SIEMENS

Converting Toolbox Applications

SIMOTION Traversing Drive V4.0.5

siemens.com/converting

SIMOTION Traversing Drive V4.0.5

**SIEMENS**

Converting Toolbox
Introduction

The standard application "SIMOTION Traversing Drive" was developed with the objective of creating a flexible solution for traversing drive functions – whereby the essential data for defining the coil profile can be specified by input parameters which can be modified on the fly.

Using the SIMOTION control platform the application SIMOTION Traversing Drive allows to implement traversing drive functionality for the widest range of materials, e.g. wire, cable, foil, paper and textile threads.

Applicable in combination with:
SIMOTION Axis Function Block
SIMOTION Winder
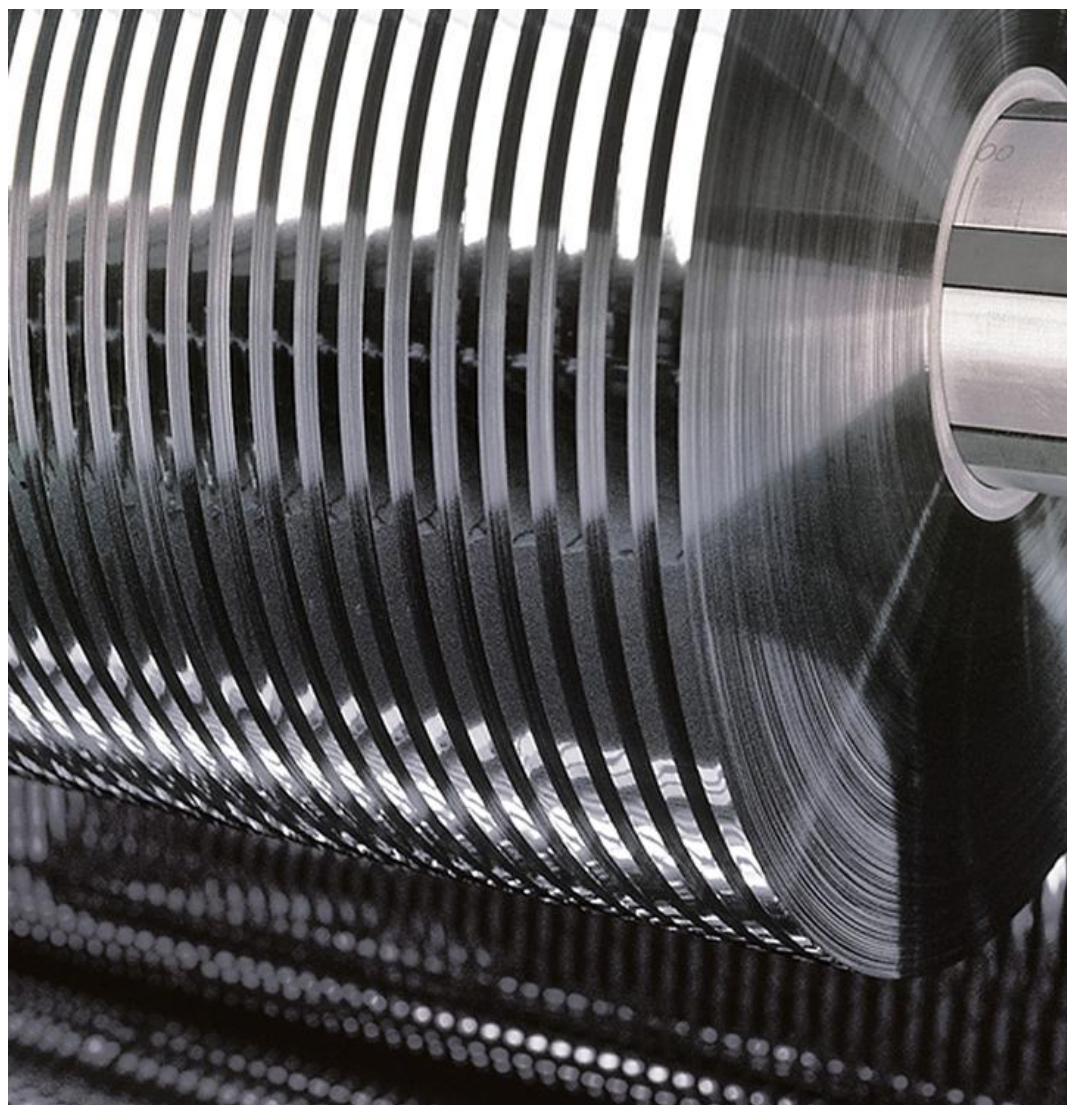
SIMOTION Traversing Drive V4.0.5
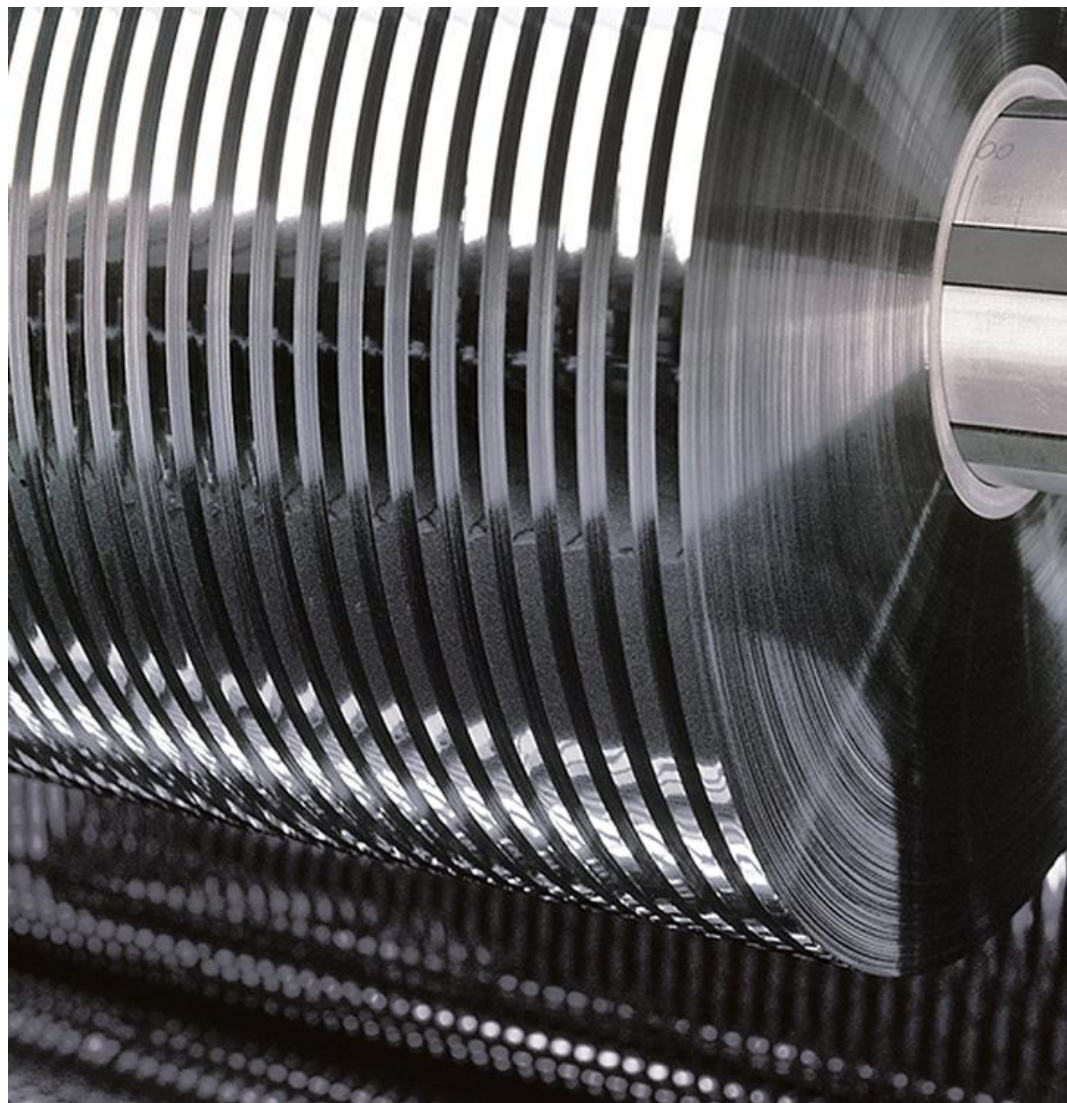
Converting Toolbox
Benefits when using the Application

SIEMENS

- Time-saving at engineering and service (same look & feel)

- Can be used in all programming languages

- Industry standards are used (PLC Open)

- Supported by Application Centers World Wide

- Regularly updated in the Intranet

- Open source code
  (Functions can be modified according to customer's requirements)

- User Manuals in English and German

- Easy learning using pre-programmed application examples

- Free of Charge
  (downloads via Siemens representatives)

