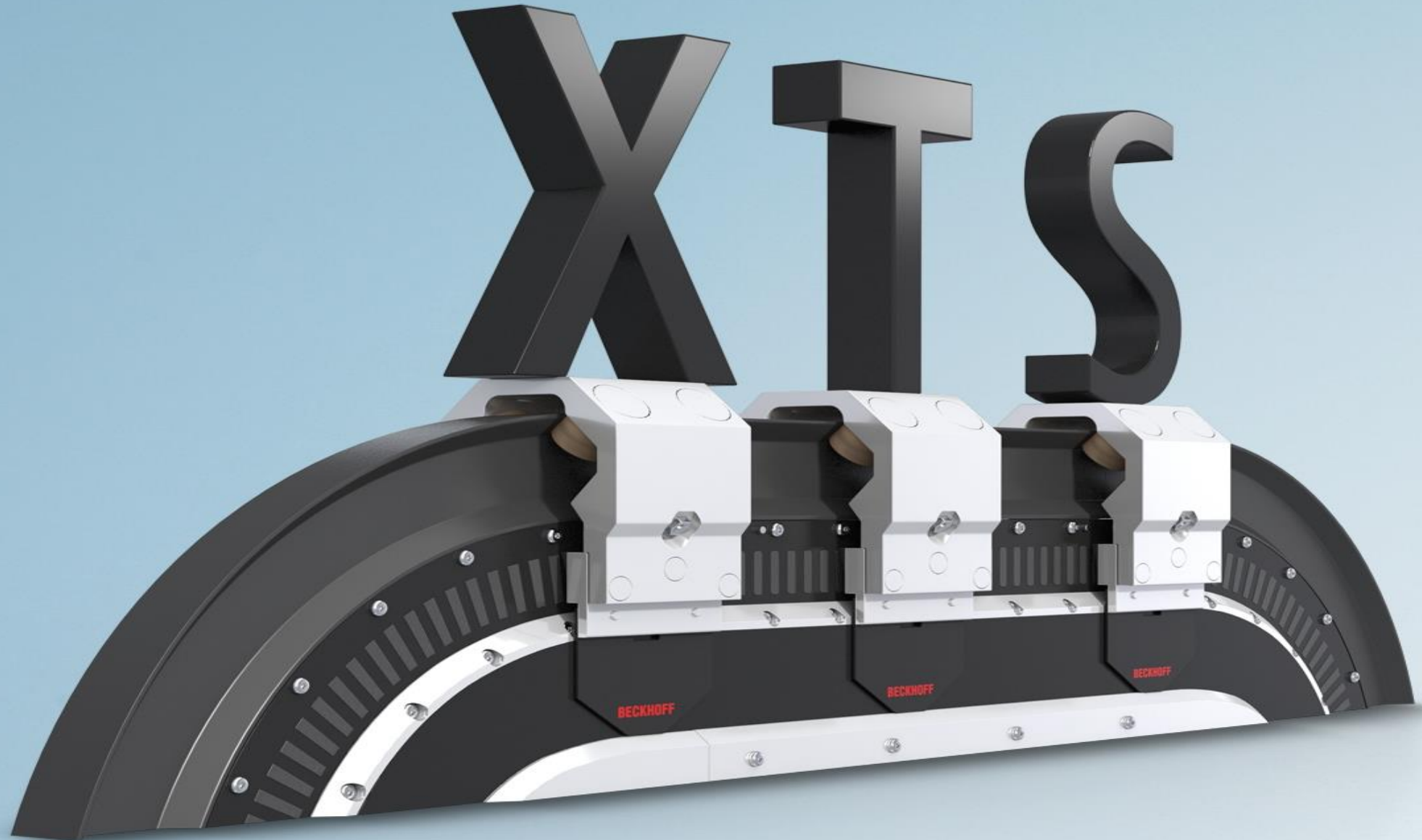


# New Automation Technology

## Beckhoff Automation

**BECKHOFF**





# BECKHOFF

## XTS – TcIoXtsProcessingUnit (XPU)

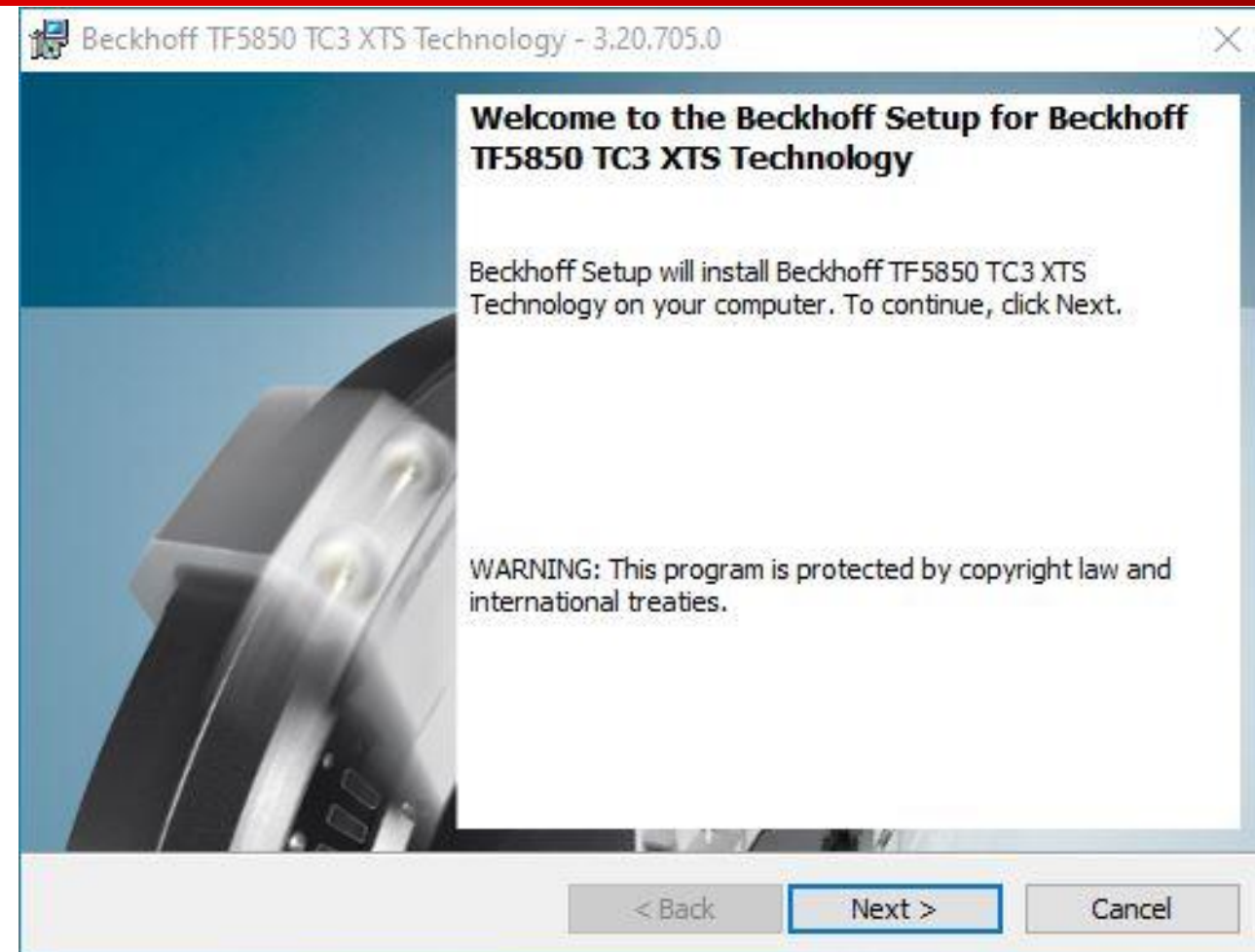


1. **XPU Introduction**
2. XTS Configuration Process
3. XPU – Deep Dive
4. XTS Viewer
5. Mover 1
6. Simulation Mode

