes, the MANUAL mode is selected
	You can access the automatic screen from every operator screen using the **AUTO** button. If the application is in the IDLE or MANUAL modes, the AUTOMATIC-STOPPED mode is selected
	You can access the technology screen from every operator screen using the **TECHNOLOGY** button.
	You can access the status screen from every operator screen using the **STATUS** button.
	You can access the welcome screen (home) from every operator screen using the **HOME** button. If the application is in the MANUAL or AUTOMATIC-STOPPED modes, the IDLE mode is selected

5.2.3 Machine parameter settings

The standard application allows the following parameters to be adapted:

Machine geometry

- **Distance to sensor**
  Distance between the flying saw axis and the sensor of the material and print mark detection
- **StartPosition**
  Position from which the flying saw starts motion to achieve synchronism (with the material web)
- **StartSyncPosition**
  Position at which the flying saw is synchronized, start of the synchronous traversing range
- **EndSyncPosition**
  End of the synchronous traversing range
- **EndPosition**
  Maximum traversing range of the flying saw

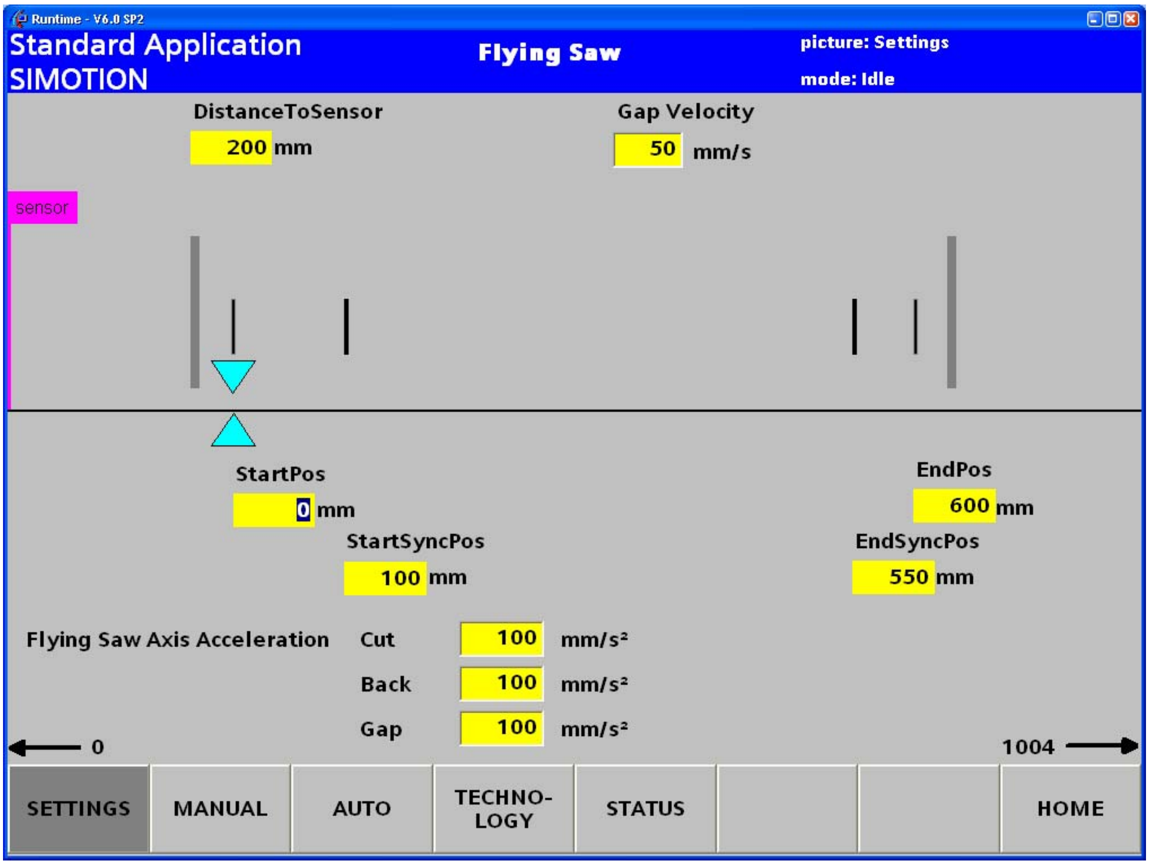
Flying Saw Axis Accelerations

- **Cut**
  Acceleration value for synchronization
- **Back**
  Acceleration value for return motion
- **Gap**
  Acceleration value for creating a "gap".

Creating a "gap"

- **GapVelocity**
  Additional velocity in order to create a gap between the material and the cut piece

Fig. 5-5 SETTINGS operator screen for machine geometry settings



Runtime - V6.0 SP2

Standard Application SIMOTION

Flying Saw

picture: Settings

mode: Idle

DistanceToSensor 200 mm

Gap Velocity 50 mm/s

StartPos 0 mm

EndPos 600 mm

StartSyncPos 100 mm

EndSyncPos 550 mm

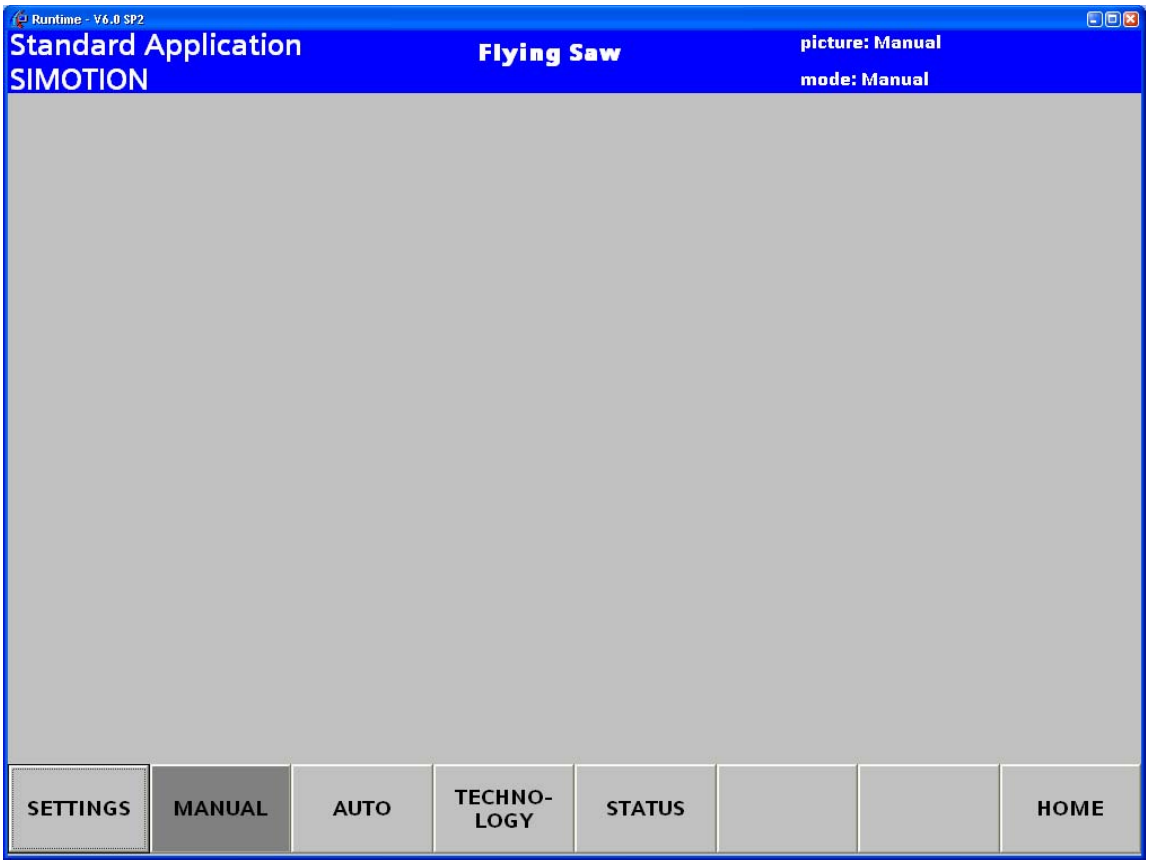
Flying Saw Axis Acceleration			
	Cut	100	mm/s^2
	Back	100	mm/s^2
	Gap	100	mm/s^2

5.2.4 Operator control functions in the setting-mode

In the manual mode, the material web and flying saw can be manually moved.

This standard application does not require any functions that may only be executed in the setting-up mode. This is the reason that we are only providing users with an empty screen form that can be adapted, when required - to the specifications and requirements of the user’s application.

Fig. 5-6 MANUAL operator control screen form for the operator functions in the setting-up mode

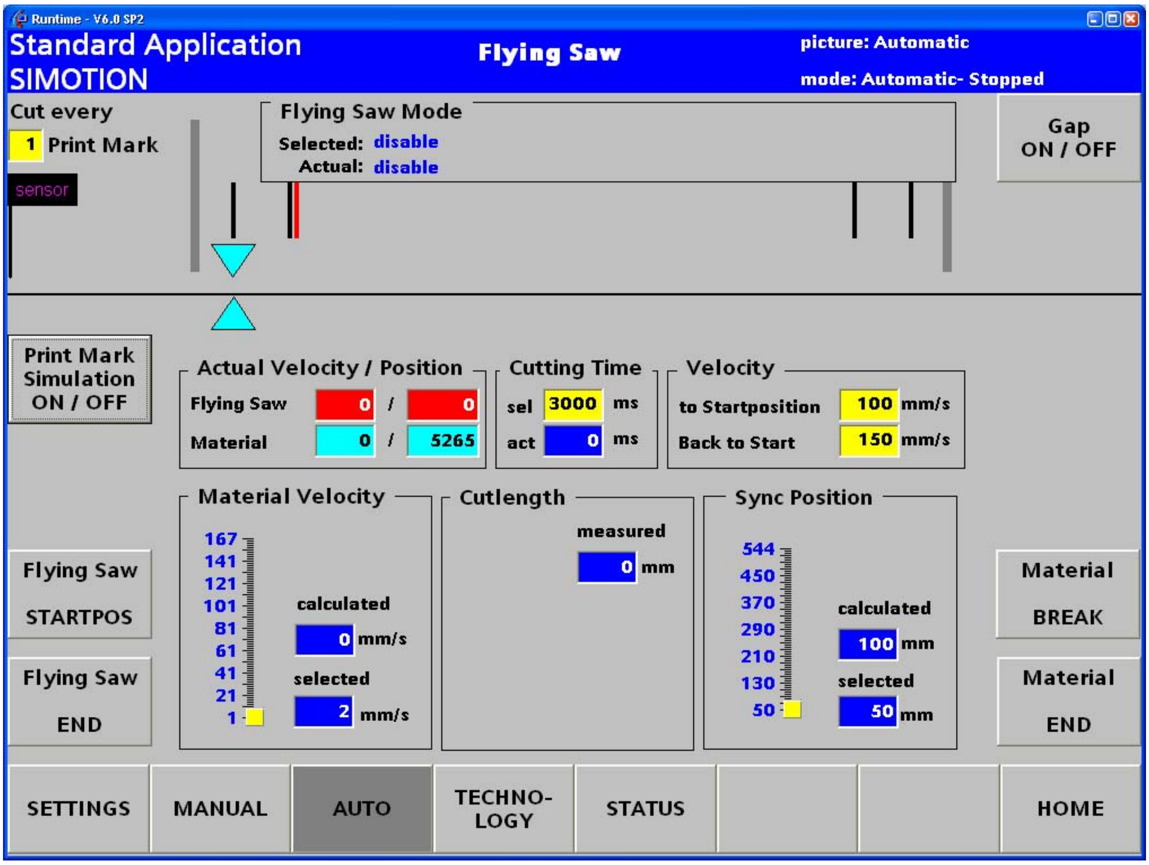


5.2.5 Operator functions of the process in the automatic mode

Note

> The automatic mode is only available, if
>
> - There is no fault,
> - Both axes are enabled, and
> - For both of these axes, no manual operator control functions are active.