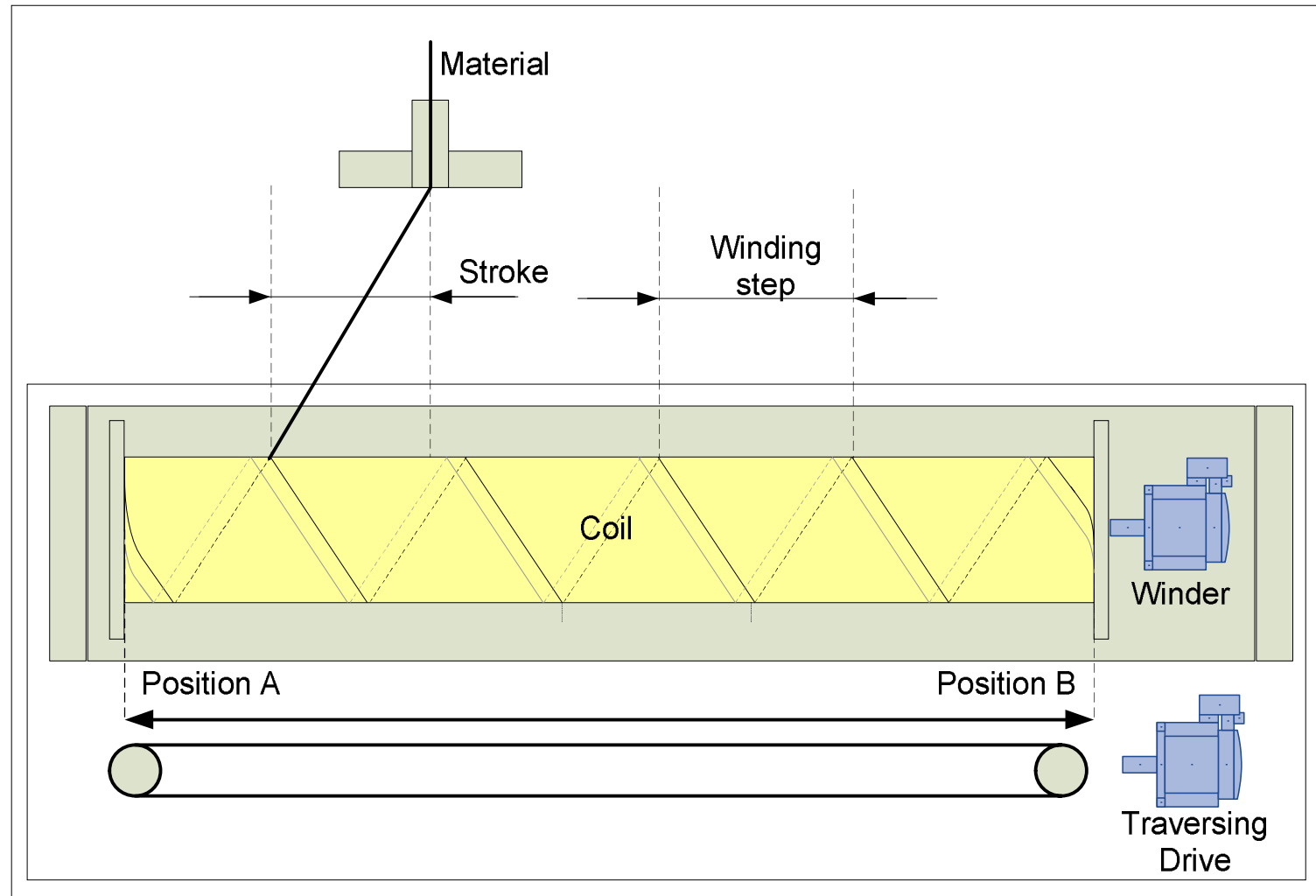# SIMOTION Traversing Drive V4.0.5

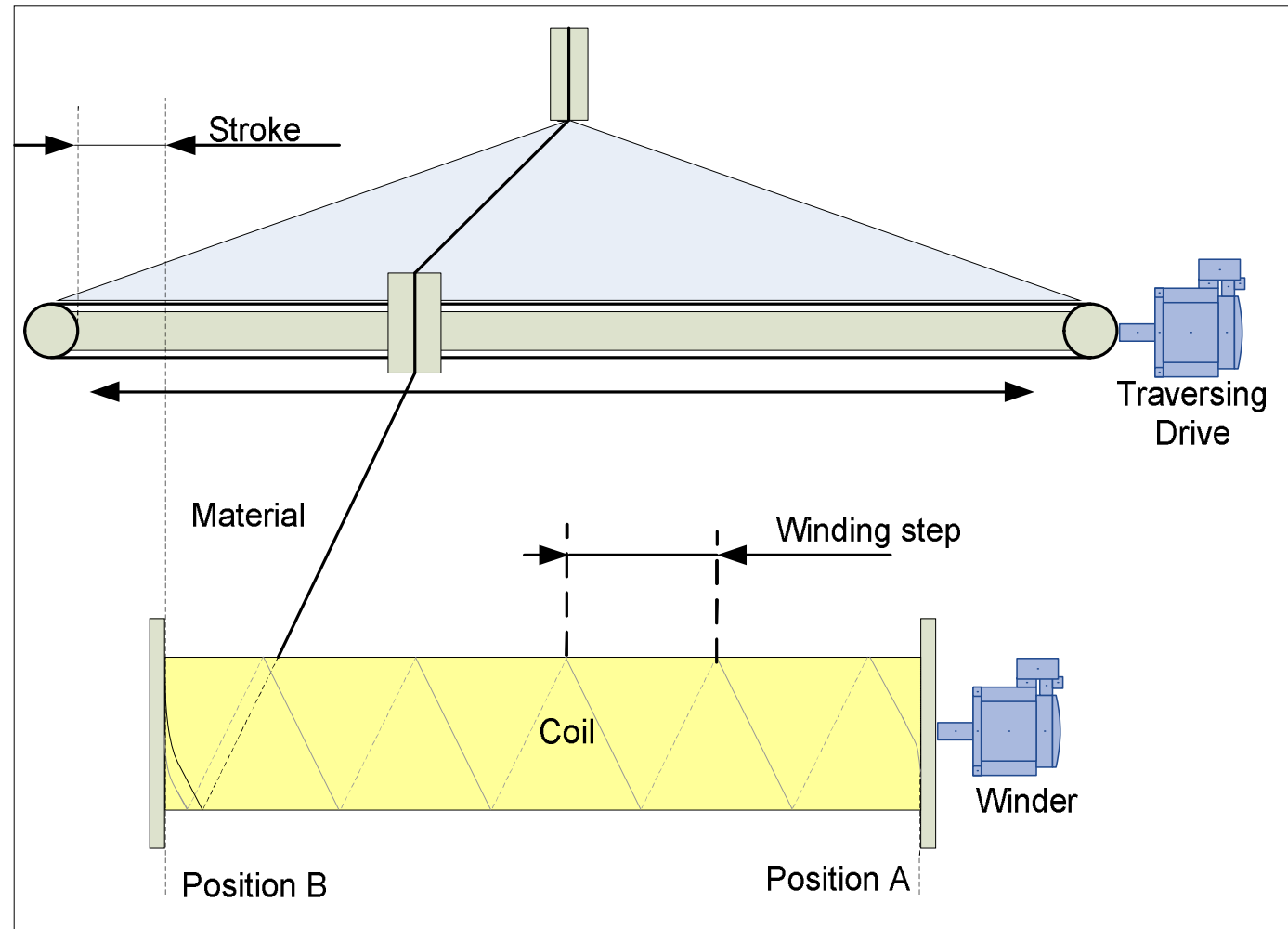# Converting Toolbox
Contents of the Application

- PowerPoint presentation (English / German)

- Units / libraries (programming in ST or MCC)

- User Manuals (English and German)

- Example-project for SIMOTION D demonstration case

- Feedback sheets (English / German)
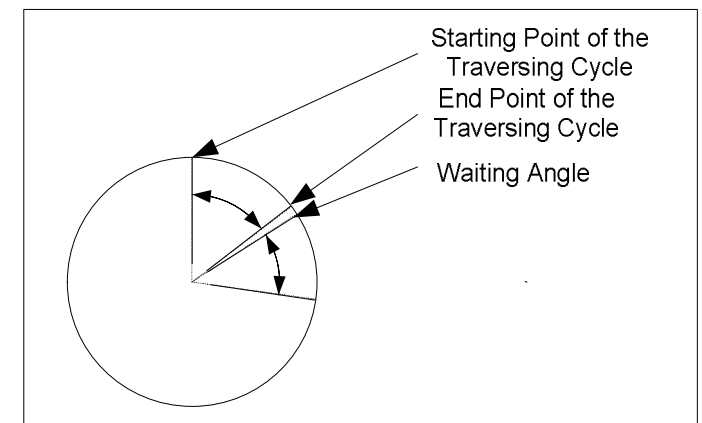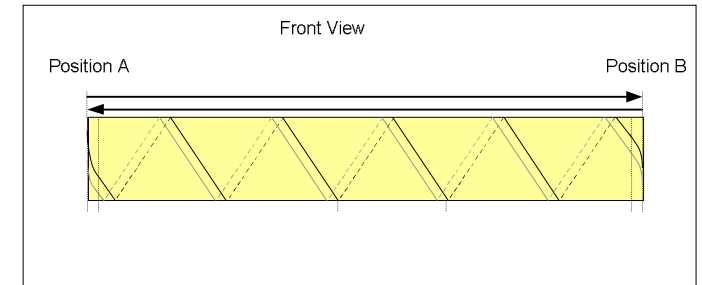
- Change log (change history)