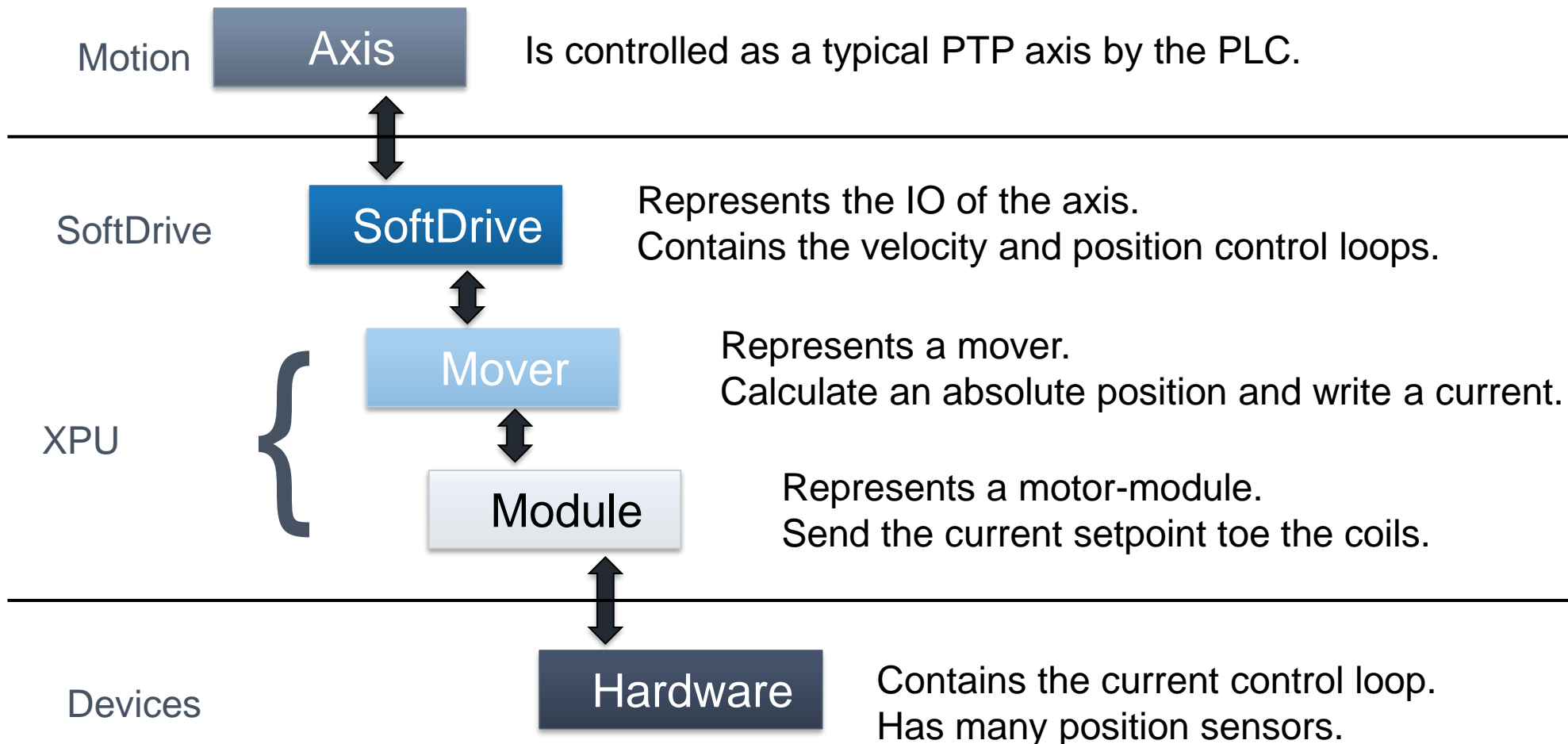




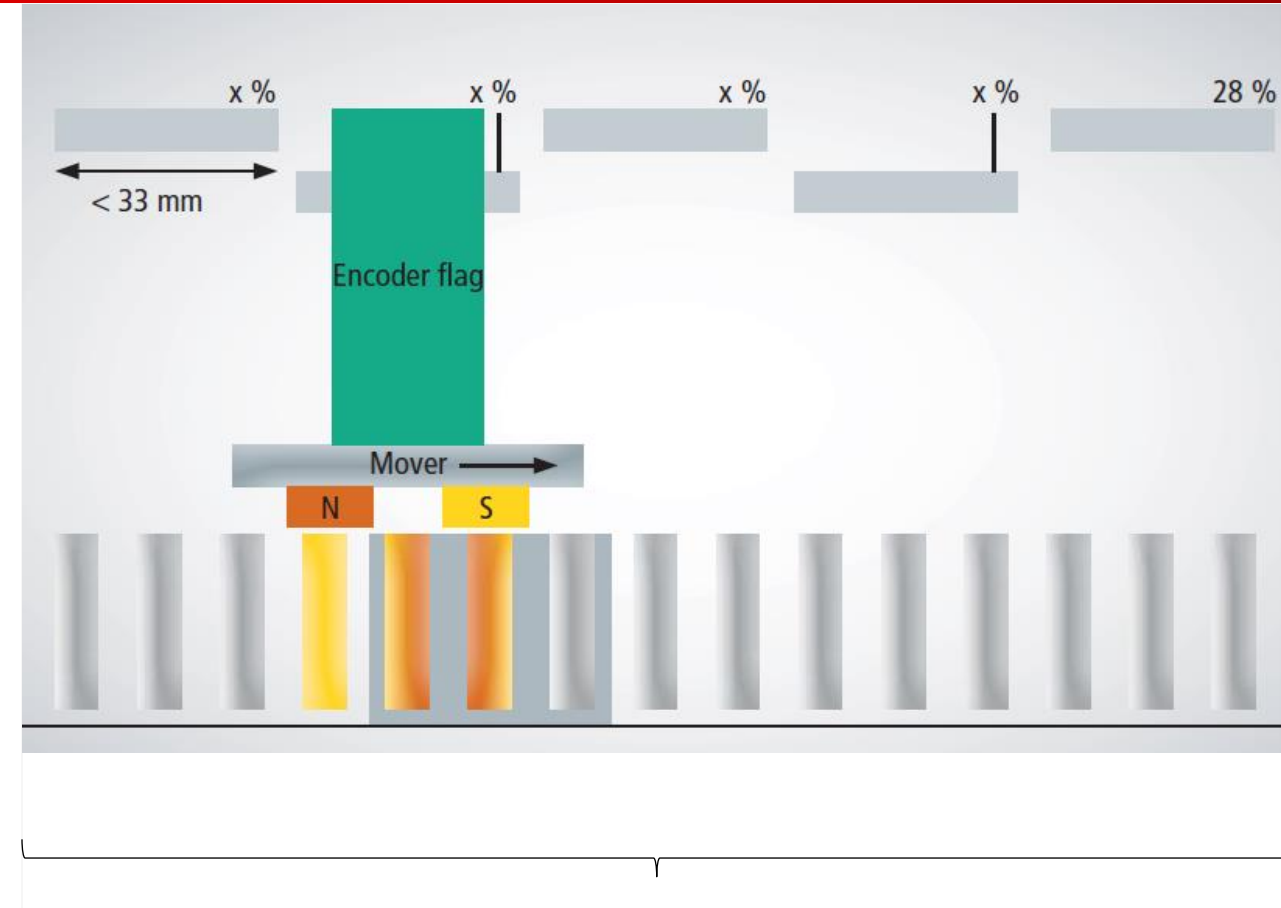
- TcloXtsProcessingUnit  
as TcCOM Module  
(TwinCAT Component Object Models)
- TF5850 | TC3 XTS Extension
  - Included
    - TcloXtsProcessingUnit
    - TcloXtsDrv (obsolete)
    - SoftDrive
- TF5400 | TC3 Advanced Motion Pack
  - Included
    - TC3 Collision Avoidance



- TcIoXtsProcessingUnit is the link between the Motion and the hardware.



- Collects the input channels of all terminals and calculates an absolute position for each mover.  