Fig. 5-7 AUTOMATIC operator screen form for operator functions in the automatic mode



Runtime - V6.0 SP2

Standard Application SIMOTION

Flying Saw

picture: Automatic

mode: Automatic- Stopped

Cut every 1 Print Mark

Flying Saw Mode
Selected: disable
Actual: disable

Actual Velocity / Position
Flying Saw 0 / 0
Material 0 / 5265

Cutting Time
sel 3000 ms
act 0 ms

Velocity
to Startposition 100 mm/s
Back to Start 150 mm/s

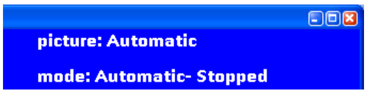
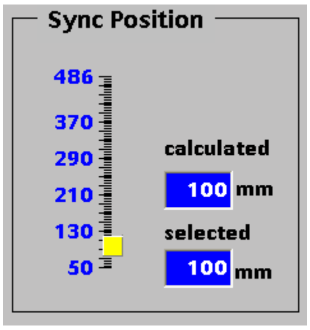
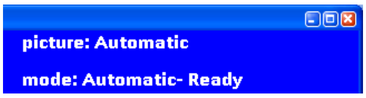
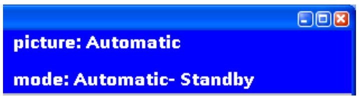
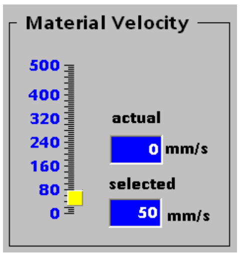
Material Velocity
calculated 0 mm/s
selected 2 mm/s

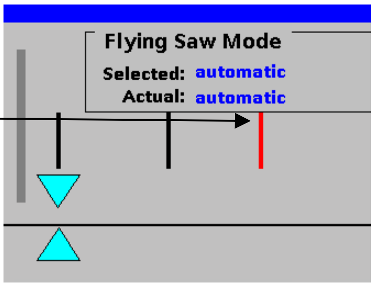
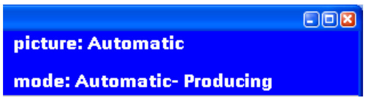
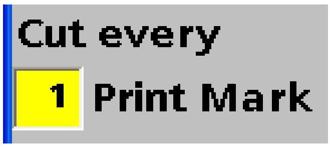
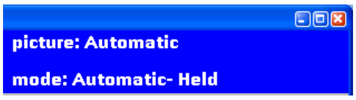
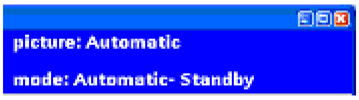
Cutlength
measured 0 mm

Sync Position
calculated 100 mm
selected 50 mm

Standard operator control

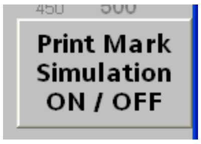
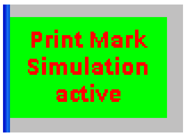
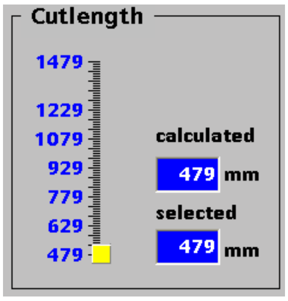
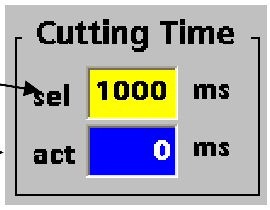
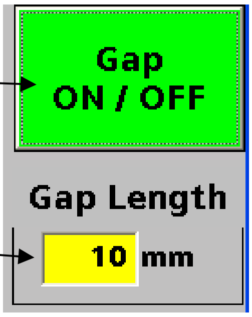
Table 5-3: Standard operator control in the automatic mode

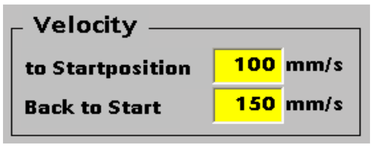
No.	Action	Comment
1	Initial situation: The “flying saw” is in the AUTOMATIC-STOPPED mode	 picture: Automatic mode: Automatic- Stopped
2	Using the **Sync Position** slider switch, enter the position at which the flying saw reaches the position where the material web is to be cut.	 calculated 100 mm selected 100 mm
3	The flying saw starts to move to the starting position by pressing the **Flying Saw STARTPOS** button	
4	After the starting position has been reached, the flying saw is in the AUTOMATIC-READY mode	 picture: Automatic mode: Automatic- Ready
5	The flying saw is enabled for operation using the **Flying Saw START** button.	
6	The flying saw is in the AUTOMATIC-STANDBY mode and waits for material.	 picture: Automatic mode: Automatic- Standby
7	Select the required material web velocity using the **Material Velocity** slider.	 Material Velocity 500 400 320 240 160 80 0 actual 0 mm/s selected 50 mm/s

8	Depending on the material velocity and the cutting duration, an actual maximum position of the flying saw is obtained, which is identified by a red bar.	 Flying Saw Mode Selected: automatic Actual: automatic
9	You can start to thread the material web or continue motion after the material web was stopped by pressing the **Material START** button.	
10	If the flying saw has synchronized itself to the motion of the material web, the flying saw is in the AUTOMATIC-PRODUCING mode.	 picture: Automatic mode: Automatic- Producing
11	Here, you can select whether a cutting position is to be generated at each print mark (sensor signal) or only after n print marks.	 Cut every 1 Print Mark
12	You can stop the material web using the **Material BREAK** button.	
13	When the material web has been stopped, the flying saw is in the AUTOMATIC-HELD mode	 picture: Automatic mode: Automatic- Held
14	You can start to remove the material web from the system by pressing the **Material END** button.	
15	The flying saw then waits in the AUTOMATIC-STANDBY mode for the next material web.	 picture: Automatic mode: Automatic- Standby

Expanded operator control

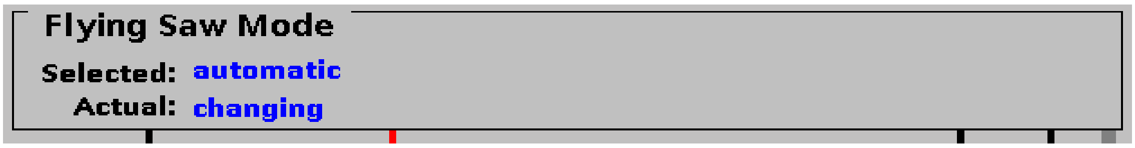
Table 5-4: Expanded operator control in the automatic mode

No.	Action	Comment
1	If the flying saw is in the AUTOMATIC-STOPPED, operating mode, you can select one of two possibilities: 1. Print Mark Simulation OFF i.e. the demonstration case itself generates print marks using sensors. The cut length can only be changed in steps of complete revolutions. 2. Print MARK simulation ON this means that the print marks – and therefore also the cut length – can be freely selected .	
2	If the print mark simulation has been activated, this character is displayed at the top left edge of the screen.	
3	You can change the cut length with the **Cutlength** slider. The system automatically calculates the minimum cut length from the data specified for the material velocity, cut duration, velocity for return positioning and the actual acceleration values. The maximum cut length is obtained from the minimum plus 1000!	 Cutlength 1479 1229 1079 929 779 629 479 calculated 479 mm selected 479 mm
4	You can enter the cutting time using **sel** For **act** the remaining cutting time is displayed during the cut itself.	 sel 1000 ms act 0 ms
5	You can activate/deactivate the "gap" function using the **Gap ON / OFF** button You can define the size of the gap by entering **Gap Length**	 Gap Length 10 mm

6	Here, you can set the velocities for the return to the starting position and also when returning to the starting position in the automatic mode	 Velocity to Startposition 100 mm/s Back to Start 150 mm/s

Display areas

Fig. 5-8: Flying saw mode



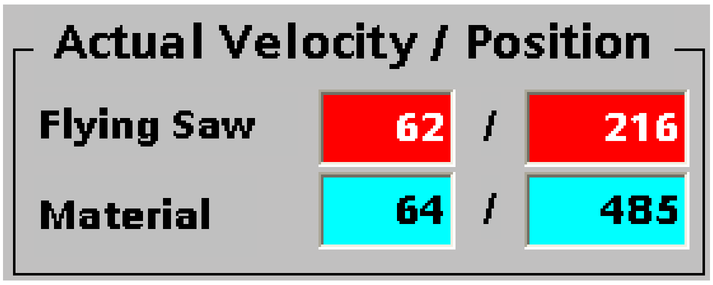
Flying Saw Mode

Selected: automatic

Actual: changing

This area informs you about the selected and presently active operating mode of the FlyingSaw FB.

Fig. 5-9: Actual velocity / position



Actual Velocity / Position

Flying Saw 62 / 216

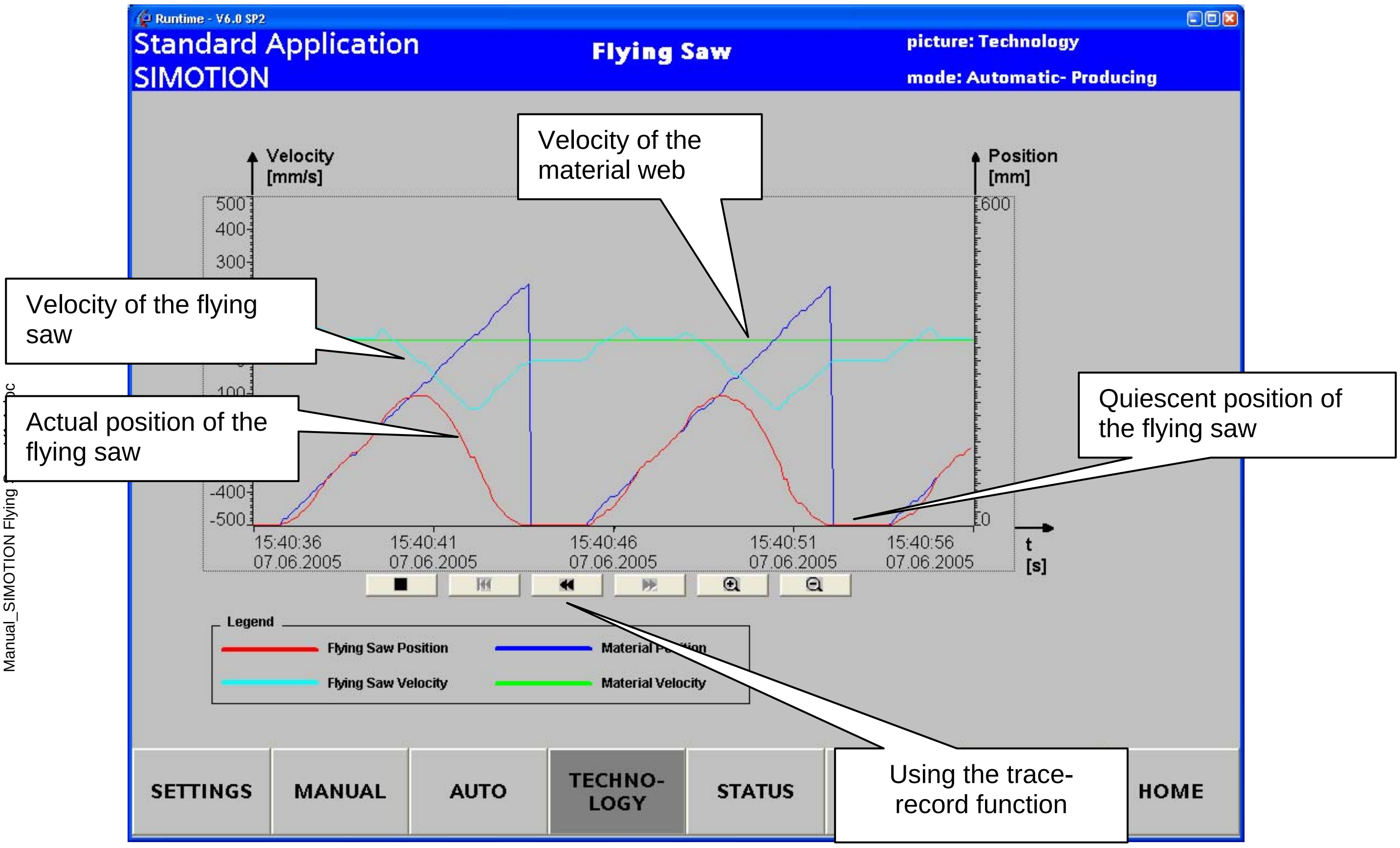
Material 64 / 485

In this area, the actual velocity [mm/s] and the actual position [mm] are displayed for the material and flying saw axis.