General Layout
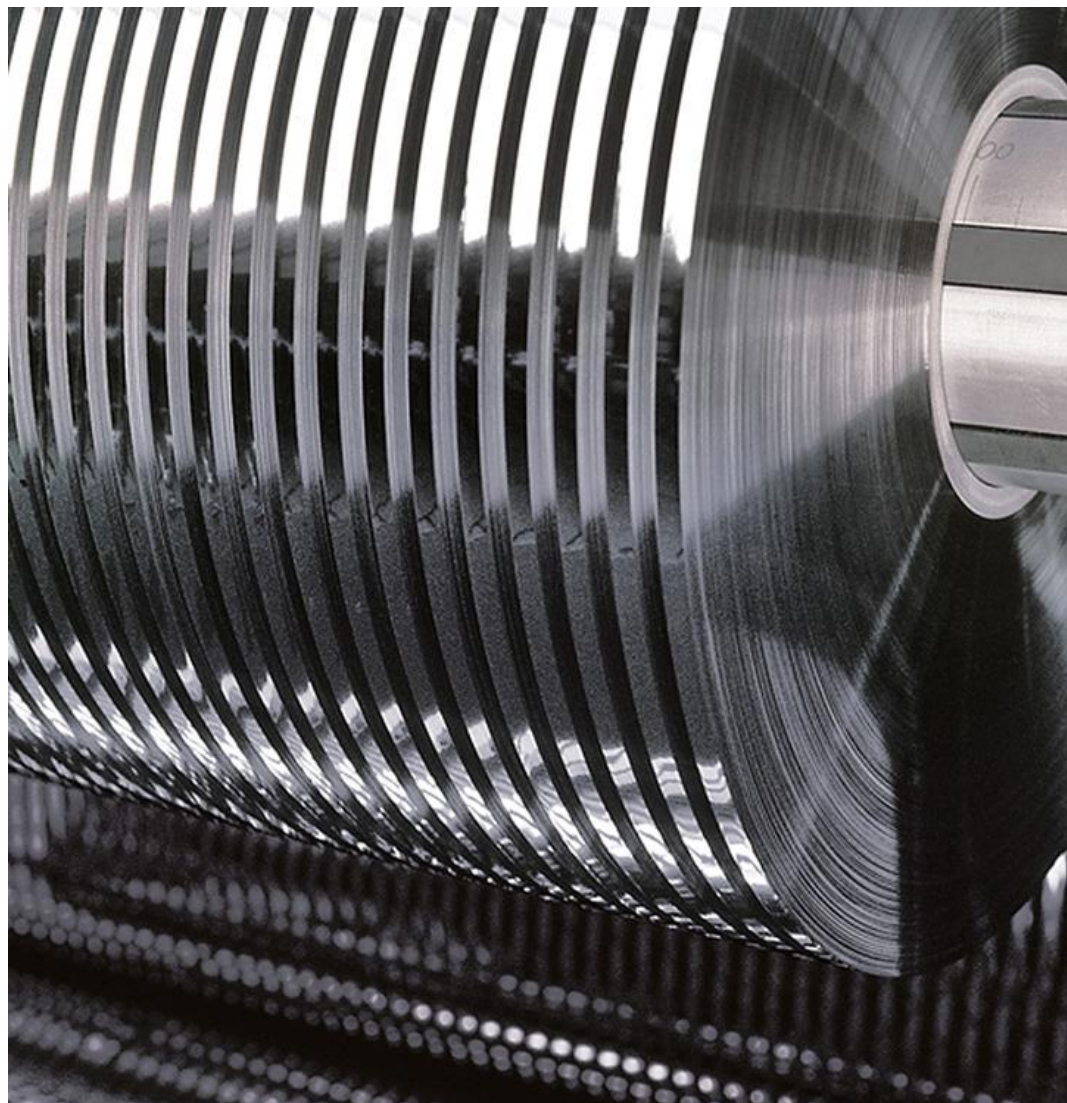
Converting Toolbox
Scope of Functionality

Converting Toolbox
Scope of Functionality

- Traversing-cycle:
  A complete forward and reverse movement
  between coil endpoints

- Winding step:
  Linear feed movement during a single master revolution
  (Winding_step = material_width + padding)

- Displacement angle:
  Difference in degrees between traversing-
  cycle-start and cycle-end at the coil end

- Waiting angle:
  Length of traverser standstill phase at both coil ends

- Acceleration angle:
  Length of the acceleration phases of the traverser

- Position A,B:
  Left and right coil endpoints

- Spike:
  Relative velocity- or track-offsets for a defined period around coil-
  endpoints to prevent material build-up (two modes available)

Front View

Position A   Position B

Starting Point of the
Traversing Cycle
End Point of the
Traversing Cycle

Waiting Angle

SIMOTION Traversing Drive V4.0.5

Converting Toolbox
Scope of Functionality

Speed- / Position-diagram

- During the spike-period the traverser is moving with an overspeed-factor
- All four spikes have individual parameters
- Spikes can be defined in two modes
  - Length in degrees
  - Velocity in mm/revolution (as a winding-step) OR additional feed of the traverser in mm (= area enclosed by the "spike-velocity-trapezium")
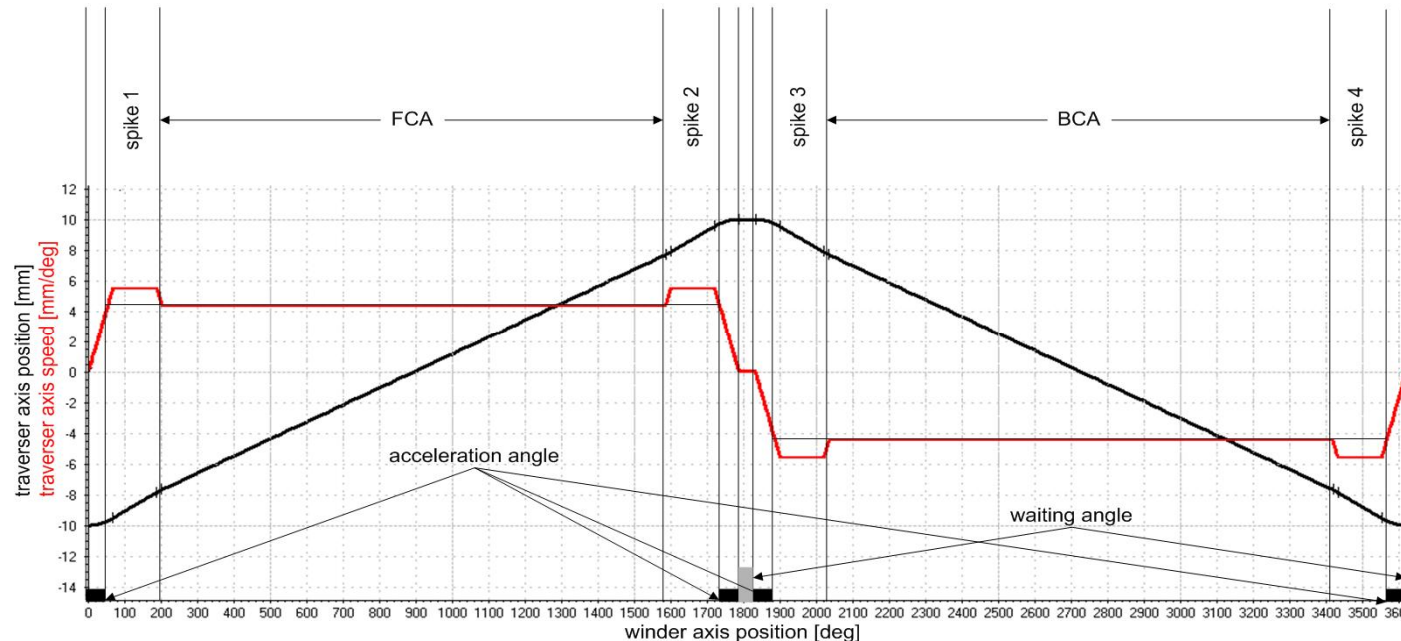
Converting Toolbox
Scope of Functionality

Example:

Coil width: 51mm, Winding step: 10mm, Waiting angle: 20°,
Displacement angle: 160°
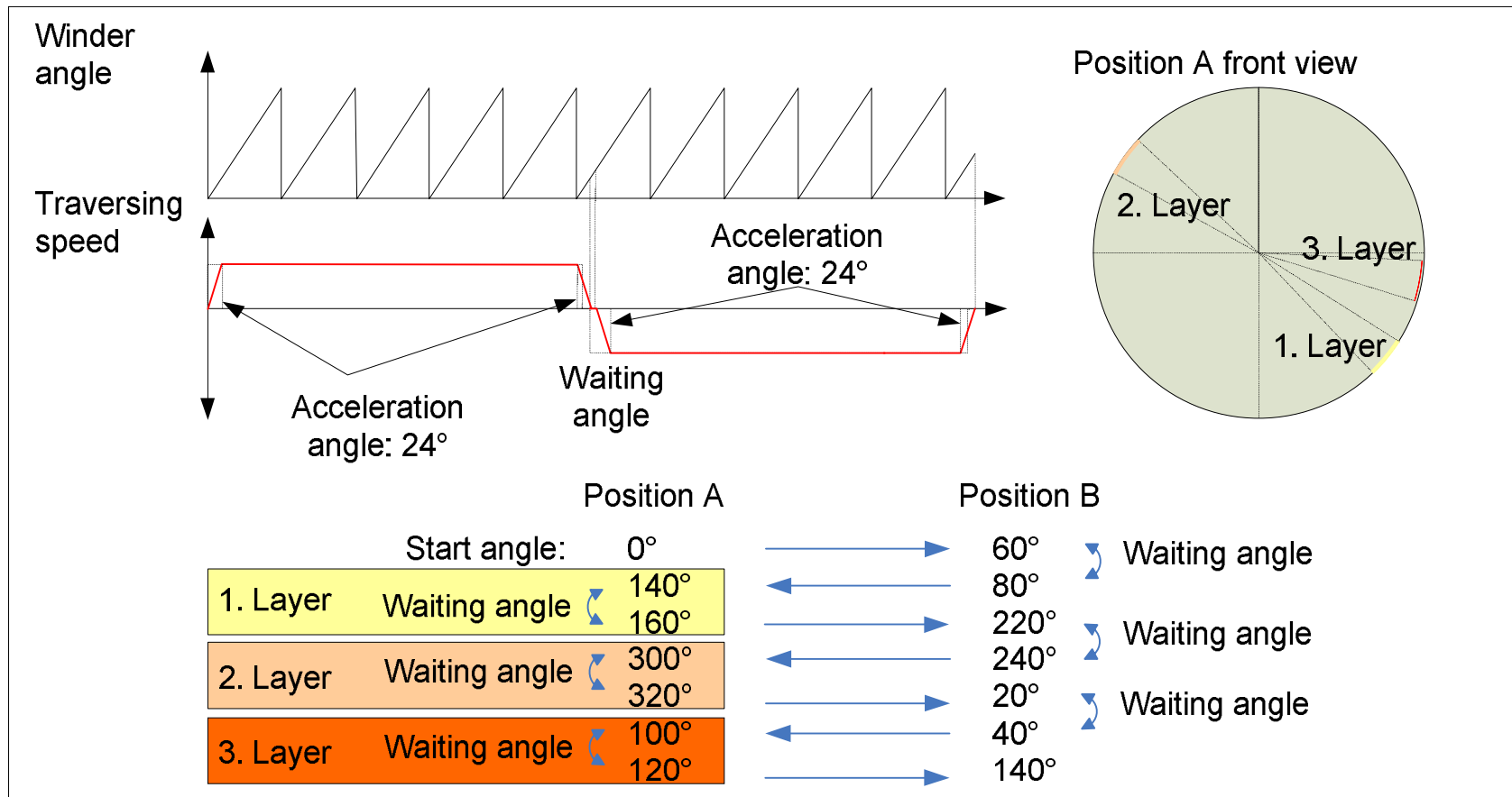
Converting Toolbox
Scope of Functionality