(It knows the XTS topology.)
- Forwards the current output of the controller (SoftDrive) to the individual coils which are activated by a mover.
- Handles module boundaries smoothly.



The abstract components of one XTS module

1. XPU Introduction
2. **XTS Configuration Process**
3. XPU – Deep Dive
4. XTS Viewer
5. Mover 1
6. Simulation Mode





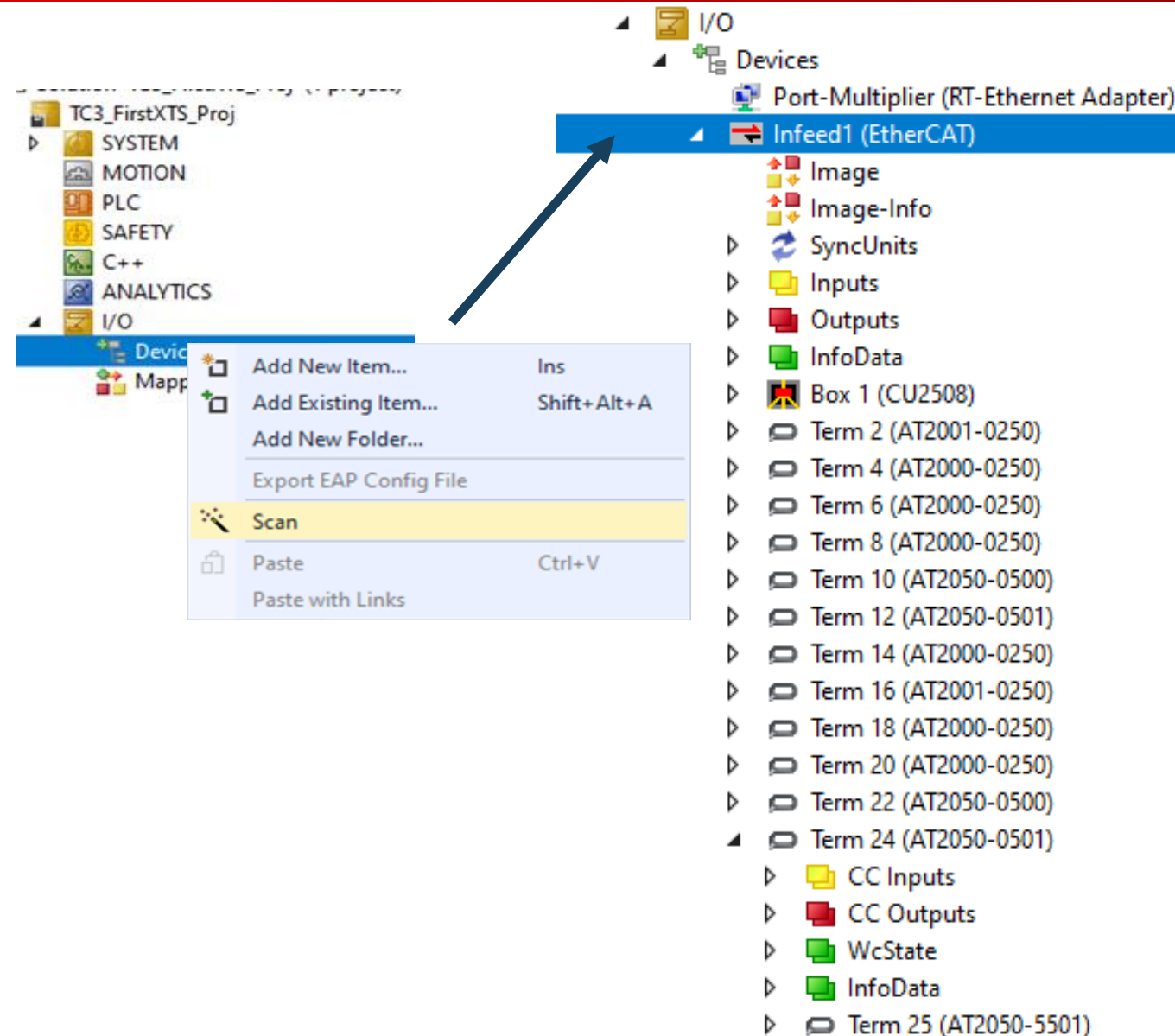
# XTS Configuration Process...

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- Start with a new project.
- Perform a 'Scan' of the IO...