5.2.6 Technology view

The technology view of the application can be selected from every operator screen using the **TECHNOLOGY** button.

Fig. 5-10 Technology view of the flying saw



Velocity of the material web

Velocity of the flying saw

Actual position of the flying saw

Quiescent position of the flying saw

Using the trace-record function

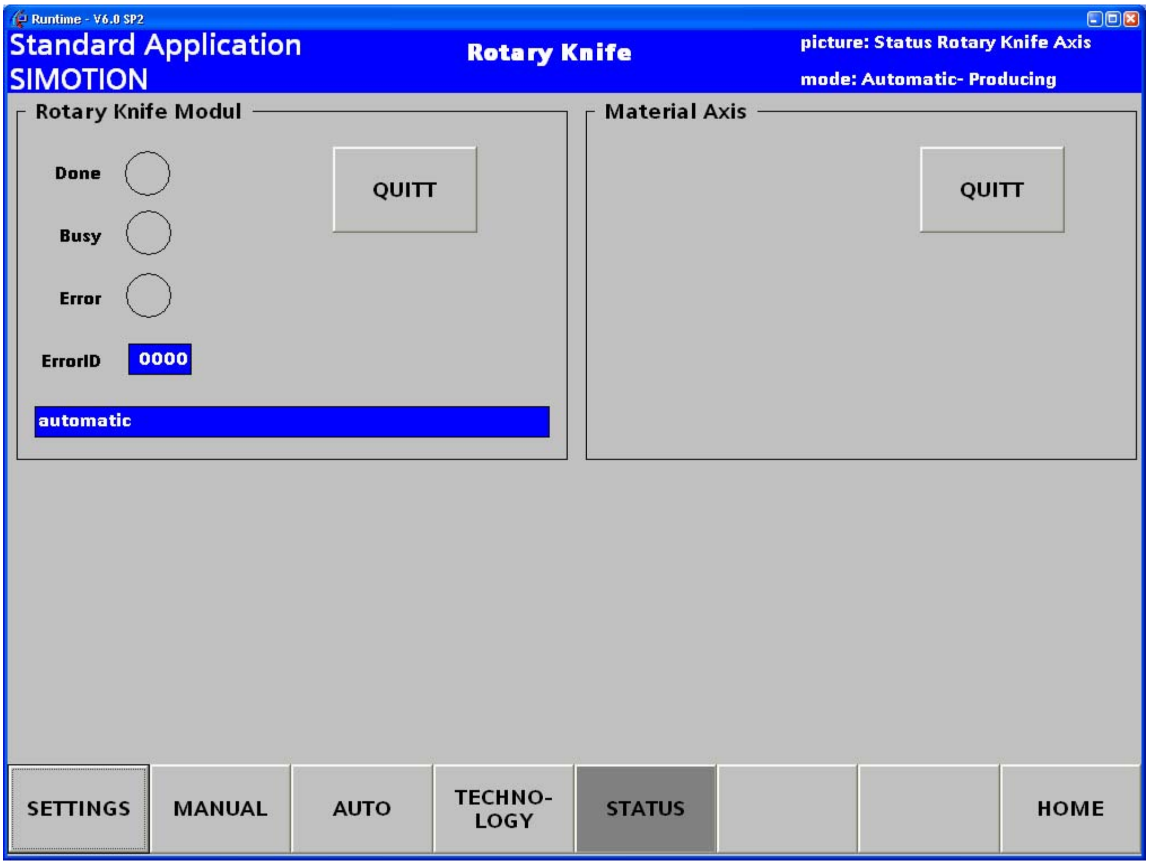
Using the trace function on the HMI screen, the actual position and velocity of the flying saw, the starting position, its velocities and position of the material web referred to the particular cut can be monitored and traced in the technology view.

It can also be easily seen how the position of the flying saw precisely corresponds to that of the material web during the cut itself.

5.2.7 Operator control functions in the status display

The status display of the application can be selected from every operator screen using the **STATUS** button.

Fig. 5-11: Status



picture: Status Rotary Knife Axis

mode: Automatic- Producing

ErrorID 0000

automatic

You can see the actual state of the FlyingSaw FB in the status display.

The error numbers that are displayed under ErrorID can be viewed under **Chapter** 12.2 Possible error messages at the error output ErrorID of the „FB_BGD_TEMPLATE_FlyingSaw()“.

Errors can be acknowledged using the **QUITT** button.

If the FlyingSaw-FB is in the **“error”** state, then the **Quitt** button should be pressed until the FlyingSaw-FB is in the **“disable”** state.

Section C: Integrating the core “flying saw” functions

Content

All of the steps necessary to integrate the core “flying saw” functions into your application are explained in Section C.

Preparations and parameterizing operations are also explained. Further, you are also told how to integrate the “FlyingSaw FB” into your application step-by-step.

Objective

Section C of this document is intended to provide the user with

- The prerequisites to use this standard SIMOTION application
- Preparations and parameterizing operations are explained
- The necessary steps to integrate this standard application into their application.
- Information and references to possible error messages and tips on how to use this standard application.

Subjects discussed

Chap.	Title	Contents
6	Program environment and interfaces	Structure of the standard application Function and identification of the program groups Call environment of the FlyingSaw FB Description of the interfaces and the parameters of the FB_BGD_TEMPLATE_FlyingSaw()
7	Integrating the core “flying saw” functions	Prerequisites that are absolutely necessary to use the core “flying saw” functions Preparations to use the core functions in your application Technology objects required and their parameterization Synchronous objects required and their parameterization Integrating core functions into your application
8	Using the „FB_BGD_TEMPLATE_FlyingSaw()“	General information and instructions Basic state of the function block “FB_BGD_TEMPLATE_FlyingSaw()” and when this state occurs. Mode changeover at the "FB_BGD_TEMPLATE_FlyingSaw()". Using the restart bit of the block. Function of the "immediate cut" of FB_BGD_TEMPLATE_FlyingSaw()“. Function of the "create gap" of the FB_BGD_TEMPLATE_FlyingSaw()“. Display of block errors Function of the synchronizing mechanism of the FB_BGD_TEMPLATE_FlyingSaw ()

6 Program environment and interfaces

6.1.1 Function and identification of the program groups

The standard “flying saw” application is sub-divided into the following program groups:

- **OMAC**
- **SAP**
- **FS**
- **SIM**
- **HMI**

OMAC

In the OMAC program group, the operating mode manager is used according to the OMAC standard of the standard SIMOTION Easy Basics (SEB) application.

SAP

Program group to solve automation tasks (demo) machine with the application example of the standard “flying saw” application. Based on the SIMOTION D demonstration case, the mode of operation and core functions of the standard application are presented/demonstrated in conjunction with a WinCCflex-base visualization system.

FS

Program group with the core functions of the standard “flying saw” application.
This program group includes the "flying saw" TEMPLATE and supplementary functions to manage the synchronous position.

SIM

Program group to simulate system signals in the demonstration case environment

HMI

Program group to display system sequences on the WinCCflex operator interface (screen)

6.1.2 Program structure

All of the functions, implemented in the standard “flying saw” application are listed in the following table according to their assignment to a particular program group and program unit.

Table 6-1: Program structure of the standard “flying saw” application

Pro-gram Section	Program unit	Program module	Data unit
OMAC	OmacMain	OmacMain()	OmacVar
	OmacStUp	OmacStUp()	

SAP	SAP_FS	BGD_SAP_FlyingSaw()
		Startup_SAP()
			SAP_Var

SAP	SAPState	FC_SAP_FlyingSaw_AutomaticAborted()
		FC_SAP_FlyingSaw_AutomaticAborting()
		FC_SAP_FlyingSaw_AutomaticHeld()
		FC_SAP_FlyingSaw_AutomaticHolding()
		FC_SAP_FlyingSaw_AutomaticProducing()
		FC_SAP_FlyingSaw_AutomaticStandby()
		FC_SAP_FlyingSaw_AutomaticReady()
		FC_SAP_FlyingSaw_AutomaticStarting()
		FC_SAP_FlyingSaw_AutomaticStopping()
		FC_SAP_FlyingSaw_AutomaticStopped()
		FC_SAP_FlyingSaw_AutomaticManual()
		FC_SAP_FlyingSaw_AutomaticIdle()
		FC_SAP_FlyingSaw_AutomaticEStop()	

Pro-gram Section	Program unit	Program module	Data unit
FS	FS_TEMPL	**FB_BGD_TEMPLATE_FlyingSaw()**	FS_Var

	FS_PMIPO	MT_FS1_PrintmarkDetection()
		IPO_FS1_IPO_routine()	

	FS_SPB	FB_BGD_FS_SPB_in()
		FB_BGD_FS_SPB_reset()
		FB_BGD_FS_SPB_read()
		FB_BGD_FS_SPB_out()	

SIM	SIM_PM	IPO_SIM_Printmarks()
		Startup_SIM()
			SIM_Var

HMI	HMI_SAP	BGD_HMI_FlyingSaw()
		Startup_HMI()
		FB_BGD_HMI_Printmarks()
		FB_BGD_HMI_Cuts()
		FB_BGD_HMI_Material()
			HMI_Var

The meanings are as follows:

FB: The program module is programmed as function block

FC: The program module is programmed as function

MT: The program must be called in the motion task

BGD: Programming function or function block is used to make a call in the background task.

IPO: Program is used to make a call in the IPO task.