General layout Step Wind

Converting Toolbox
Scope of Functionality

- Traversing cycle Step Wind:
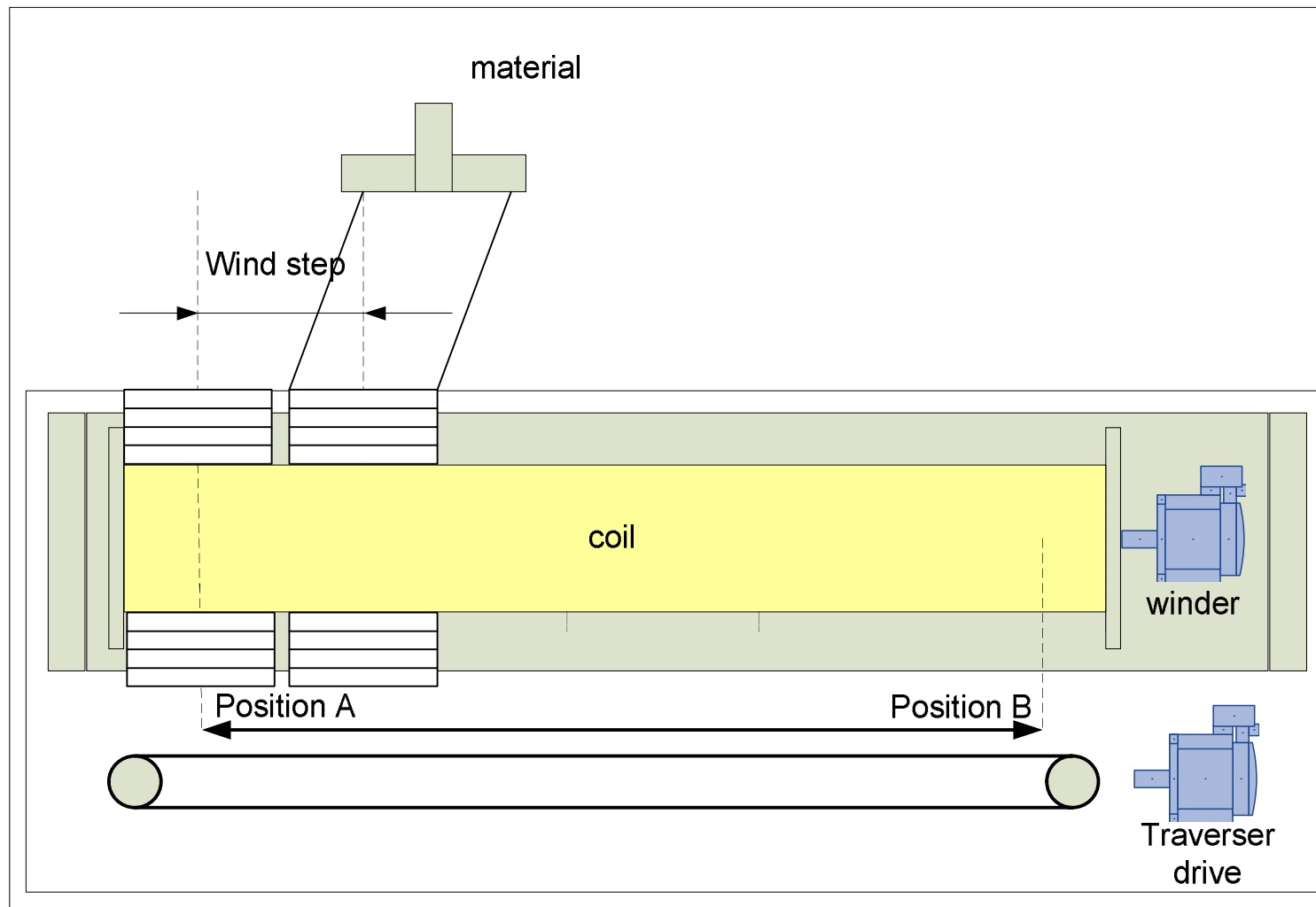 Stepwise motion between end points
  position A and position B

- Winding step:
  Feeding-distance of the traverser to the
  next step
  (winding step = material width + gap)

- Number of layers per step:
  Calculated by waiting angle and
  parameter: r32LayersPerStep * 360°

- Acceleration angle:
  Length of the traverser motion phase to
  the next step

- Position A, B:
  Left and right terminal-point of the coil
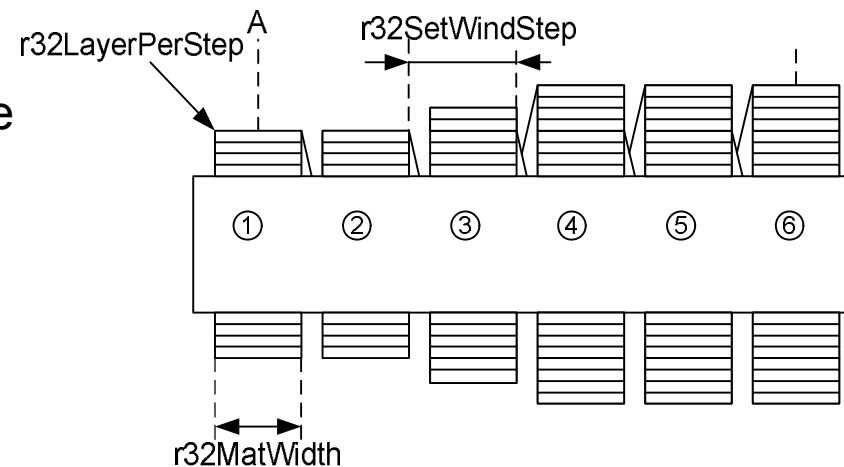
Converting Toolbox
Scope of Functionality

Speed- / Position-diagram (Step wind)