- **TIP**

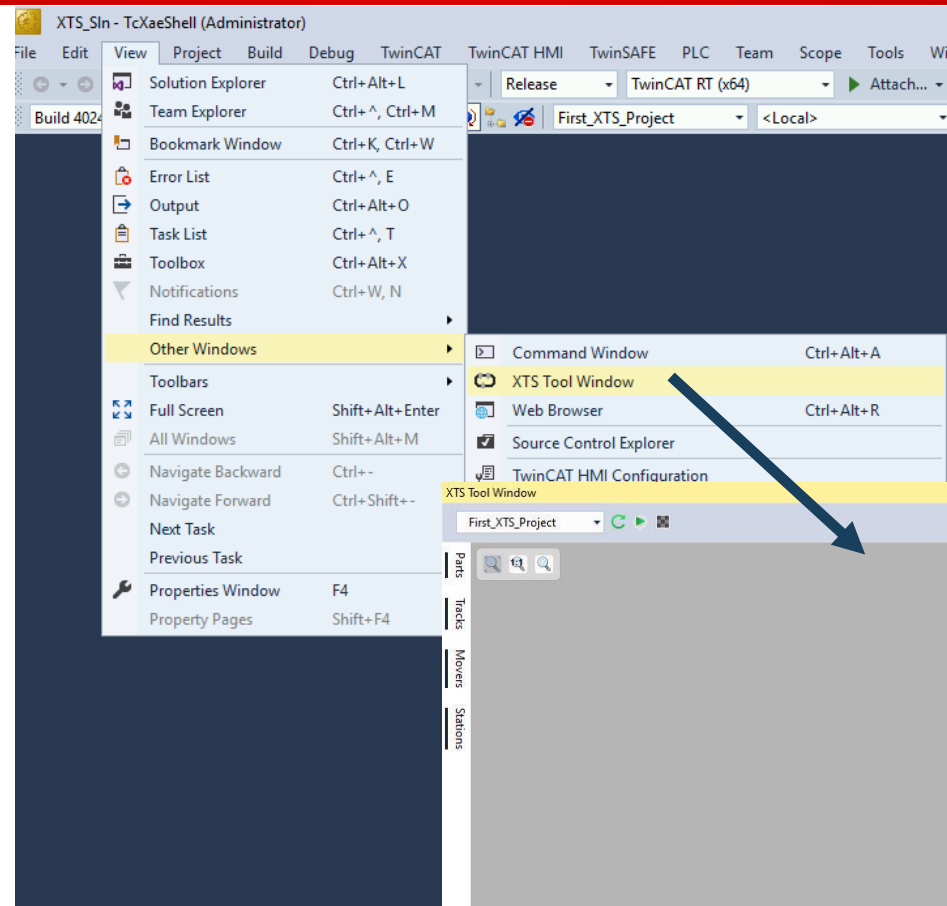
After scan, change to Free-Run mode and have a look at the signals, the values should be changing continuously.



# XTS Configuration Process...

BECKHOFF

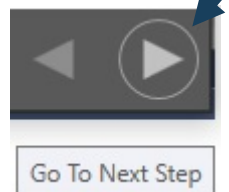
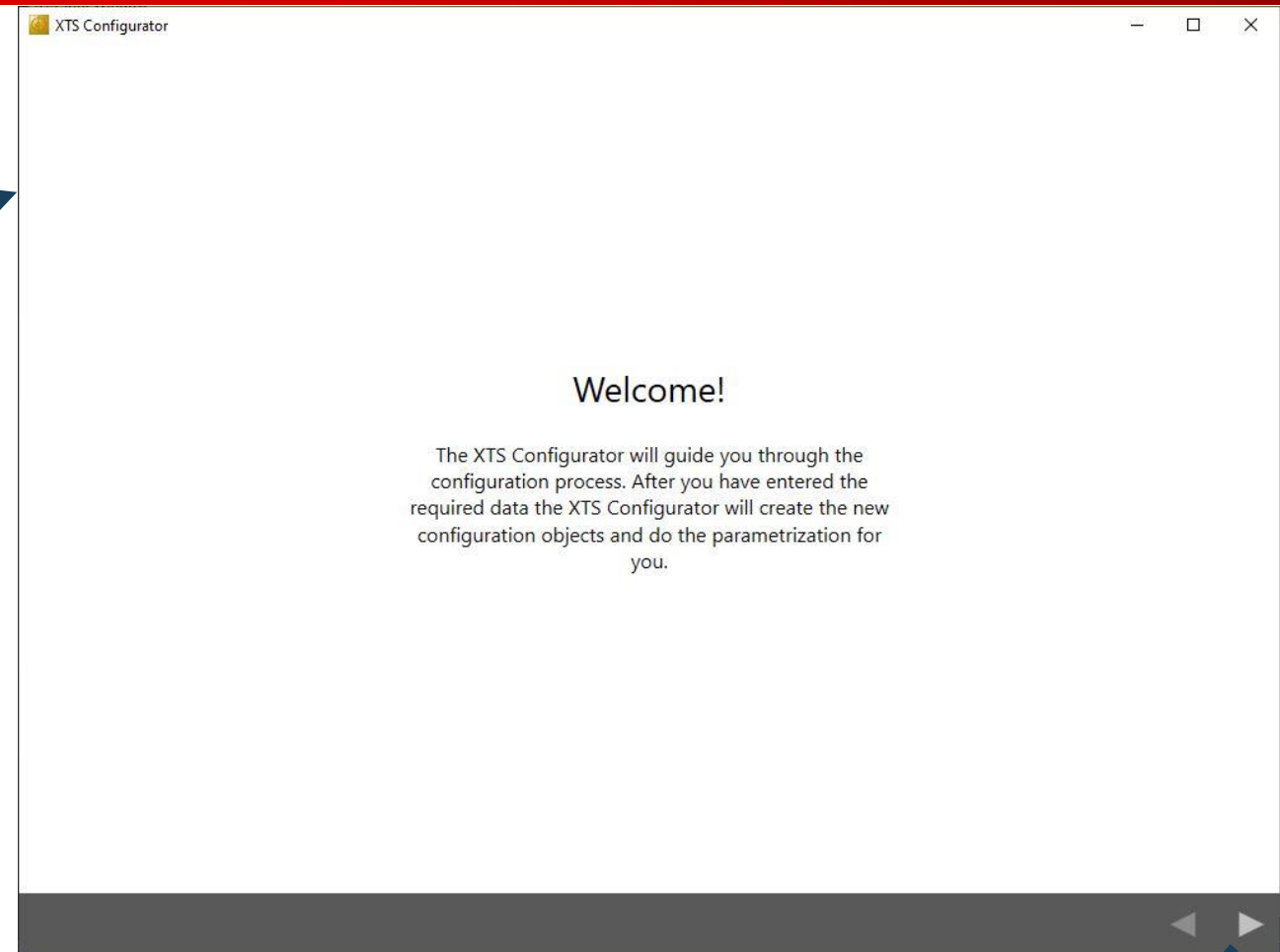
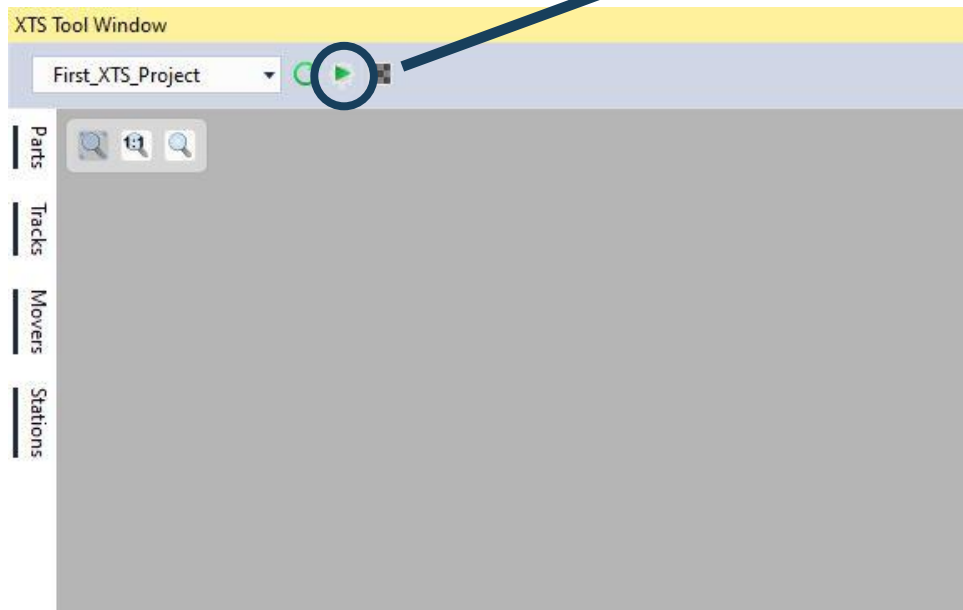
- Open XTS Tool Window