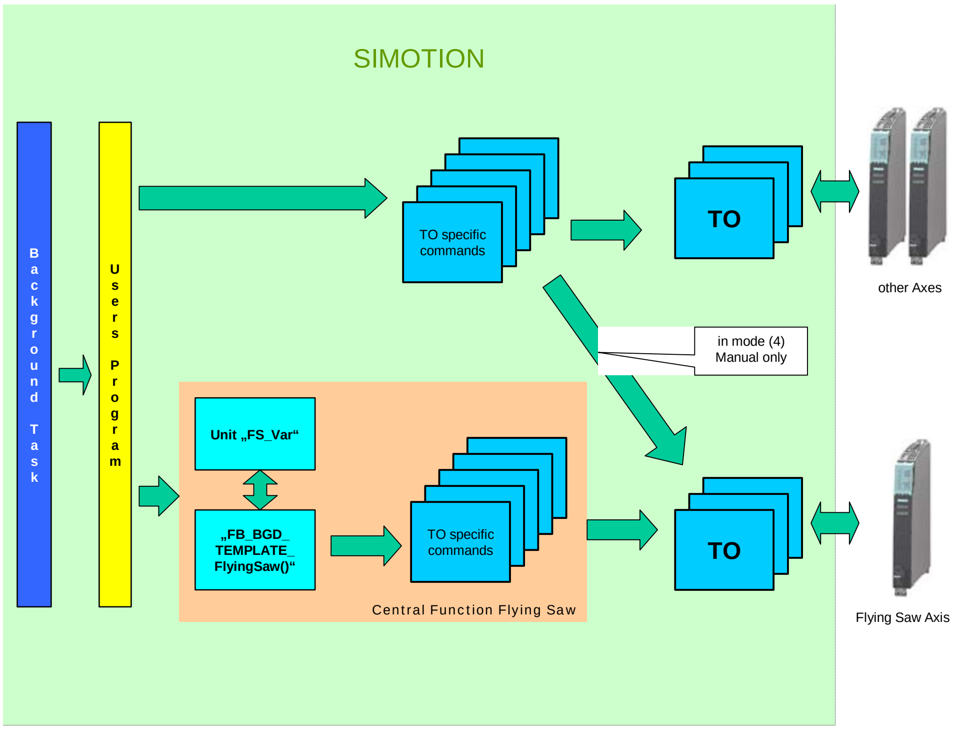
Startup Program is used to make a call in the start-up task.

🟧 Core functions, which the user can use, unchanged in his application.

6.2 Call environment

The function block FB_BGD_TEMPLATE_FlyingSaw() of the “flying saw” core function must be cyclically called in the user program. This is the reason that the call can only be made from a program that is incorporated in the background task.

Fig. 6-1 Call environment of the FB_BGD_TEMPLATE_FlyingSaw()



The technology object “FlyingSawAxis”, influenced by the function block FB_BGD_TEMPLATE_FlyingSaw(), may only be addressed by the user program if, beforehand, the user switched the core “flying saw” function into **Mode 4 “Manual”**. In all of the other modes, it is not permissible that the user program influences the technology object “FlyingSawAxis”.

6.3 Interfaces

6.3.1 Classifying the interfaces

The function block FB_BGD_TEMPLATE_FlyingSaw() can be influenced using several parameters and interfaces that are classified/sub-divided into the following areas:

- Block interfaces
- User interface in the global data area (data unit FS_Var)

The function block is signaled changing tasks and modes using the block interface. The function block signals the actual status and possibly occurring faults back to the user program also via this interface.

The function block is mainly signaled the physical quantities of the “flying saw” to be controlled via the user interface in the global data area. In normal “flying saw” operation, these quantities are not changed.

6.3.2 Block interface of the FB_BGD_TEMPLATE_FlyingSaw()

The following interfaces are provided at the block to control the flying saw using the function block FB_BGD_TEMPLATE_FlyingSaw():

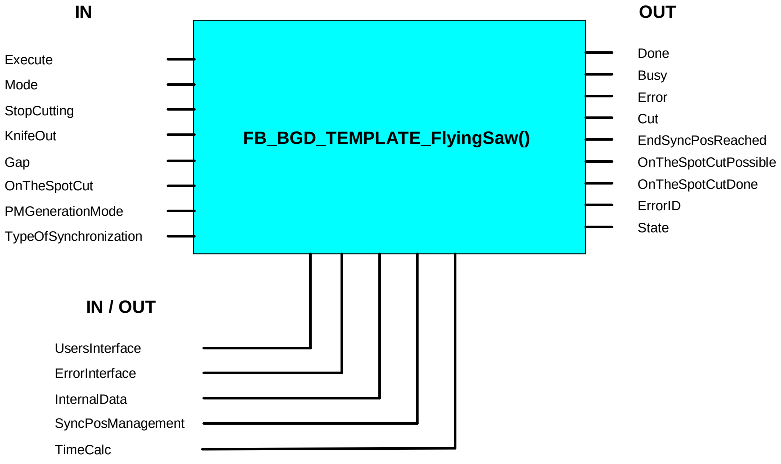


Table 6-2 Interfaces of the FB_BGD_TEMPLATE_FlyingSaw()

Parameter	Data type	Initial value	Description
Input parameter (IN)			
Execute	BOOL	False	A queued mode changeover is activated using this input.

Parameter	Data type	Initial value	Description
Mode	INT	0	Using Mode, the mode is pre-selected that is activated with the next positive signal edge at the execute input.
StopCutting	BOOL	False	When this bit is set, the module is informed that cutting has been completed and a gap can be created or the cutting device can be withdrawn from the material.
KnifeOut	BOOL	False	When this bit is set, the module is signaled that the cutting device is no longer in contact with the material and the cutting device can be returned to its starting position.
Gap	BOOL	False	If this bit is set, after a cut, the flying saw generates a gap between the cut piece of material web and the material web using a superimposed motion of the cutting device.
OnTheSpotCut	BOOL	False	When this bit is set, a synchronous position is immediately generated on the material web for the next cut.
PMGenerationMode	INT	PM_CALCULATED	PM_CALCULATED: The next cut position is defined automatically after running one cutlength. PM_MEASURED: The next cut position is defined by printmark detection.
TypeOfSynchronisation	INT	BY_TIME	BY_TIME: The synchronizing is done according to dynamic values entered. BY_LEADING_AXIS_VALUE: The synchronizing is done according to leading axis values. The master synclength is set to a value as twice as slave synclength automatically. This causes an asymptotic synchronization.

Parameter	Data type	Initial value	Description
Input/output parameter (IN/OUT)			
UsersInterface	STRUCT		User interface
ErrorInterface	STRUCT		ErrorID of the technology functions
InternalData	STRUCT		Internal data of the sequence control
SyncPos Management	STRUCT		Data of the synchronous position management
TimeCalc	STRUCT		Time calculation data
Output parameter (OUT)			
Done	BOOL	False	Selected mode has been activated.
Busy	BOOL	False	Mode changeover is active.
Error	BOOL	False	Indicates faults/errors within the FBs and at the cross-cutter axes.
Cut	BOOL	False	The flying saw moves in synchronism with the material web – cutting can start.
EndSyncPos Reached	BOOL	False	Alarm, if the flying saw passes/exceeds the upper limit value of the synchronous range when in the automatic mode
OnTheSpotCut Possible	BOOL	False	The flying saw is in its starting position and an immediate cut is possible
OnTheSpotCut Done	BOOL	False	The immediate cut was carried-out
SyncNotPossible	BOOL	False	The last synchronization operation could not be executed with the secondary conditions/constraints present.
ErrorID	WORD	0	Fault code
State	INT	0	Actual operating mode

6.3.3 Structure of the global data area of the data unit FS_Var

The interconnection and links with the technology objects required and the physical reference quantities and control information are saved in the user interface of the instance data area.

The parameters saved here are generally not changed during fault-free operation of the “flying saw”.

Fig. 6-2 Structure of the global data area of the core “flying saw” function

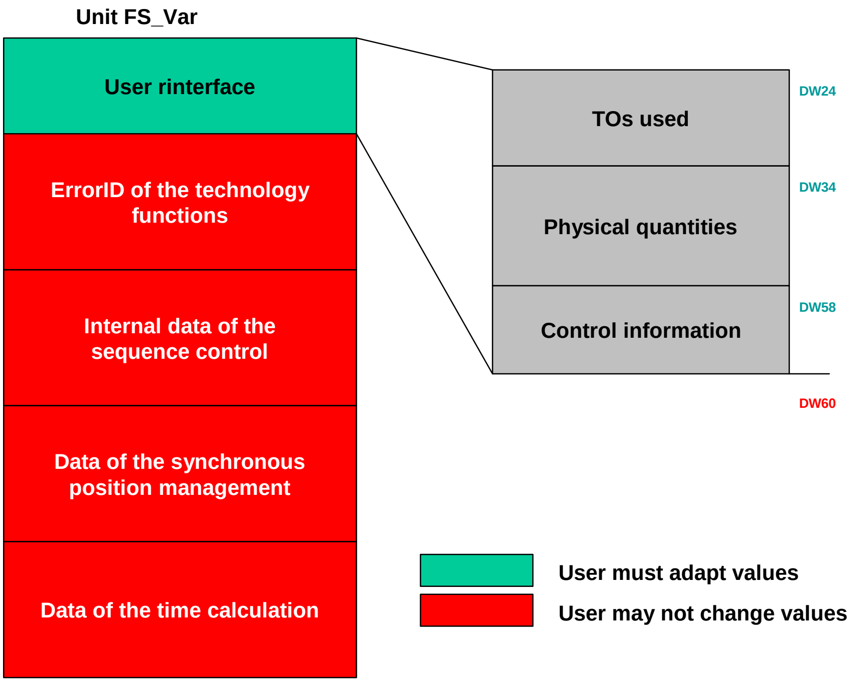

Unit FS_Var
User rinterface
ErrorID of the technology functions
Internal data of the sequence control
Data of the synchronous position management
Data of the time calculation
TOs used
Physical quantities
Control information
DW24
DW34
DW58
DW60
User must adapt values
User may not change values

Table 6-3 User interface in the global data area of the unit FS_Var

Parameter	Data type	Initial value	Description
User interface			
Matrix of the TOs used			
FS_AxesTOs	StructAxesTOs		Matrix to reference the technology objects relevant for the “flying saw”.
Physical quantities			
DistanceToSensor [mm]	LREAL	200.0	Clearance between the sensor and zero position of the FlyingSawAxis
StartPos [mm]	LREAL	0.0	Circumference of the cross-cutter / number of knives
SyncPos [mm]	LREAL	100.0	Position from where the flying saw moves in synchronism with the material web.

Parameter	Data type	Initial value	Description
EndSyncPos [mm]	LREAL	20.0	End position of the synchronous range
EndPos [mm]	LREAL	125.0	Starting position of the cross-cutter
ToStartposVelocity [mm/s]	LREAL	100.0	Velocity of the travel back to the starting position
ToBackposVelocity [mm/s]	LREAL	150.0	Velocity of the travel back to the starting position
AccelerationCut [mm/s²]	LREAL	100.0	Acceleration value for synchronization motion
AccelerationBack [mm/s²]	LREAL	100.0	Acceleration value for return motion to the starting position
AccelerationGap [mm/s²]	LREAL	100.0	Acceleration value for motion to create a "gap".
GearingRatio	LREAL	1.0	Ratio between measured and effective velocity of the material web.
CutEverySensorSignal	DINT	1	Specifies after how many sensor signals a synchronous position is to be generated.
GapLength	LREAL	10.0	Length of the gap that should be located between the cut pieces
GapVelocity	LREAL	50.0	Higher-level velocity with which the gap is to be created

Parameter	Data type	Initial value	Description
Control information			
Restart	BOOL	false	If the bit is set (e.g. in the StartUp task), then the template executes a re-initialization and resets the bit. This bit **must** be set for each new start!
MaterialIn	BOOL	false	If the bit is set, the material web is in the flying saw area.
MaterialInMotion	BOOL	false	If the bit is set, the material web in the flying saw area.is moving.