- The traverser is in standstill until the required number of layers have been wound
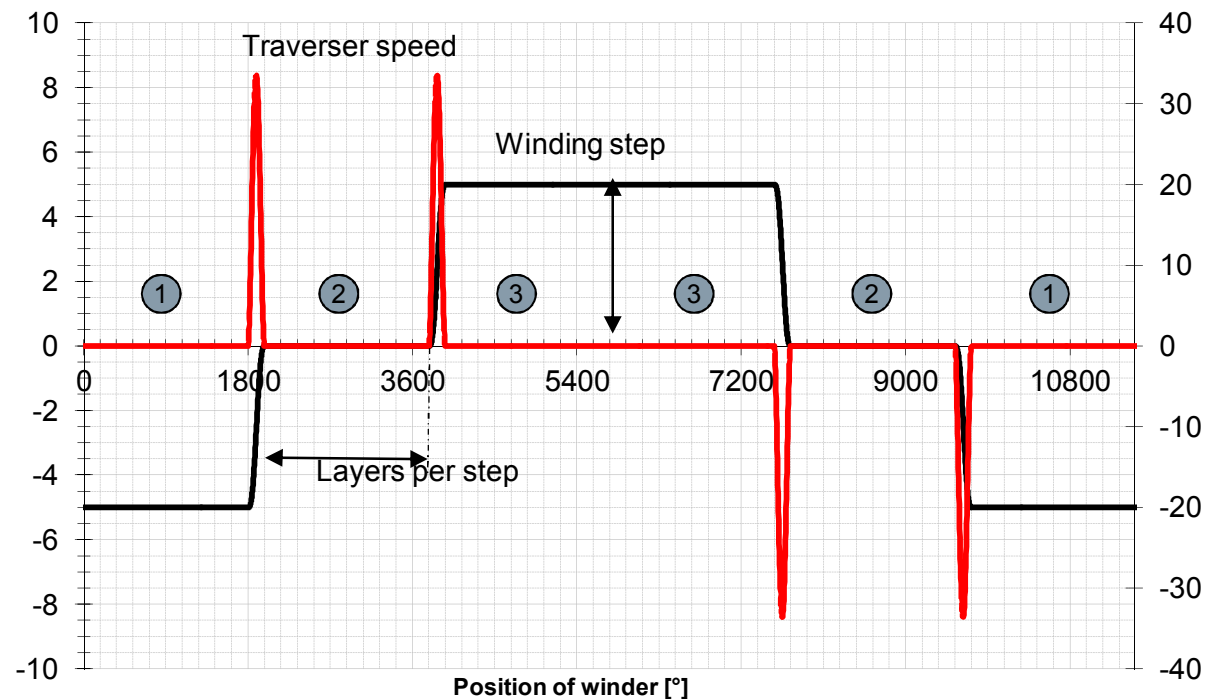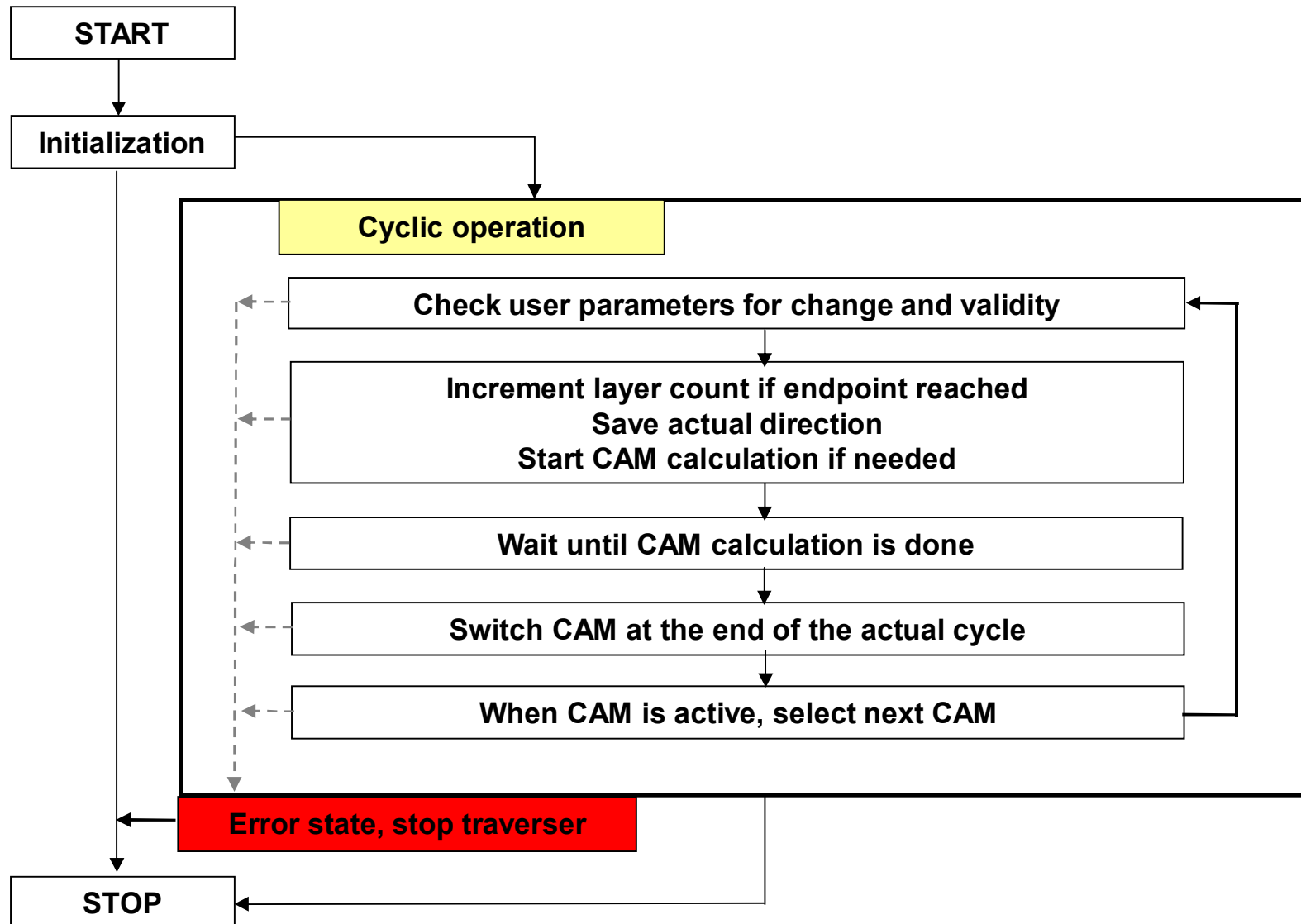
- The traverser is moving to the next step calculated by polynomial 5th order respecting the acceleration angle and winding step

Converting Toolbox
Scope of Functionality

Converting Toolbox
Scope of Functionality

General functions

- Trapezoidal speed-profile with target-displacement-angle

- Adjustment of the displacement angle by:

  - Acceleration angle

  - Waiting angle

  - Winding step value

- Parameters can be changed on the fly
  (activation within the next cycle)

- Stroke, spike and coil profile functions

- Resume with last active direction

- Direction change of the traverser on the fly

- Parameterization instead of programming

- CAM is only calculated if needed (runtime efficiency)

Converting Toolbox
Scope of Functionality

- Coil profiles will be defined through angle set points
  - Positive angle: coil-width will increase with every layer
  - Negative angle: coil-width will be decrease with every layer

  OR

- Coil profiles can be defined with an offset per layer
  - Equal characteristics like definition with angle set points

- Independent settings for left and right endpoints
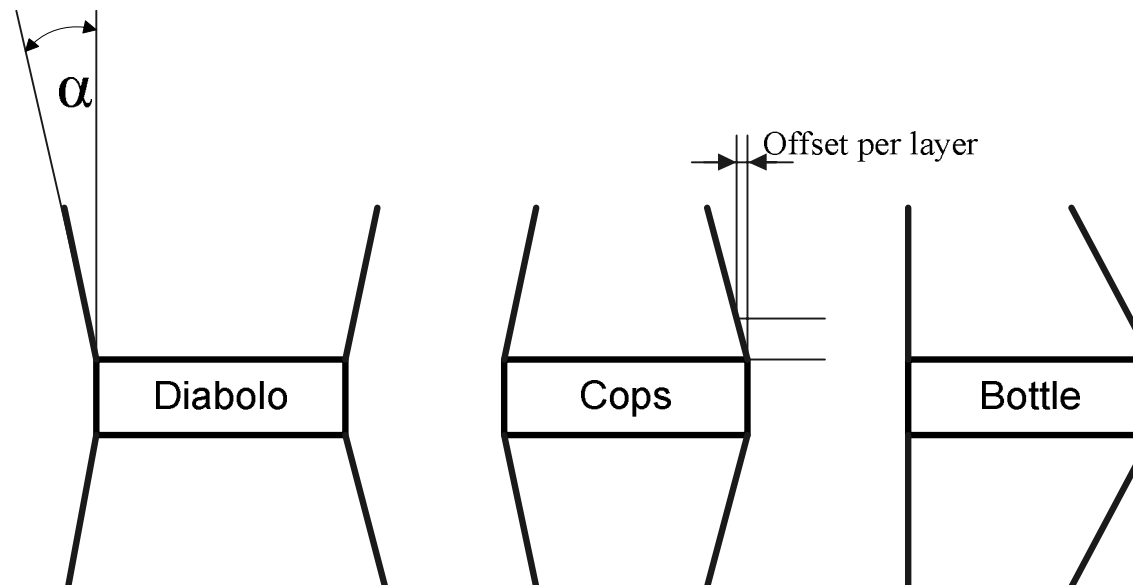
SIMOTION Traversing Drive V4.0.5
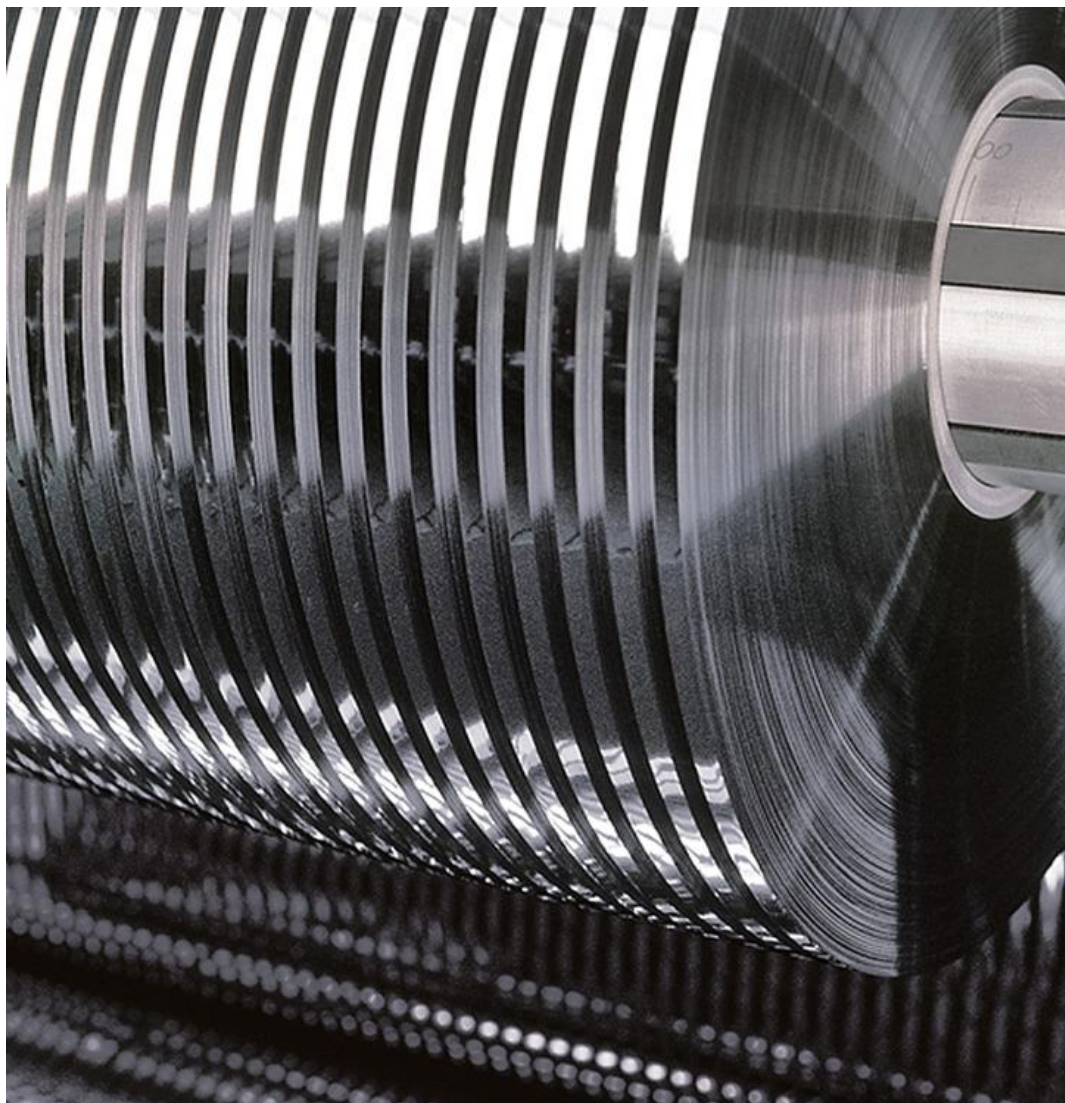
Converting Toolbox
Function Block Overview