# XTS Configuration Process...

BECKHOFF

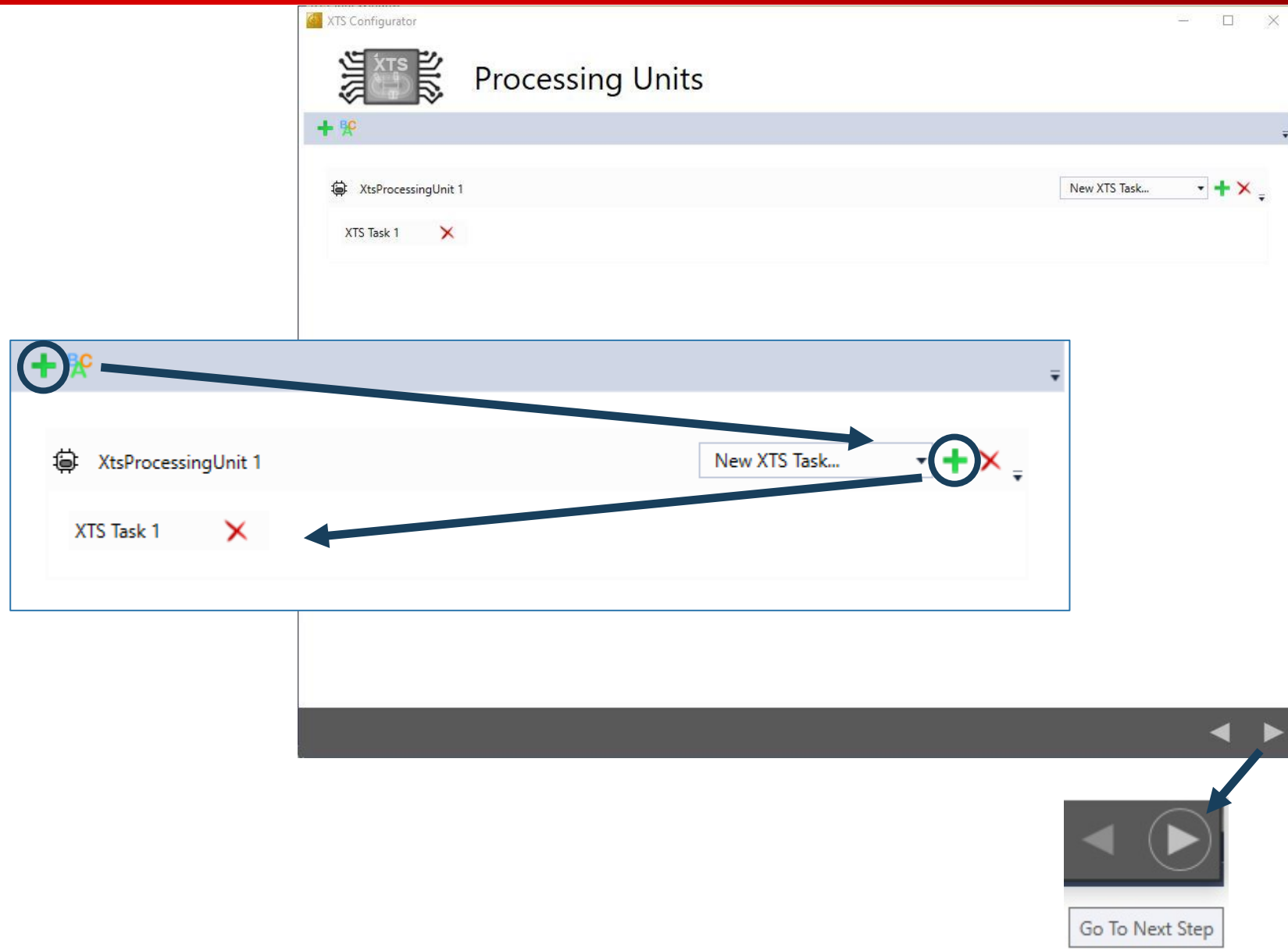
- Start the configuration process



# XTS Configuration Process...

BECKHOFF