Fig. 6-3 Matrix of the relevant technology objects (TOs)

	Axis_Material	**Axis_FlyingSaw**
Pos_Axis	**X**	**--**
Following_Axis	**--**	**X**
External_Encoder	**(X)**	**--**
Following_Objekt	**--**	**X**
Printmark	**X**	**--**

(X) In realen Anwendungen kann auch auf einen externen Geber zugegriffen werden

7 Integrating the core “flying saw” functions

7.1 This is how you integrate core functions into your project

Please proceed as follows to integrated core functions into your project:

- Check whether your equipment fulfills the software and hardware prerequisites listed in **Chapter 7.2 Prerequisites.**
- De-archive and load the relevant project sections as described in **Chapter 7.3 Preparations.**
- Set-up the required technology objects as described in **Chapter 7.4 Setting-up the required technology objects.**
- Assign the synchronous relationships as described in **Chapter 7.5 Assigning the synchronous relationships.**
- Call-up the core functions as listed in **Chapter 7.6 Integrating into your application.**
- Information and instructions on how you must integrate core functions into the sequence of your user program are provided in **Chapter 8 Using the "FB_BGD_TEMPLATE_FlyingSaw()".**

7.2 Prerequisites

7.2.1 SIMOTION SCOUT with SIMATIC STEP 7

In order to use this standard SIMOTION application, the SIMOTION SCOUT programming interface must be correctly installed on your computer.

You have two possibilities to do this:

- You can install SIMOTION SCOUT in its standalone version - the STEP 7 functions required will be automatically installed.

Table 7-1 Software components

Software	Diagram	Order No./MLFB and functions	Version used
SIMOTION SCOUT standalone		6AU1810-0CA40-0XA0 SCOUT standalone is the engineering tool to program all SIMOTION controls without STEP 7	V4.0.0

or

- You install STEP 7 followed by SIMOTION SCOUT.

Table 7-2 Software components

Software	Diagram	Order No./MLFB and functions	Version used
STEP 7		6ES7810-4CC07-0YA5 Step7 is the basis package for all optional software packages and is used to program the SIMATIC S7.	V5.3 SP3 HF1
SIMOTION SCOUT		6AU1810-0BA40-0XA0 SCOUT is the engineering tool to program all SIMOTION controls	V4.0.0

This form of the installation has been used when generating the standard “flying saw” application and should therefore be the preferred one for users.

7.2.2 SIMOTION control

A SIMOTION control is required to operate the core “flying saw” functions. All SIMOTION D, SIMOTION P and SIMOTION C controls can be used.

.

Note The application example has been developed and tested for use in conjunction with the **SIMOTION D** training case **with CPU D435**. Modifications and changes may have to be made when used in another hardware environment

.

In order to correctly use the program elements in this document, you should be knowledgeable about handling, and programming the control being used as well as its functions.

Table 7-3 Hardware components of the core “flying saw” functions

Hardware element	Diagram	Order No./MLFB and functions
SIMOTION CPU D435		6AU1435-0AA00-0AA0 Version C The CPU D435 processes the user program, the technology and checks the drives.
SIMOTION D435 32MB CF-Card		6AU1400-2JA00-0AA0 The SIMOTION program and the SINAMICS configuring are saved on the CF card.

7.2.3 Technology objects required and synchronous relationships

The following technology objects must be set-up and interconnected with one another in the following fashion in order to use the core “flying saw” functions:

Technology objects

The required technology objects are listed according to their function within the core “flying saw” functions in the following:

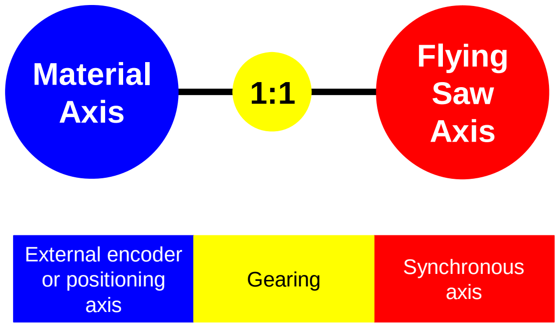
- Generating the master (leading) value from the motion of the material web:
  - **TO Achse “MaterialAxis”** as real positioning or synchronous axis (maximum configuration)

    To determine the position and velocity of the material web as master (leading) value of the core “flying saw” functions and to coordinate the motion of the axis – material web from the same control.
- Coordinating the flying saw axis
  - **TO axis “FlyingSawAxis”** as real synchronous axis

Synchronous relationships

The "flying saw" core functions require the following synchronous relationships:

Fig. 7-1 Synchronous relationship required for the “FlyingSaw FB”



The MaterialAxis is the reference quantity for the “flying saw”. For this purpose, it must be made available to the “flying saw FB” as “positioning axis”.

The FlyingSawAxis is connected, for the cut, as “synchronous axis” with the MaterialAxis in a 1:1 (gearing) synchronous relationship.

The technology objects and synchronous relationships listed above must be set-up and configured/engineered by the user in SIMOTION SCOUT.

7.3 Preparations

7.3.1 De-archiving the standard "flying saw" application

The standard “flying saw” application is supplied as STEP 7/SCOUT project. In order to use the template, this project must be de-archived either using STEP 7 or SCOUT.

7.3.2 Downloading the core functions into your SCOUT project

In order to quickly and simply transfer the core “flying saw” functions into your SCOUT project, you should proceed as shown in the following steps.

Table 7-4 This is how you download the core functions into your project

No	Action	Comment
1	Open the standard “flying saw” application using SCOUT	
2	Open your user project with SCOUT	SCOUT is opened a second time!
3	Copy the program units FS_SPB FS_PMIPO FS_TEMPL FS_VAR from the standard application into your user project	By dragging and dropping
4	Close SCOUT using the standard application	Ready!

7.4 Setting-up the required technology objects

Prerequisite

SIMOTION SCOUT has been started.

The user knows how to apply the SIMOTION SCOUT program.

7.4.1 Flying saw axis

Configuration

- Insert a new axis with the name **FlyingSawAxis**
- Parameterize the axis as **synchronous axis**
- Set the axis type as **linear**
- Parameterize as **modulo axis** with a modulo length greater than the maximum traversing distance (this is monitored from the FlyingSaw-FB → “parameterizing error”)
- All of the additional parameters should be set corresponding to the drive and encoder data.

Mechanical system

- For the parameter “distance for each spindle revolution” enter the distance that the knife tip of the “flying saw” moves through for one motor revolution.
- Appropriately supplement the other parameters as well as geometry and design.

Pre-assignment

- Please enter this parameter corresponding to the drive dynamic performance.

Limits

- Please enter these parameters corresponding to the system layout and configuration.

Referencing (homing)

- Please enter these parameters corresponding to the encoder (the template assumes a referenced/homed axis). If an incremental encoder is used, it is necessary to reference/home the axis in **mode 4 “Manual”** before additional operating modes are selected.)

Monitoring functions – closed-loop control

- Please set these parameters corresponding to the system layout and configuration.

7.4.2 Axis, material web

Configuration

- Insert a new axis with the name **MaterialAxis**
- Parameterize the axis as **positioning axis**
- Set the axis type as **linear**
- Parameterize as **modulo axis** with a modulo length greater than the maximum product length
- All of the additional parameters should be set corresponding to the drive and encoder data.

Mechanical system

- For the parameter "distance for each spindle revolution", the distance that the material web moves through for one revolution of the drive roll should be entered.
- Appropriately supplement the other parameters as well as geometry and design.

Pre-assignment - limits

- Please enter these parameters corresponding to the system / drive relationships.

Referencing (homing)

- Parameterize "**not required"**

Monitoring functions – closed-loop control

- Please set these parameters corresponding to the system layout and configuration.

7.5 Assigning the synchronous relationships

7.5.1 FlyingSawAxis_SYNCHRONOUS_OPERATION

Configuration

- Select the **MaterialAxis** as master (leading) axis
- Select **setpoint coupling** as coupling type.

Pre-assignment (gear synchronization)

- Synchronizing:
  Enter the synchronizing position of the master (leading) axis and slave (following) axis
  (this is checked and corrected by the FlyingSaw FB)
- Position reference:
  Synchronize before the synchronizing position
  (this is checked and corrected by the FlyingSaw FB)
- SyncPos master (leading) value:
  0.0
  (the FlyingSaw FB enters the actual value)
- SyncPos slave (following) axis:
  0.0
  (the FlyingSaw FB enters the actual value)
- The other values are no longer relevant.

Pre-assignment (dynamic)

- Profile input: **Time-related synchronizing profile**
  (this is checked and corrected by the FlyingSaw FB)
- Please select the dynamic parameters of the time-related synchronization so that the FlyingSawAxis does not reach the dynamic limits when synchronizing and de-synchronizing.

7.6 Integrating into your application

7.6.1 Calling the “FlyingSaw FB” in the user program

The function block of the core “flying saw” functions can also be simply called in the program after integration into your SIMOTION project.

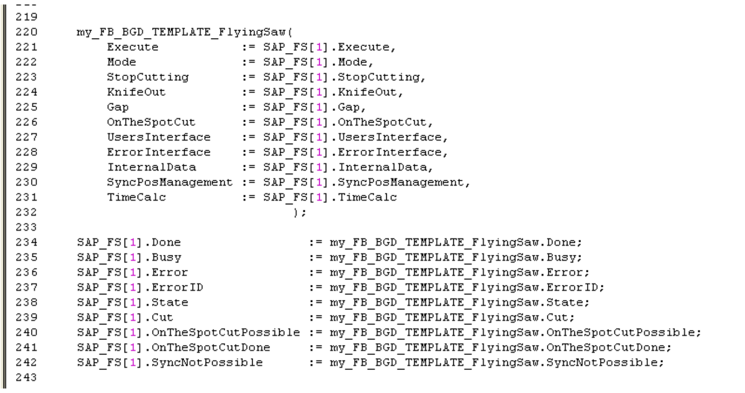
Calling the “FB_BGD_TEMPLATE_FlyingSaw()” in ST and FBD

As an example, the calls of the function block “**FB_BGD_TEMPLATE_FlyingSaw()**” of the core “flying saw” functions in the ST and FBD programming languages are shown here:

Table 7-5 Calling the function block “_BGD_TEMPLATE_FlyingSaw()“

FB_BGD_TEMPLATE_FlyingSaw()

ST



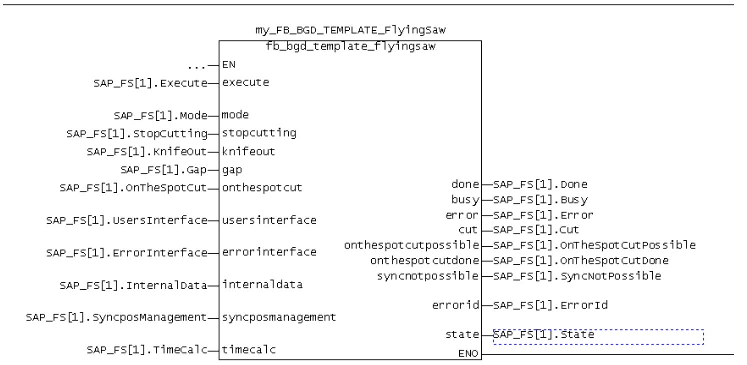
```
---

my_FB_BGD_TEMPLATE_FlyingSaw(
    Execute           := SAP_FS[1].Execute,
    Mode              := SAP_FS[1].Mode,
    StopCutting       := SAP_FS[1].StopCutting,
    KnifeOut          := SAP_FS[1].KnifeOut,
    Gap               := SAP_FS[1].Gap,
    OnTheSpotCut      := SAP_FS[1].OnTheSpotCut,
    UsersInterface    := SAP_FS[1].UsersInterface,
    ErrorInterface    := SAP_FS[1].ErrorInterface,
    InternalData      := SAP_FS[1].InternalData,
    SyncPosManagement := SAP_FS[1].SyncPosManagement,
    TimeCalc          := SAP_FS[1].TimeCalc
                          );

SAP_FS[1].Done                 := my_FB_BGD_TEMPLATE_FlyingSaw.Done;
SAP_FS[1].Busy                 := my_FB_BGD_TEMPLATE_FlyingSaw.Busy;
SAP_FS[1].Error                := my_FB_BGD_TEMPLATE_FlyingSaw.Error;
SAP_FS[1].ErrorID              := my_FB_BGD_TEMPLATE_FlyingSaw.ErrorID;
SAP_FS[1].State                := my_FB_BGD_TEMPLATE_FlyingSaw.State;
SAP_FS[1].Cut                  := my_FB_BGD_TEMPLATE_FlyingSaw.Cut;
SAP_FS[1].OnTheSpotCutPossible := my_FB_BGD_TEMPLATE_FlyingSaw.OnTheSpotCutPossible;
SAP_FS[1].OnTheSpotCutDone     := my_FB_BGD_TEMPLATE_FlyingSaw.OnTheSpotCutDone;
SAP_FS[1].SyncNotPossible      := my_FB_BGD_TEMPLATE_FlyingSaw.SyncNotPossible;

```

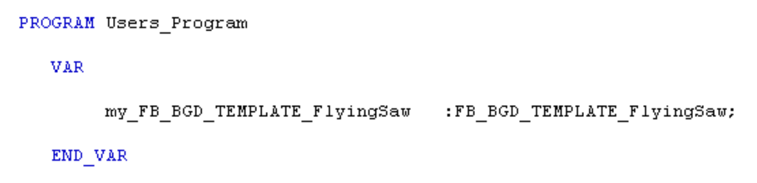
FUP



Assigning the instance

In the calling user program, the function block “FB_BGD_TEMPLATE_FlyingSaw()” must be assigned an instance. The following table includes examples in ST and FBD.