The traversing drive functionality is part of
the LTravLib library and is included in
the application "SIMOTION Traversing Drive"

The Library consists of 4 sources:
- **aVersion:**

    Changelog
- **dType**

    Type definitions
- **fMain:**

    Traverser control, Profile calculation, Plausibility check
- **fSub:**

    Auxiliary functions

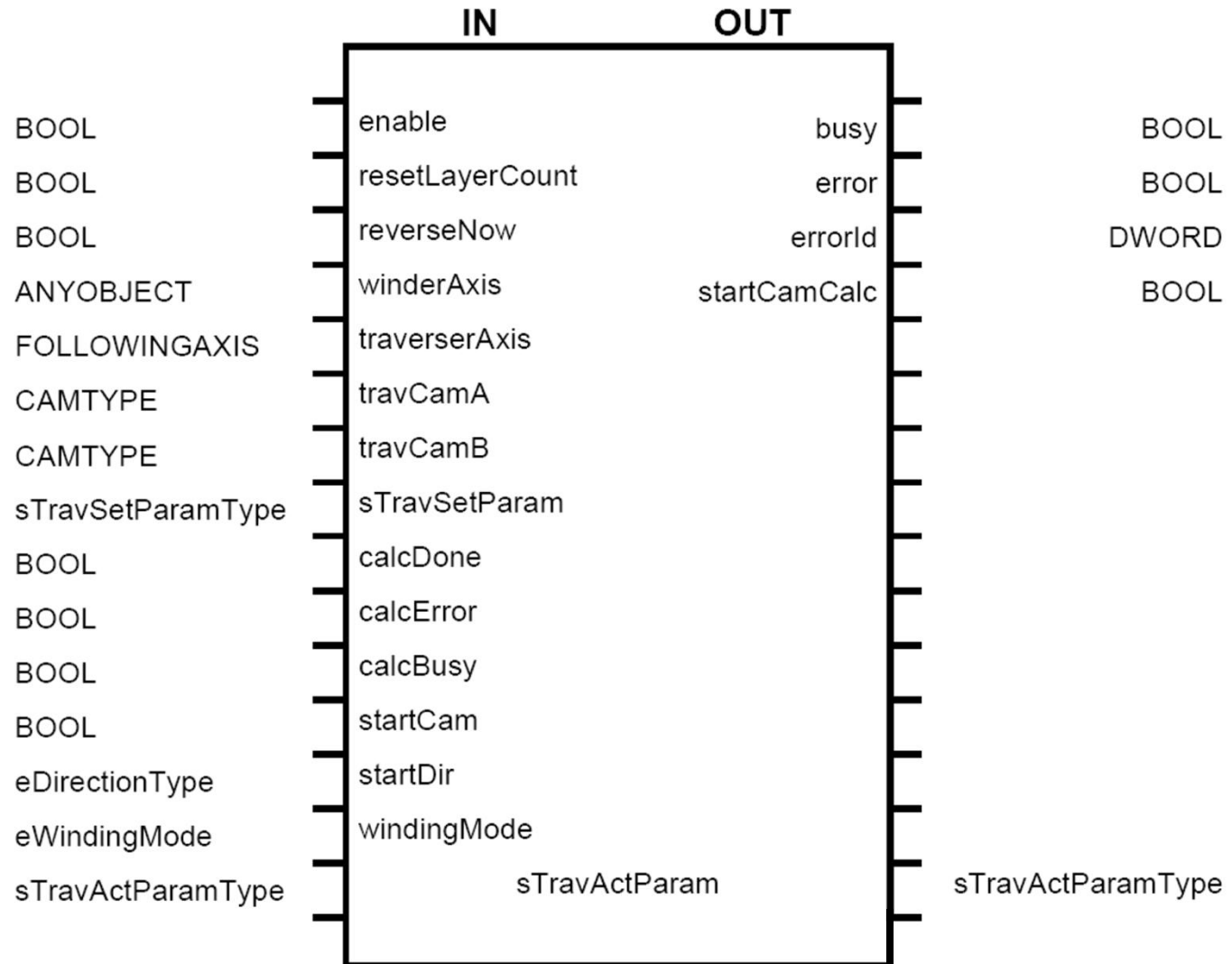|	IN	OUT	
BOOL	enable	busy	BOOL
BOOL	resetLayerCount	error	BOOL
BOOL	reverseNow	errorId	DWORD
ANYOBJECT	winderAxis	startCamCalc	BOOL
FOLLOWINGAXIS	traverserAxis		
CAMTYPE	travCamA		
CAMTYPE	travCamB		
sTravSetParamType	sTravSetParam		
BOOL	calcDone		
BOOL	calcError		
BOOL	calcBusy		
BOOL	startCam		
eDirectionType	startDir		
eWindingMode	windingMode		
sTravActParamType	sTravActParam	sTravActParam	sTravActParamType