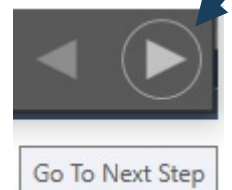
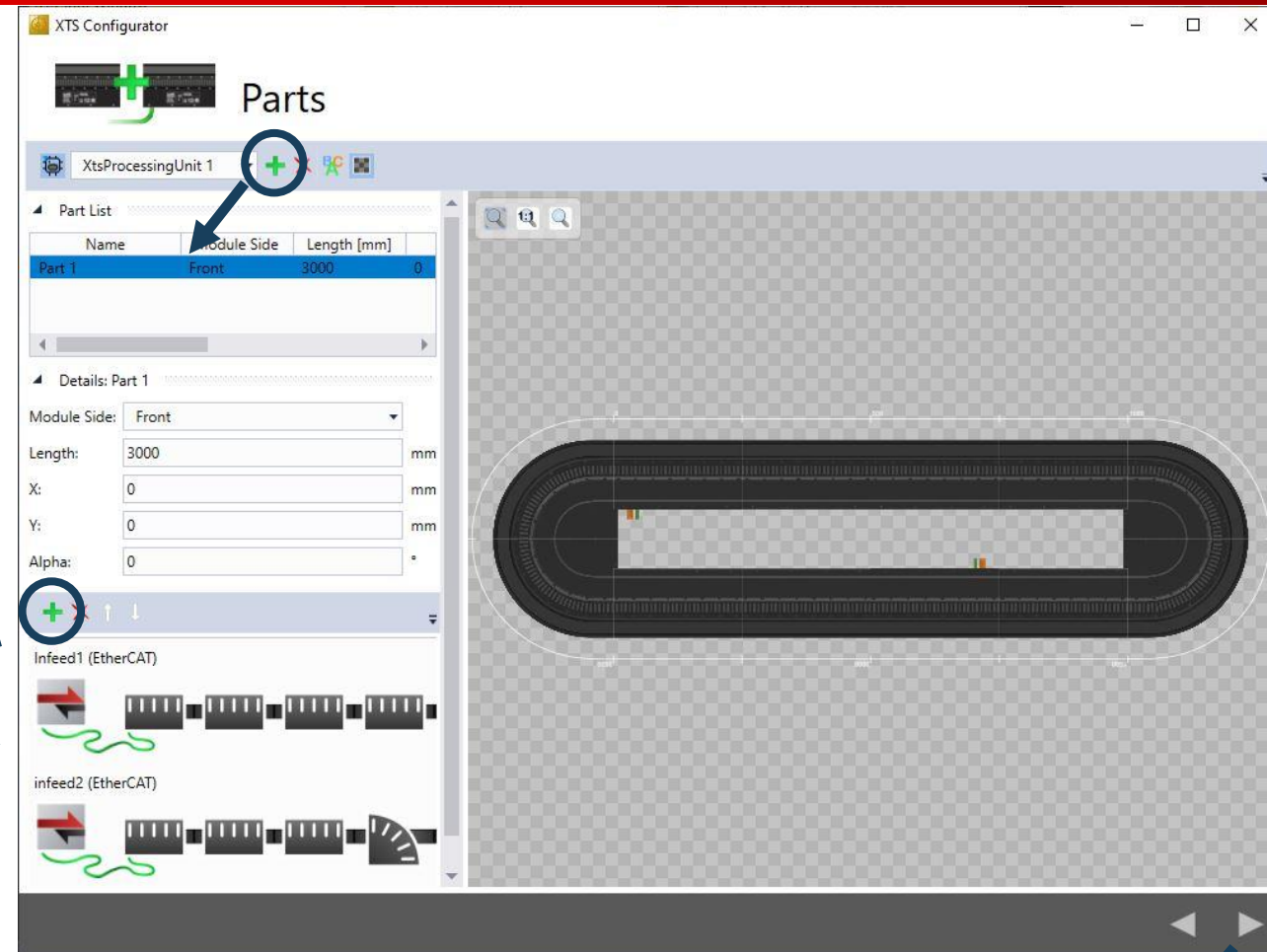
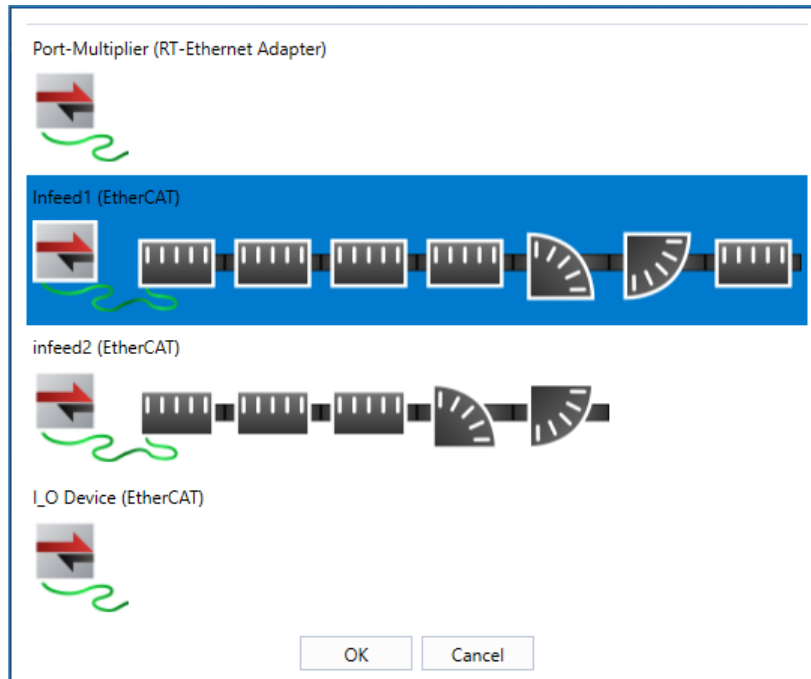
- Add XTS Task 1