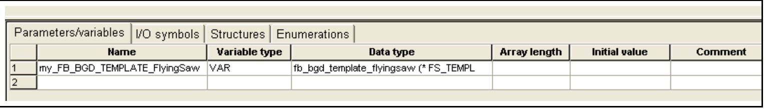
Table 7-6 Generating an instance of the “FB_BGD_TEMPLATE_FlyingSaw()”

<table>
<tr><th></th><th>Instance</th></tr>
<tr><td><b>ST</b></td><td>


```
PROGRAM Users_Program

   VAR

        my_FB_BGD_TEMPLATE_FlyingSaw   :FB_BGD_TEMPLATE_FlyingSaw;

   END_VAR
```
</td></tr>
<tr><td><b>FUP</b></td><td>


<table>
<tr><th></th><th>Name</th><th>Variable type</th><th>Data type</th><th>Array length</th><th>Initial value</th><th>Comment</th></tr>
<tr><td>1</td><td>my_FB_BGD_TEMPLATE_FlyingSaw</td><td>VAR</td><td>fb_bgd_template_flyingsaw (* FS_TEMPL</td><td></td><td></td><td></td></tr>
<tr><td>2</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
</table>
</td></tr>
</table>

7.6.2 Integrating the template block in the processing sequence

The core “flying saw” function is integrated in the processing sequence using a simple function block call and transferring the required parameters.

This call strategy corresponds to that of PLC-Open standard function blocks.

8 Using the "FB_BGD_TEMPLATE_FlyingSaw()"

8.1 General information and instructions

The most important element of the technology template is the function block “FB_BGD_TEMPLATE_FlyingSaw()”. The connected “flying saw” is parameterized and controlled using this block.

In the user program, the block must therefore be parameterized and the block mode changed-over in order to initiate that the “FB_BGD_TEMPLATE_FlyingSaw()” executes the required functions.

The "FB_BGD_TEMPLATE_FlyingSaw()“ is parameterized as described in **Chapter 6.3 Interfaces**. When parameterizing (assigning parameter values), basic values of the “flying saw” are defined that normally do not change; for example, the name of the flying saw axis, the starting position, the synchronous position etc. These values may only be changed when the system is at a standstill and changes require a re-initialization (restart) of the "FB_BGD_TEMPLATE_FlyingSaw()“!

The individual modes of the"FB_BGD_TEMPLATE_FlyingSaw()“ are described in **Chapter 3.2 Operating states of the "FlyingSaw-FB"**. The procedure to change over the mode is described in more detail in the following Chapters.

8.2 Initial state of the "FB_BGD_TEMPLATE_FlyingSaw()"

After a “restart”, the “FB_BGD_TEMPLATE_FlyingSaw()” is in the “disable” state.

Each time that the control is started, “restart” must be run by setting the restart bit in the startup task. (this is realized automatically when using the program startup_SAP() in the UNIT SAP_FS)

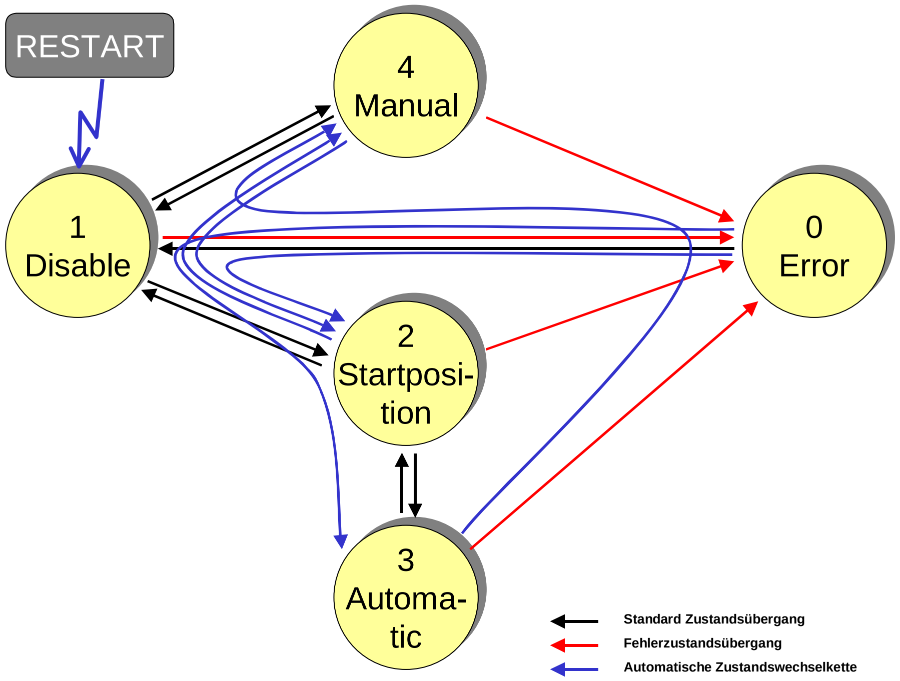
This means that the template is transitioned into its initial state and important technology parameters are checked regarding plausibility, if possible adapted, and if not possible, parameterizing errors are flagged to the user at the fault output.

8.3 Mode changeover sequence

The functions of the function block “FB_BGD_TEMPLATE_FlyingSaw()” and therefore the functions of the connected “flying saw” are controlled using the various state modes of the block.

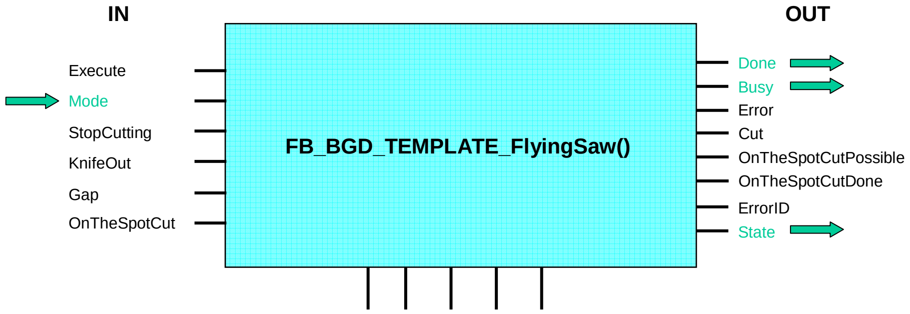
The following state modes and status transitions can be called at the block:

Fig. 8-1 Possible state transitions at the "FB_BGD_TEMPLATE_FlyingSaw()"



The actual block state is displayed at the **state** output.

Fig. 8-2 Inputs and outputs of the mode changeover



Changing-over the mode

In order to transition the block into a new state, the number of the required target state must be specified at the **mode** input. The changeover is activated using a high signal at **Execute** input. The block signals the active changeover into the new state using a high signal at the **Busy** output. If all of the actions associated with the changeover have been successfully carried-out and the new state has been reached, this is flagged by a high signal at the **done** block output. The number of the new state can be read-off at the **state** output.

The sequences and actions that are executed during the changeover are described in detail in Chapter 10.3.4 of this document.

8.4 Using the restart bit

Restart after a new start

The restart bit must be set at each new start of the SIMOTION D435 or when changing the parameterization. This is the reason that an initialization routine is run in the “FB_BGD_TEMPLATE_FlyingSaw()” and a parameter check is made and the block is brought into a defined state.

Note In the startup task, we recommend that the program startup_SAP() of the unit SAP_FS is used in order to initialize the "FB_BGD_TEMPLATE_FlyingSaw()" block.

The restart bit should also be set there in order to bring the block into a defined state!

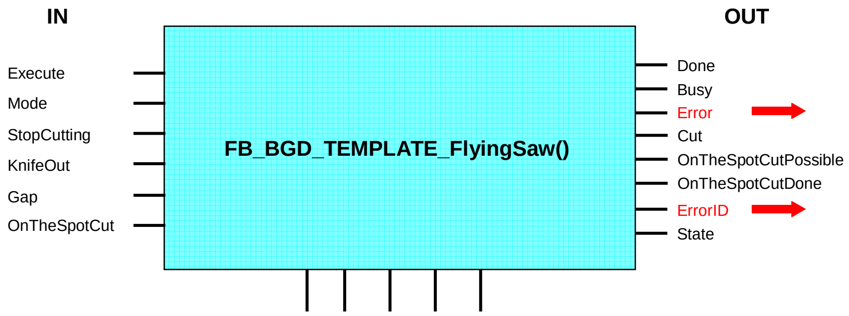
Note At restart, the block checks essential technology parameters as well as the existence of saved technology objects

After the block has been successfully initialized, the restart bit is automatically reset.

8.5 Error messages

If faults occur in the block itself or in technology objects and technology functions involved while FB_BGD_TEMPLATE_FlyingSaw() is operational, then these are signaled using the block outputs **error** and **ErrorID**.

Fig. 8-3 Block outputs for fault messages



The **error** bit signals an error while an error code is output at output **ErrorID**; this can be analyzed using the error analysis function.

A list of the possible error codes with a description of the error causes is provided in the Appendix of this document, Chapter 12.2.

Note The **error** output is only set if the **execute** input is set. The **ErrorID** and **state 0** are still output even after **execute** has been reset!

8.6 Help functions within the core “flying saw” functions

As part of the core functions, there are also help functions that make it easier for you to implement your “flying saw” application.

It provides you with solutions for the following functions:

- The synchronous position is sensed using sensors/measuring probes
- Buffer to save the measured synchronous positions for sequential execution of several cuts by the "flying saw".

The names and description of these functions are listed in **Chapter 10.5 Help routines.**

Section D: Program description

Content

Section D is interesting if you wish to expand/adapt your application based on the technology templates available.

Objectives

This part of the documentation should

- Explain to readers the special features/issues when generating a program
- Describe in detail the program structure of the FlyingSaw FB
- Illustrate and describe important program elements

Provide information and instructions on how this template can be adapted.

Prerequisite

Before possibly expanding this template it is helpful to have read the chapters in Section A and B in order to get to know the basic functions and applications of the template.