Function Block Overview – FBCamCalc
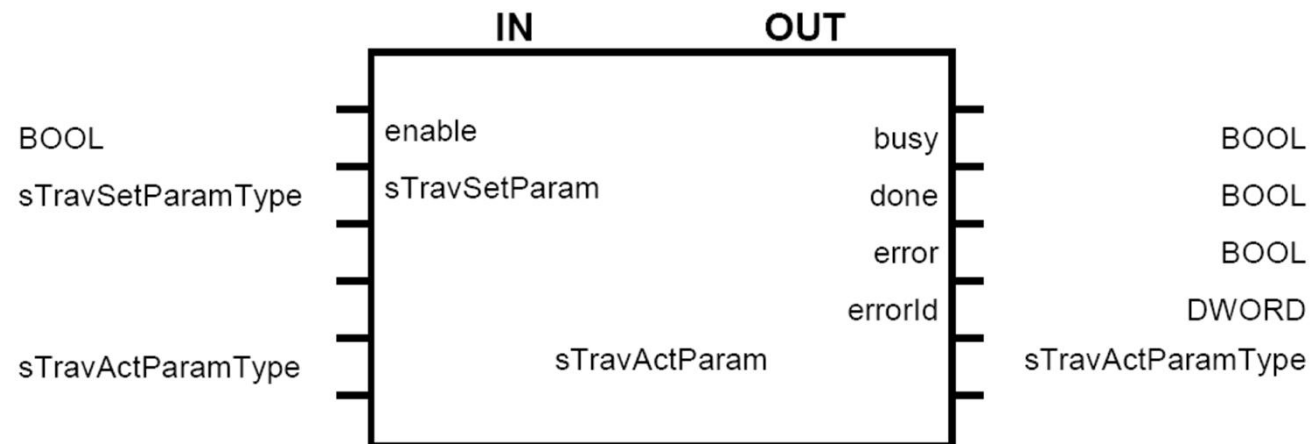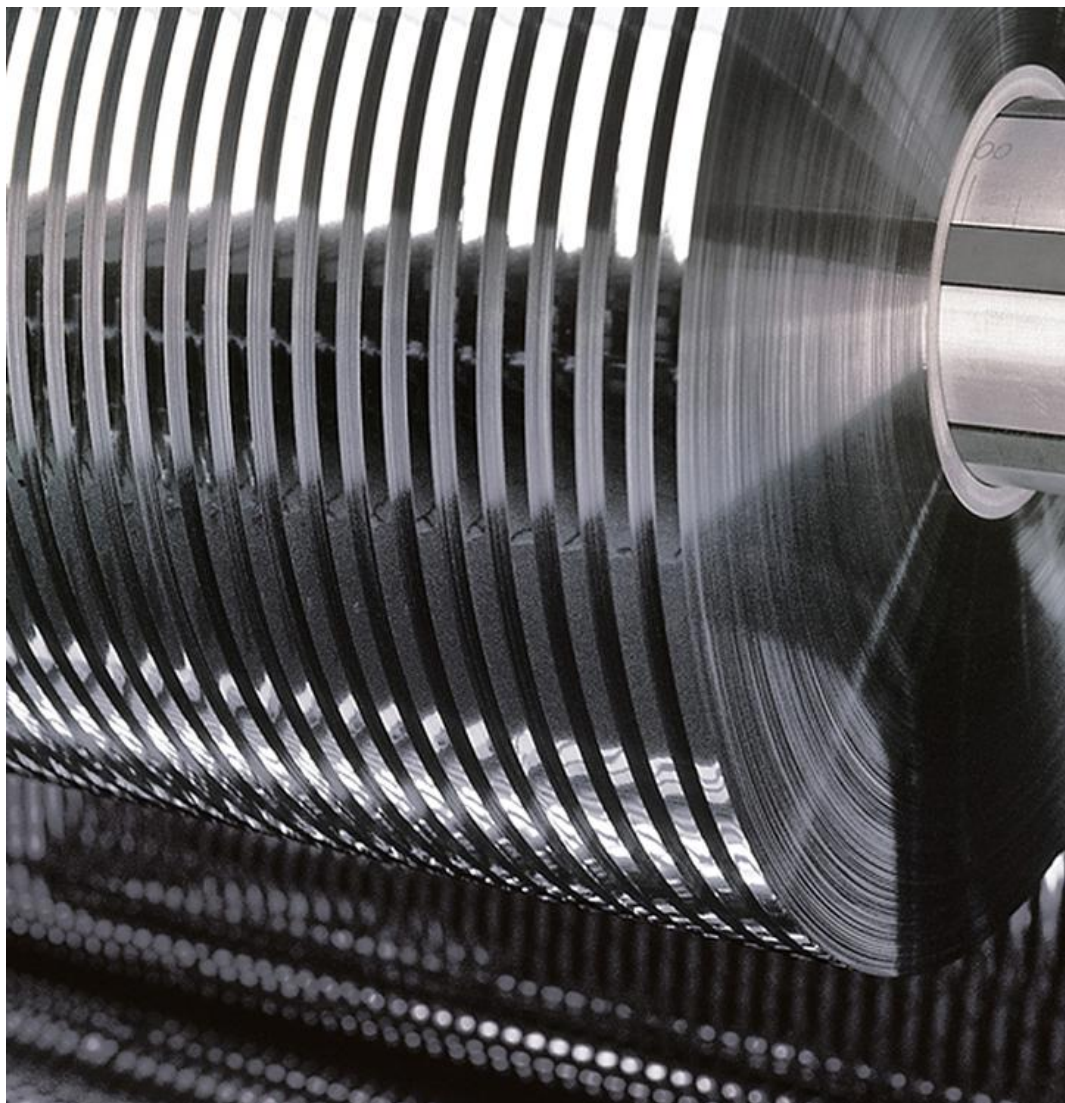
IN		OUT	
BOOL	enable	busy	BOOL
sTravSetParamType	sTravSetParam	done	BOOL
		error	BOOL
		errorId	DWORD
sTravActParamType	sTravActParam	sTravActParam	sTravActParamType

SIMOTION Traversing Drive V4.0.5
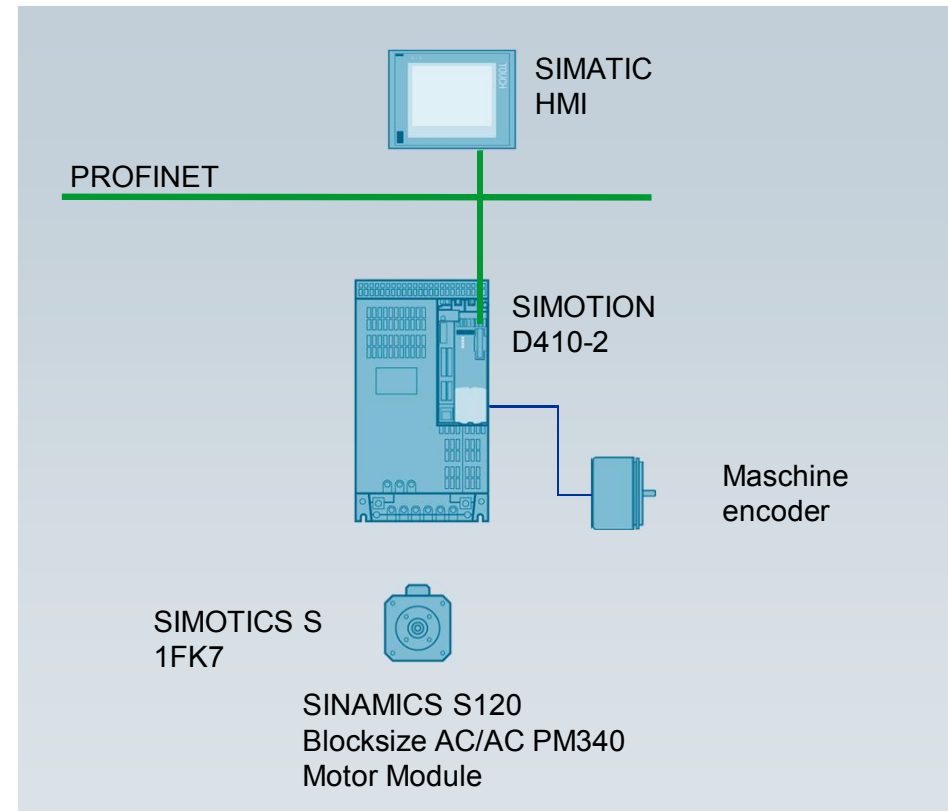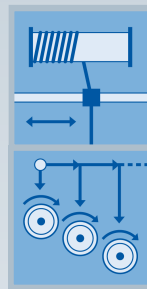
Converting Toolbox
Example Configuration

Example Configuration:
(stand alone / low performance)

- SIMOTION D410-2
- SINAMICS S120 AC/AC
- 1FK7 motor

Standards:
SIMOTION Traversing Drive
SIMOTION Axis Function Block

SIMATIC HMI

PROFINET

SIMOTION D410-2

Maschine encoder

SIMOTICS S 1FK7

SINAMICS S120 Blocksize AC/AC PM340 Motor Module

Benefits:
- Modular solution based on standard products (no "black box")
- Technology is integrated in the drives-hardware (no external technology controller)
- Fast and scalable hardware platform
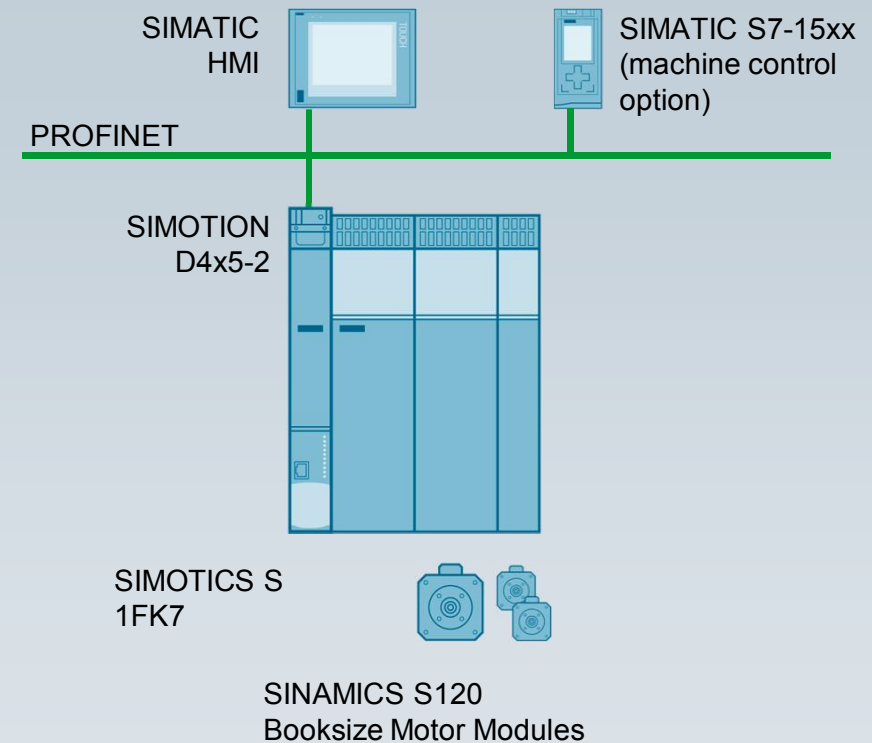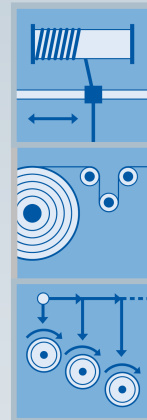- Onboard I/Os and onboard machine encoder interface

Converting Toolbox
Example Configuration

Example Configuration:
(Scalable performance / machine control)

- SIMOTION D4x5-2
- SINAMICS S120 DC/AC
- 1FK7 Motor

Standards:
SIMOTION Traversing Drive
SIMOTION Winder
SIMOTION Axis Function Block

SIMATIC HMI

SIMATIC S7-15xx
(machine control option)

PROFINET

SIMOTION D4x5-2

SIMOTICS S 1FK7

SINAMICS S120
Booksize Motor Modules

Benefits:
- Modular solution based on standard products (no "black box")
- Technology is integrated in the drives-hardware (no external controller)
- Modular software-structure for multiple controls