# XTS Configuration Process...

BECKHOFF

- Add XTS Parts

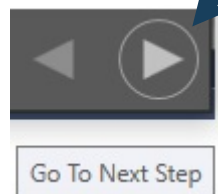
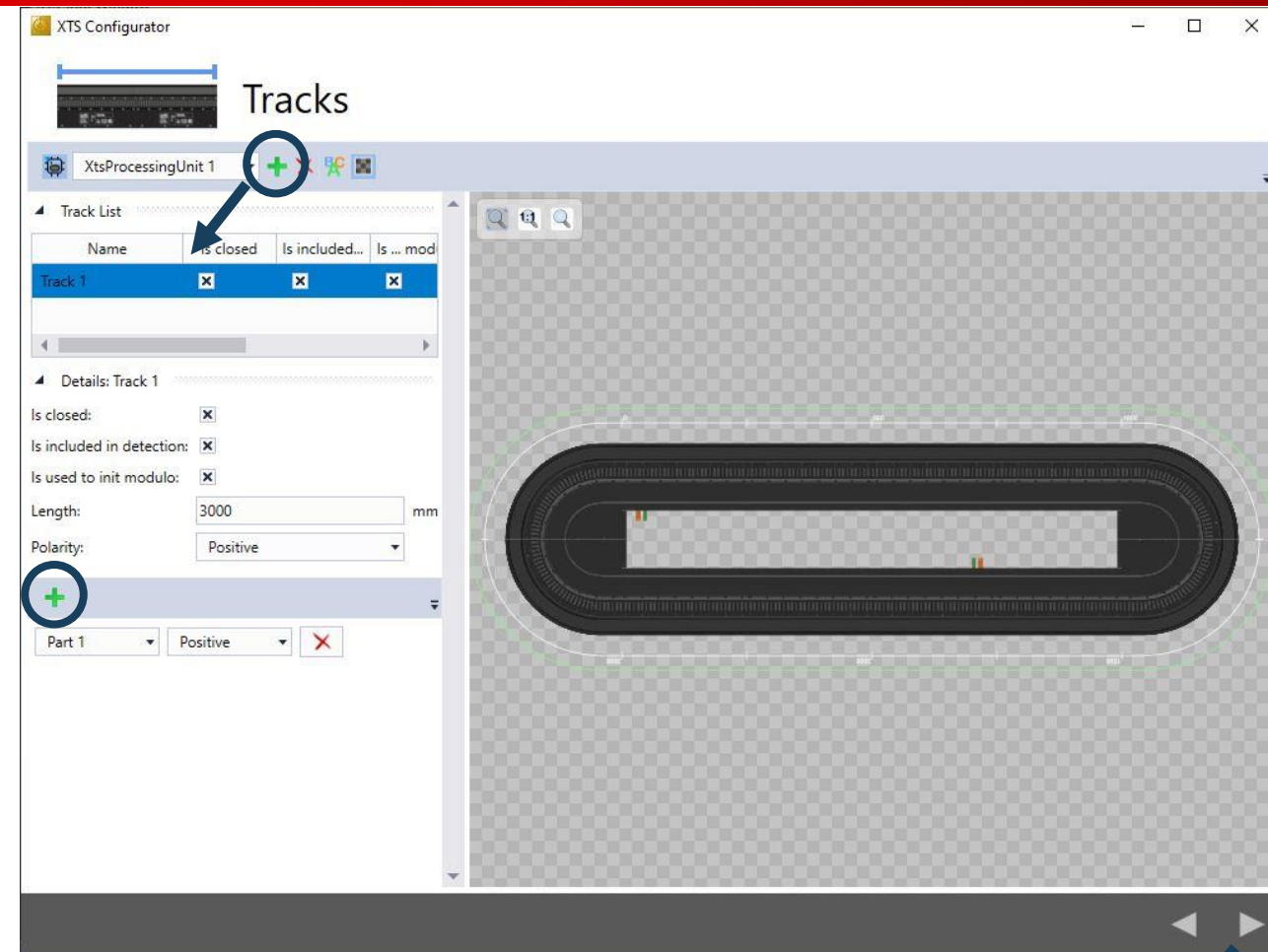




# XTS Configuration Process...

BECKHOFF

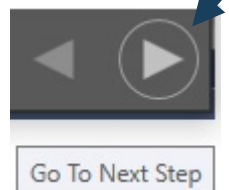
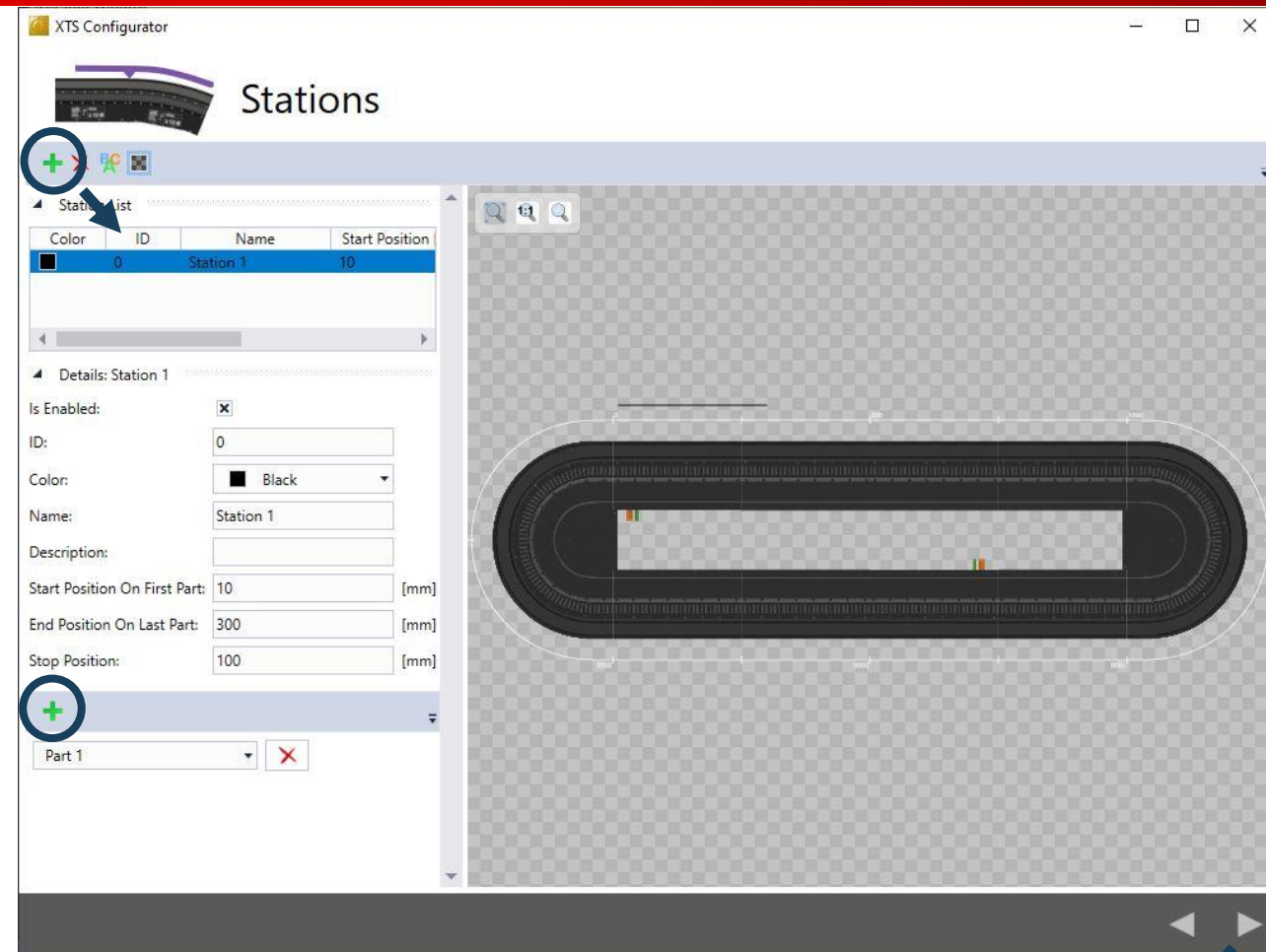
- Add XTS Tracks  
(one track minimum)
- Add Parts to the track