Subjects discussed

Chap.	Title	Contents
9	Information and instructions to adapt the core “flying saw” functions	
10	Description of important program elements	

Note

Before you make changes to the template, please observe the information and warnings listed in the following Chapter as well as the associated restrictions regarding support!

9 Information and instructions to adapt the core “flying saw” functions

9.1 Information and warnings

Before carrying-out changes

Before you carry-out changes to the components included in the core functions, you should get to know how the components function by referring to and reading the ST/MMC documentation.

Uncontrolled, incorrect changes and modifications to core functions can result in death and severe bodily injury!

Restrictions regarding support when changing components of the core functions

The Application Center can only provide support for core functions that have not been changed

If changes have been made to the code, then support can no longer be provided for core functions.

This also applies for the revision and adaptation recommendations listed in this Chapter.

10 Description of important program elements

10.1 Program structure

The core functions of the standard “flying saw” application are sub-divided into two sections

- **Declaration section**
- **Instruction section**

All of the interfaces, constants, instance data and multi-instance of the function blocks called from the block are described in the **Declaration section**. Er besteht aus der Unit FS_Var.

All program instructions of the code that can be run are provided in the **Instruction section**. This Section is sub-divided into four units.

- FS_TEMPL with the "FlyingSaw FB“.
- FS_PMIPO with the print mark sensing and the ipo-synchronous functions.
- FS_SPB with the FBs to manage the synchronous positions in the SyncPo buffer

10.2 Declaration part FS_Var

The structure of all of the data required for the FlyingSaw FB is saved in the unit FS_Var. Instances will be the data in the user unit SAP_Var. When required, in this unit, this data area can also be instantiated several times so that the FlySaw FB can also be called for several flying saws within one project.

Constants

- Axis numbers
- Operating states of the flying saw
- Sequence phases of the parameter check
- Sequence phases of the automatic parameterization
- Sequence phases when changing from the “error” to “disable”
- Sequence phases when changing from the “error” to “disable” state
- Sequence phases when changing from the “disable” to “error”
- Sequence phases when changing from the “disable” to “starting position”

- Sequence phases when changing from the “disable” to “manual”
- Sequence phases when changing from the “starting position” to “disable”
- Sequence phases when changing from the “starting position” to “error”
- Sequence phases when changing from the “starting position” to “automatic”
- Sequence phases when changing from the “automatic” to “disable”
- Sequence phases when changing from the “automatic” to “starting position”
- Sequence phases when changing from the “manual” to “disable”
- Sequence phases in "automatic" operation.
- Maximum length of the SyncPos buffer

Static variables

- Description of the data structure of the TO parameters
- Description of the data structure of the user interface with the geometry, machine data and control bits
- Description of the data structure of the error interface with the error IDs of the state change and the RetDINT and FR values of the system commands.
- Description of the data structure of the internal data area of the FlyingSaw FBs. Under no circumstances may users change these values.
- Description of the data structure to manage synchronous positions.
- Description of the data structure for time calculations within the FlyingSaw FBs
- Description of the data structure of the synchronous position detection using measuring function.

10.3 Functions of the FB_BGD_Template_FlyingSaw() ("FlyingSaw-FB")

10.3.1 Declarations

- Input interface
- Input/output interface
- Output interface
- Internal program data

10.3.2 Start identification, axis monitoring and automatic state change chains

Start identification

Identify whether a restart is present.
If yes, then

- Activate the monitoring of the parameterization of the technology objects as well as auto-parameterization.
- Control the state machines in the “manual” state via the state sequence
  - Error
    (if activated, the monitoring and auto-parameterization are realized in the error state)
  - Disable
  - Manual

  From any state.

If no, then

- Transfer the selected operating state with a positive edge at the execute input
- Reset all block outputs with a negative signal edge at the execute input

Axis monitoring functions

The flying saw axis has an error, the "FlyingSaw FB“ is forced into the error state.

However, the monitoring function is only active after the technology objects have been successfully completed.

Automatic state change sequences

The following automatic state change sequences have been implemented:

- From the “error” state into the “starting position” state.
  “Error“ → “Disable” → “Starting position”
- From the “error” state into the “automatic” state.
  “Error“ → “Disable” → “Starting position” → “Automatic”
- From the “error” state into the “manual” state.
  “Error“ → “Disable” → “Manual”
- From the “starting position” state into the “manual” state.
  “Starting position” → “Disable” → “Manual”
- From the “automatic” state into the “manual” state.
  “Automatic” → “Error” → “Disable” → “Manual”

- From the “manual” state into the “starting position” state.
  “Manual” → “Disable” → “Starting position”

10.3.3 Checking the input parameters and parameterization of the technology settings that are absolutely necessary

This program function is only active in the error state if it was activated by the user using the restart bit.

The following are monitored:

- The existence of specified TOs.
- The function (positioning axis, synchronous axis, …)
- Special properties/features required for the template, such as: Modulo axis and modulo value.

Deviations with respect to the template are displayed as fault messages.

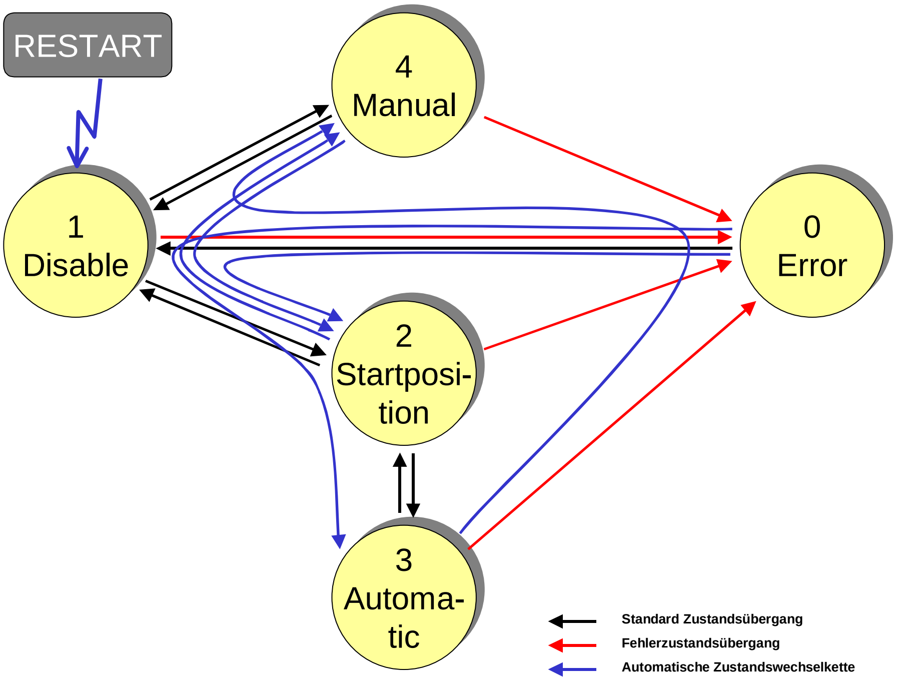
Parameterization of the technology objects absolutely required is carried-out in another program part.

The parameters that are therefore changed are described in **Chapter 7.4 Setting-up the required technology objects** and **Chapter 7.5 Assigning the synchronous relationships**.

10.3.4 State machine of the “FlyingSaw FB”

The state machines of the “FlyingSaw FB” are described in the following diagram. It includes possible operating states that can be activated and clearly shows the possible state transitions that may be initiated by the user.

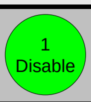
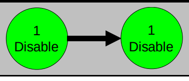
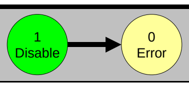
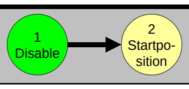
Fig. 10-1 State model of the "FlyingSaw FB"

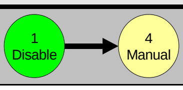
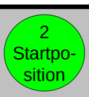
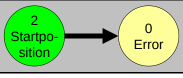
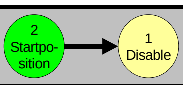
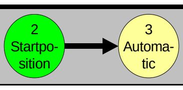


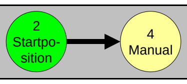
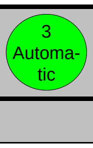
The functional sequences that are hidden behind the states and state changes (transitions) are listed in the following table.

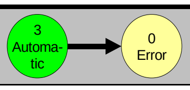
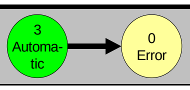
Table 10-1 Description of the sequences at the state change (state transition) in the “FlyingSaw FB”

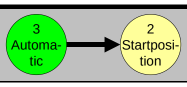
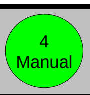
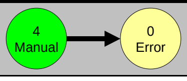
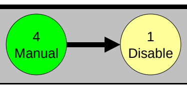
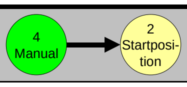
Step	Function	Comment
Mode Error (0)		0 Error
Error → Disable		0 Error → 1 Disable
0	All ErrorID memories are reset	
1	Calls the **_resetAxisError()** for the flying saw axis Calls the **_resetFollowingObject()** for the flying saw axis If the axis and the synchronous object have no error condition, then the "disable“ mode is activated.	

Step	Function	Comment
Mode Disable (1)		
Disable → Disable		
0	The stop command is prepared	
1	**_stop()** is called for the flying saw axis	
2	**_disableAxis()** is called for the flying saw axis If the axis is disabled, then the “disable” mode is activated.	
Disable → Error		
0	Preparation	
1	**_disableAxis()** is called for the flying saw axis If the axis is disabled, then the “error” mode is activated	
Disable → Starting position		
0	The enable command is prepared	
1	**_enableAxis()** is called for the flying saw axis If the axis is enabled, then advance to step 2	
2	**_resetAxisError()** is called for the flying saw axis If the axis is OK, advance to step 3	
3	**_pos()** is called for the flying saw axis with the direction of rotation for the shortest path If the starting position is reached, then the “starting position” mode is activated.	

Step	Function	Comment
Disable → Manual		
0	The enable command is prepared.	
1	**_enableAxis()** is called for the flying saw axis If the axis is enabled, then the “manual” mode is activated	
Mode, starting position (2)		
Starting position → Error		
0	Preparation	
1	**_disableAxis()** is called for the flying saw axis If the axes are disabled, then the “error” mode is activated	
Starting position → Disable		
0	The stop command is prepared.	
1	**_stop()** is called for the flying saw axis	
2	**_disableAxis()** is called for the flying saw axis If the axis is disabled, then the “disable” mode is activated	
Starting position → Automatic		
0	The SyncPosBuffer is reset	
1	Wait until a valid synchronous position is available If yes, then advance to step 2	
2	**_enableGearing()** is called to synchronize the flying saw axis to the material web at the master and slave positions If successfully synchronized, then advance with step 4, if not, then advance with step 3	

Step	Function	Comment
3	**_disableGearing()** is called to delete (clear) the command from the command queue. If required, then continue with step 1	
4	The "cut" output bit is set The actual synchronous position is deleted (cleared) from the SyncPosBuffer	
5	Wait until "StopCutting" signal appears If the "Gap" signal is present, then continue with step 6 If not, then continue with step 7	
6	**_pos()** is called for the flying saw axis with the "superimposed" merge mode in order to create a gap with the superimposed motion. When completed, then continue with step 7.	
7	If the "KnifeOut" signal appears, then **_pos()** is called for the flying saw axis to position back to the starting position. When completed, then continue with step 1.	
Starting position → Manual		
	This state change is achieved using an automatic state change sequence that reaches the manual state through the disable state.	
Mode, automatic (3)		
Automatic cycle		
0	Wait until a valid synchronous position is available If yes, then advance to step 1	