SIMOTION Traversing Drive V4.0.5
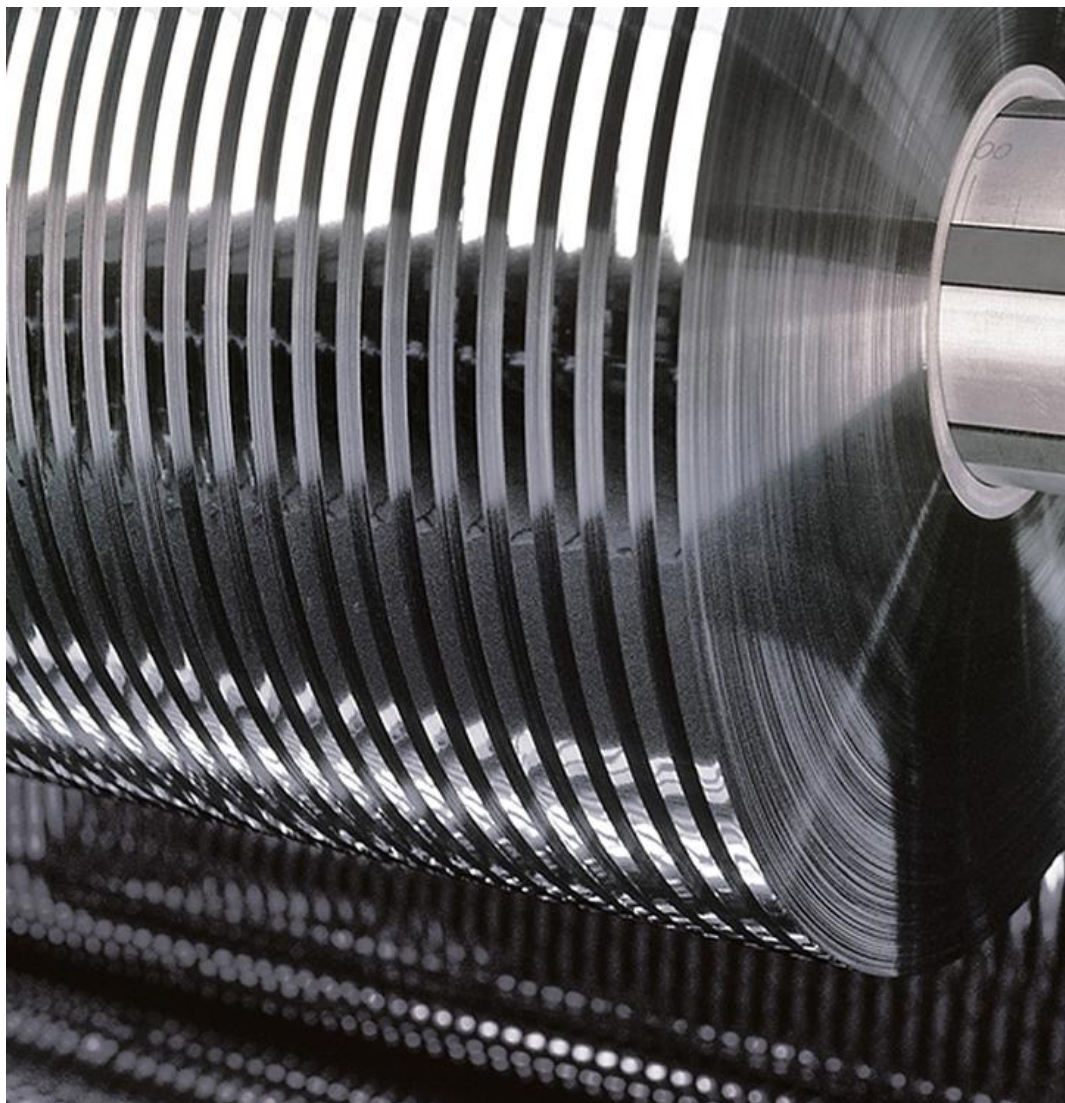
Converting Toolbox
Example Project

SIMATIC WinCC flexible Runtime

**Standard Application
SIMOTION**

Traversing Drive

Enables axes

Winder ON/OFF

Traverser ON/OFF

Traverser Reverse

Traversing drive

Speed offset spike 1	2.15 [mm/rev]	Spike mode	Mode 1	
Length spike 1	180.00 [deg]	Calculation mode:	Winding step	
Speed offset spike 2	0.00 [mm/rev]	Acceleration angle	120.00 [deg]	
Length spike 2	180.00 [deg]	Waiting angle	65.00 [deg]	
Speed offset spike 3	2.15 [mm/rev]	Winding step	20.30 [mm/rev]	
Length spike 3	180.00 [deg]	Displacement angle	65.00 [deg]	
Speed offset spike 4	0.00 [mm/rev]	PosA (with stroke)	-26.72 [mm]	
Length spike 4	180.00 [deg]	PosB (with stroke)	26.72 [mm]	
Spike adaption	ON	Coil Endpoint Offset A	5.00 [um]	
Stroke	2.15 [mm]	Coil Endpoint Offset B	5.00 [um]	
Stroke adoption	ON	Profile mode:	Mode 2	
Spike adaption factor	0.03 [mm]	Material thickness	0.10 [mm]	

Winder Velocity:	-520.00 [deg/s]
Traverser Velocity	+29.32 [mm/s]
Traverser Position	+0.97 [mm]
Actual layer counter	915
Diameter	233.00 [mm]
Maximal layer counter	0

Limit active

Reset layer counter

Home | Settings | Diagrams | Auto | Validation | Manual | EXIT

Thank you for your attention!
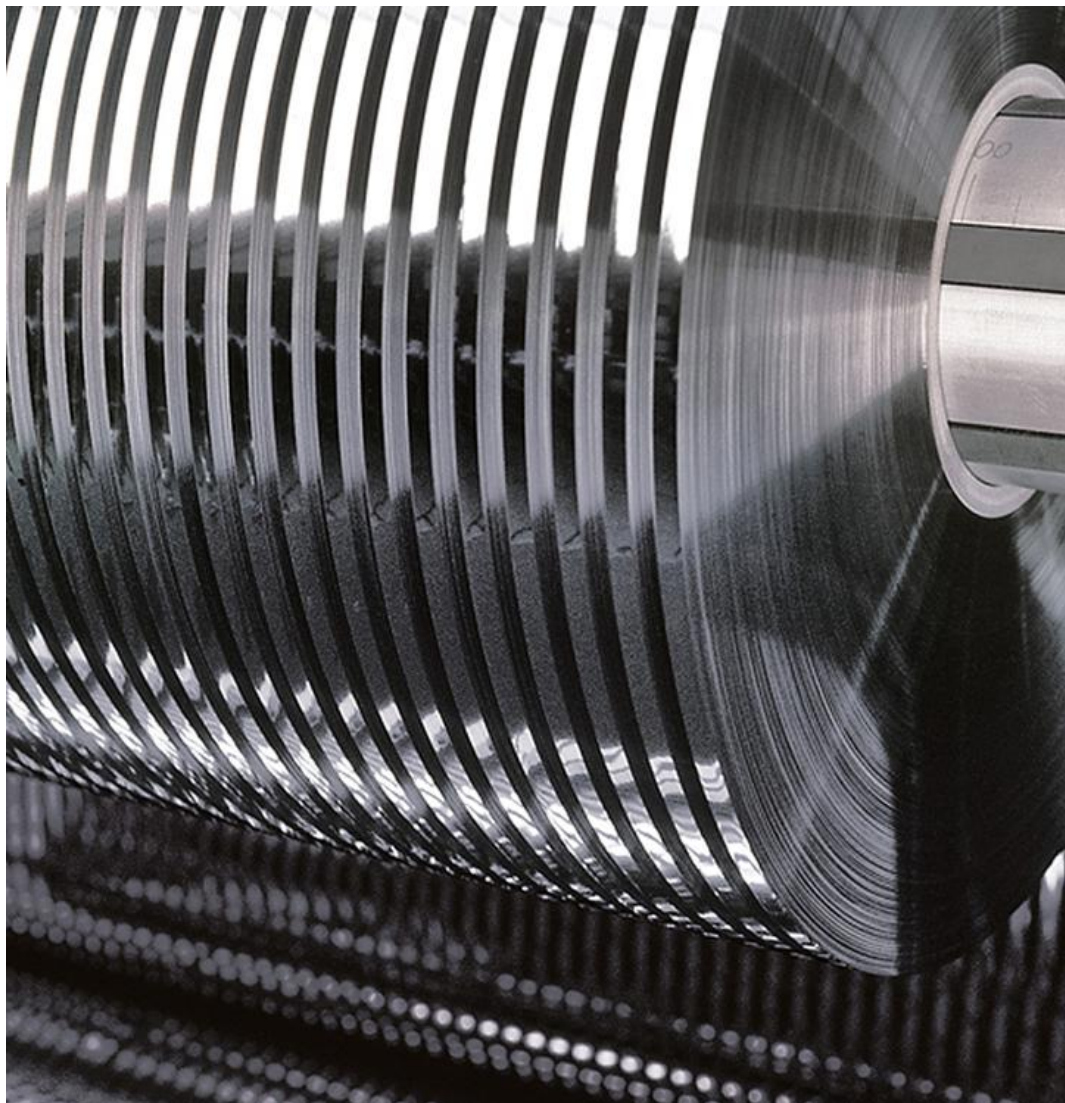
Application Center

DF FA PMA APC

Frauenauracher Str. 80

D-91056 Erlangen

E-Mail:
tech.team.motioncontrol@siemens.com

siemens.com/converting