Step	Function	Comment
1	**_enableGearing()** is called to synchronize the flying saw axis to the material web at the master and slave positions If synchronization was successful, then continue with step 3, if not, then continue with step 2	
2	**_disableGearing()** is called to delete (clear) the command from the command queue. If this is successful, then continue with step 0	
3	The "cut" output bit is set The actual synchronous position is deleted (cleared) from the SyncPosBuffer	
4	Wait until "StopCutting" signal appears If the "Gap" signal is present, then continue with step 5 If not, then continue with step 6	
5	**_pos()** is called for the flying saw axis using the merge mode "SUPERIMPOSED_MOTION_MERGE" in order to create a gap with the superimposed motion. When completed, then continue with step 6.	
6	If the "KnifeOut" signal appears, then **_pos()** is called for the flying saw axis to return to the starting position. When completed, then continue with step 1.	
Automatic → Error		
	_disableAxis() is called for the flying saw axis If the axis is disabled, then the “error” mode is activated	
Automatic → Disable		
0	The stop command is prepared	

Step	Function	Comment
1	**_stop()** is called for the flying saw axis If the axis is disabled, then advance to step 2	
2	**_disableAxis()** is called for the flying saw axis If the axis is disabled, then the “disable” mode is activated	
Automatic → Starting position		
0	Resets the "cut" output bit If the "KnifeOut" signal is present, then prepare the position command and advance to step 1	
1	**_pos()** is called to return the flying saw axis back to its starting position.	
Mode, manual (4)		
Manual → Error		
	_disableAxis() is called for the auxiliary axis and the flying saw axis If the axes are disabled, then the “error” mode is activated.	
Manual → Disable		
0	The stop command is prepared	
2	**_stop()** is called for the flying saw axis	
3	**_disableAxis()** is called for the flying saw axis If the axes are disabled, then the “disable” mode is activated	
Manual → Starting position		
	This state change is achieved using an automatic state change sequence where the starting position state is reached via the disable state.	

10.4 Properties/features of startup_SAP

The startup_SAP program is located in the unit SAP_FS

- Assigns the actual TO instances
- Assigns the machine-specific parameters
- Resets the restart bit.
- Deletes the SyncPos buffer.
- Resets all internal program flags.

10.5 Help routines

10.5.1 Features and characteristics of the MT_FS1_PrintmarkDetection (print mark sensing)

The program MT_FS1_PrintmarkDetection is in the unit RK_PMIPO and must be called from a motion task.

The following functions are executed:

- Waits for a valid measured value
- Determines the synchronous position for the actual print mark
- Enters the synchronous position into the SyncPos buffer

10.5.2 Properties/features of the IPO_FS1_IPO_Routine

The program IPO_FS1_IPO_Routine is located in the RK_PMIPO unit and must be called from the IPO task.

- Calculates the position of the MaterialAxis referred to the flying saw
- Edge detection.

10.5.3 SyncPos buffer

Using the following FBs of the FS_SPB unit,

the SyncPos buffer is managed

- FB_BGD_FS_SPB_reset()
- FB_BGD_FS_SPB_in()

- FB_BGD_FS_SPB_out()
- FB_BGD_FS_SPB_read()

FB_BGD_FS_SPB_reset()

The SyncPos buffer is deleted (cleared) using this FB.

FB_BGD_FS_SPB_in()

Using this FB, when the print mark is sensed, a new synchronous position is entered into the buffer.

FB_BGD_FS_SPB_out()

Using this FB, after every cut, a synchronous position is deleted (cleared) from the buffer (FIFO)

FB_BGD_FS_SPB_read()

This FB is used to check as to whether a new synchronous position is available for the next cut and the flying saw must be synchronized.

Section E: Appendix

11 General information on the application

11.1 Scope of supply

The "flying saw" package comprises:

- Program
  S7/Scout project as ZIP file:
  FlyingSaw_for_SIMOTION_V4.1.1_V1.4.zip
- Documentation
  Implementation/Operating Instructions as PDF file
  FlyingSaw_with_SIMOTION_V4.1.1_V1.4.pdf

11.2 Revisions/Author

Table 11-1: Revisions/Author

Version	Date/Revision	Author
V 1.0	Generation	H.-E. Böhm
V 1.1	Change-over Ethernet	H.-E. Böhm
V 1.2	Protool templates trilingual	Ch. Pabst H.-E. Böhm
V 1.2	Changes General Notes	A. Hagelauer
V 1.3	13.04.06 Scout V4.0	H.-E. Böhm
V 1.3 (V 2.0!)	04.04.07 Functional Changes: - synchronization according to leading axis values. (asymptotic synchronization) - Ratio between measured and effective velocity of material web	H.-E. Böhm
V 1.4	06.06.08 Replacing ProTool by WinCflex / SCOUT V4.1.1.6	P. Tabori H.-E. Böhm

12 Error messages

12.1 Signaling error events at the "FlyingSaw FB" of the core "flying saw" functions

If an error occurs when calling the "FB_BGD_TEMPLATE_FlyingSaw()" of the core "flying saw" functions, then this is displayed using an error code at output **ErrorID** of the FB.

If the error is caused by a TO-specific command called from the Flying Saw FB, then its **RetDINT** or **FR** is documented in the data area FS_Var for evaluation by the user.

12.2 Possible error messages at the error code output ErrorID of the „FB_BGD_TEMPLATE_FlyingSaw()"

A reference is made to the internal block error source of the "FlyingSaw FB" in the **Explanation** column.

Table 12-1 Error codes of the flying saw template

ErrorID error code	**Explanation**
C001	There is an error at a flying saw axis
C005	Position of the flying saw axis greater than that specified under **UsersInterface.g_r_EndPos**.
C011	Disable to Disable Error when stopping the FlyingSawAxis **(_stop)** Details in FS_Var structure under **RetDINT_stop_FSA**
C012	Disable to disable Error when stopping the FlyingSawAxis **(_stop)** Details in FS_Var structure under **FR_stop_FSA**

ErrorID error code	Explanation
C021	Disable to starting position Error when positioning the FlyingSawAxis **(_pos)** Details in FS_Var structure under **RetDINT_pos_FSA**
C022	Disable to starting position Error when positioning the FlyingSawAxis **(_pos)** Details in FS_Var structure under **FR_pos_FSA**
C031	Starting position to disable Error when stopping the FlyingSawAxis **(_stop)** Details in FS_Var structure under **RetDINT_stop_FSA**
C032	Starting position to disable Error when stopping the FlyingSawAxis **(_stop)** Details in FS_Var structure under **FR_stop_FSA**
C041	Starting position to Startpos Error when positioning the FlyingSawAxis **(_pos)** Details in FS_Var structure under **RetDINT_pos_FSA**
C042	Starting position to Startpos Error when positioning the FlyingSawAxis **(_pos)** Details in FS_Var structure under **FR_pos_FSA**
C051	Starting position to automatic Error when activating gearing of the FlyingSawAxis **(_enablegearing)** Details in FS_Var structure under **RetDINT_enablegearing_FSA**
C052	Starting position to automatic Error when de-activating gearing after unsuccessful synchronization of the FlyingSawAxis **(_disablegearing)** Details in FS_Var structure under **RetDINT_disablegearing_FSA**
C053	Starting position to automatic Error when de-activating gearing after unsuccessful synchronization of the FlyingSawAxis **(_disablegearing)** Details in FS_Var structure under **FR_disablegearing_FSAFSA**
C054	Starting position to automatic Error for superimposed positioning of the FlyingSawAxis to create "gap" **(_pos)** Details in FS_Var structure under **RetDINT_possuperimp_FSA**

C055	Starting position to automatic Error for superimposed positioning of the FlyingSawAxis to create "gap" **(_pos)** Details in FS_Var structure under **FR_possuperimp_FSA**
C056	Starting position to automatic Error when positioning the FlyingSawAxis **(_pos)** Details in FS_Var structure under **RetDINT_pos_FSA**
C057	Starting position to automatic Error when positioning the FlyingSawAxis **(_pos)** Details in FS_Var structure under **FR_pos_FSA**

ErrorID error code	Explanation
C061	Automatic Run Error when activating gearing of the FlyingSawAxis **(_enablegearing)** Details in FS_Var structure under **RetDINT_enablegearing_FSA**
C062	Automatic Run Error when de-activating gearing after unsuccessful synchronization of the FlyingSawAxis **(_disablegearing)** Details in FS_Var structure under **RetDINT_disablegearing_FSA**
C063	Automatic Run Error when de-activating gearing after unsuccessful synchronization of the FlyingSawAxis **(_disablegearing)** Details in FS_Var structure under **FR_disablegearing_FSAFSA**
C064	Automatic Run Error for superimposed positioning of the FlyingSawAxis to create "gap" **(_pos)** Details in FS_Var structure under **RetDINT_possuperimp_FSA**
C065	Automatic Run Error for superimposed positioning of the FlyingSawAxis to create "gap" **(_pos)** Details in FS_Var structure under **FR_possuperimp_FSA**
C066	Automatic Run Error when positioning the FlyingSawAxis **(_pos)** Details in FS_Var structure under **RetDINT_pos_FSA**
C067	Automatic Run Error when positioning the FlyingSawAxis **(_pos)** Details in FS_Var structure under **FR_pos_FSA**
C071	Automatic to Disable Error when stopping the FlyingSawAxis **(move mit v=0)** Details in FS_Var structure under **RetDINT_stop_FSA**
C072	Automatic to Disable Error when stopping the FlyingSawAxis **(move mit v=0)** Details in FS_Var structure under **FR_stop_FSA**
C081	Automatic to Starting position Error when positioning the FlyingSawAxis **(_pos)** Details in FS_Var structure under **RetDINT_pos_FSA**
C082	Automatic to Starting position Error when positioning the FlyingSawAxis **(_pos)** Details in FS_Var structure under **FR_pos_FSA**

ErrorID error code	Explanation
C091	Manual to Disable Error when stopping the FlyingSawAxis **(move mit v=0)** Details in FS_Var structure under **RetDINT_stop_FSA**
C092	Manual to Disable Error when stopping the FlyingSawAxis **(move mit v=0)** Details in FS_Var structure under **FR_stop_FSA**
C0A1	Manual to Starting position Error when positioning the FlyingSawAxis **(_pos)** Details in FS_Var structure under **RetDINT_pos_FSA**
C0A2	Manual to Starting position Error when positioning the FlyingSawAxis **(_pos)** Details in FS_Var structure under **FR_pos_FSA**
C0F1	Incorrect mode selection from “error” mode
C0F2	Incorrect mode selection from “disable” mode
C0F3	Incorrect mode selection from “starting position” mode
C0F4	Incorrect mode selection from “automatic” mode
C0F5	Incorrect mode selection from “manual” mode
C101	Parameterizing error at the flying saw axis Axis is not parameterized as synchronous axis.
C201	Parameterizing error at the material axis/external encoder The material master (leading) value is neither a positioning axis nor an external encoder

13 Contact partner

Applicationcenter

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14 Please help us to become even better

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Evaluation of the document

Is this subject helpful/ beneficial for you? □ Yes □ No

How high are the benefits of this application for you in the following working phases?

	Very high				Very low	
– own training/ information	□	□	□	□	□	□
– conceptual phase	□	□	□	□	□	□
– engineering/writing code	□	□	□	□	□	□
– commissioning	□	□	□	□	□	□

How is this application from the didactic perspective?

	Very good				Very bad	
– scope	□	□	□	□	□	□
– layout/design	□	□	□	□	□	□
– clarity	□	□	□	□	□	□

Can the application be transferred to your own application?

	Very good				Very bad	
	□	□	□	□	□	□

Do you require support for this application? □ Yes □ No

Other comments ....

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