# XTS Configuration Process...

BECKHOFF

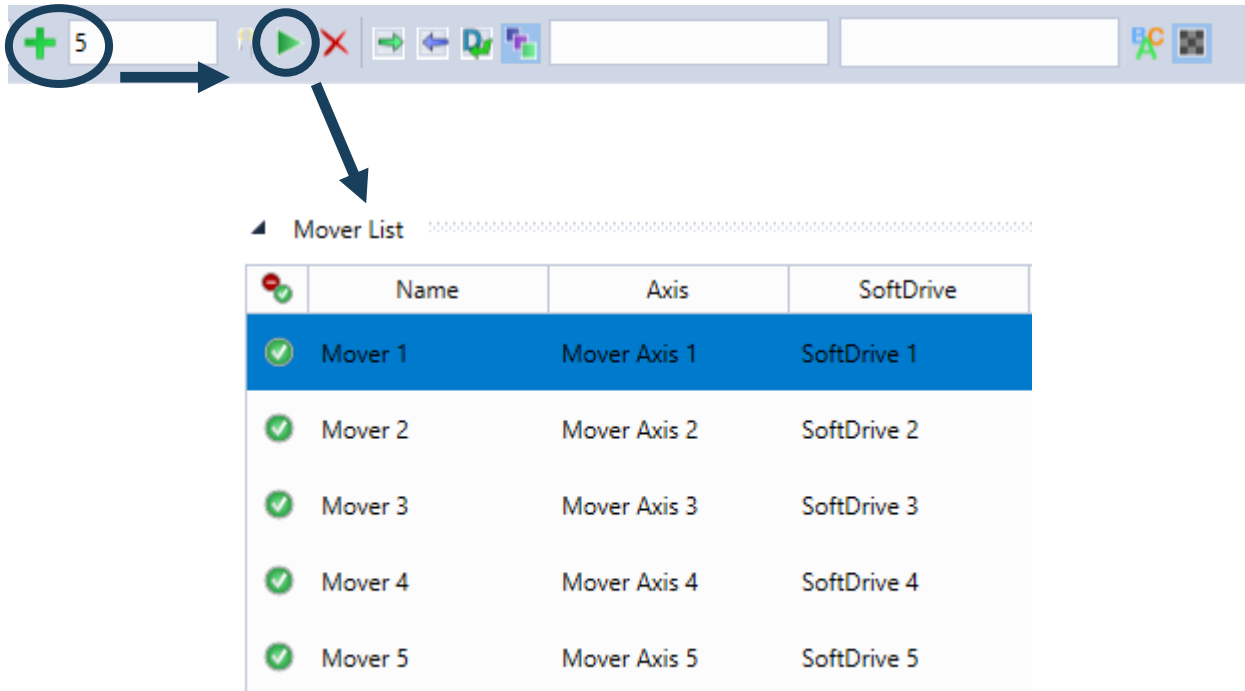
- Add XTS Station  
(only display at the moment)
- Info
  - At the moment not necessary



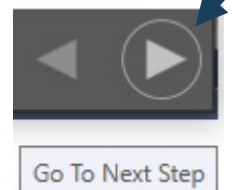
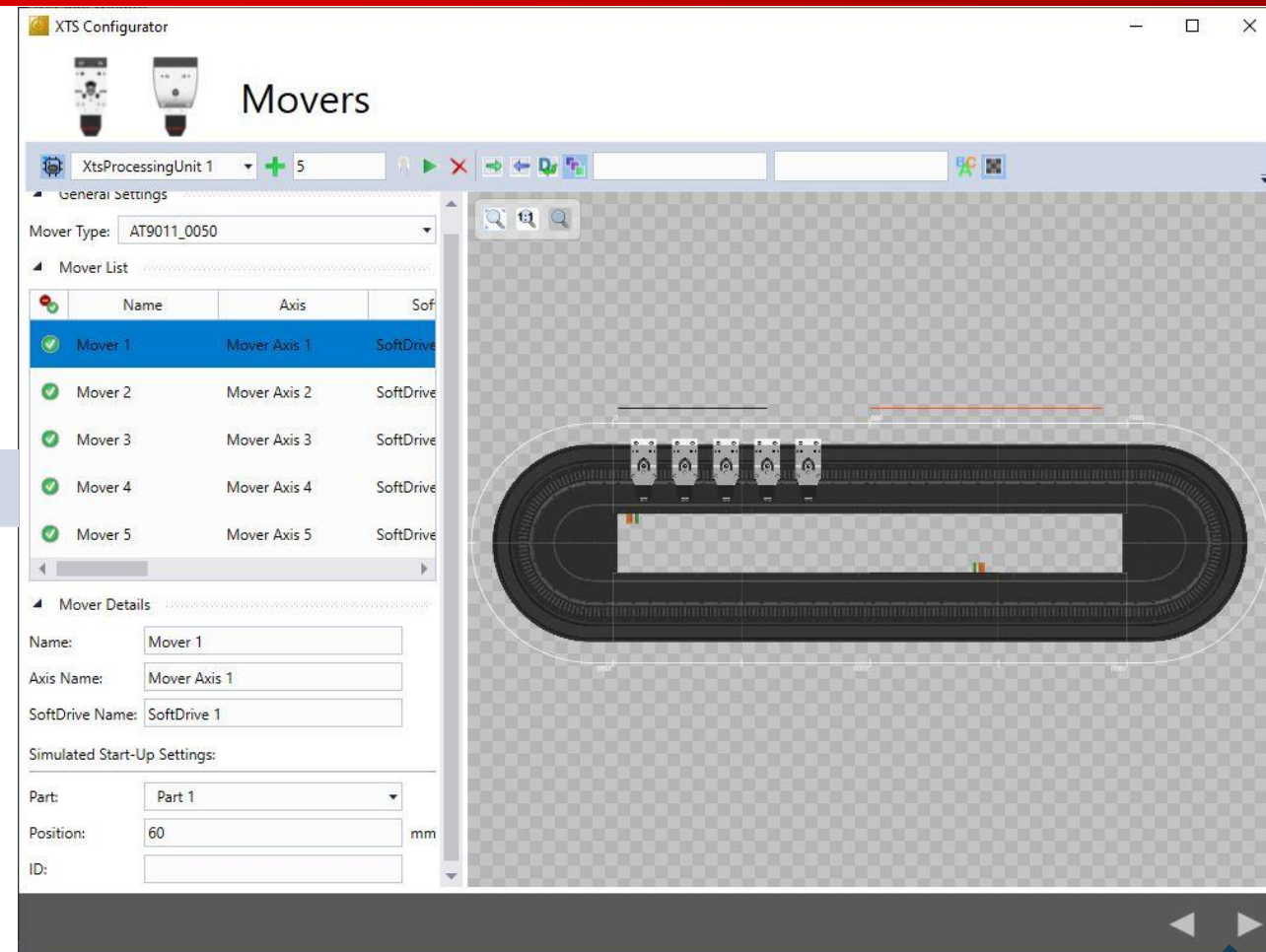
# XTS Configuration Process...

BECKHOFF

- Add XTS Mover



	Name	Axis	SoftDrive
✓	Mover 1	Mover Axis 1	SoftDrive 1
✓	Mover 2	Mover Axis 2	SoftDrive 2
✓	Mover 3	Mover Axis 3	SoftDrive 3
✓	Mover 4	Mover Axis 4	SoftDrive 4
✓	Mover 5	Mover Axis 5	SoftDrive 5



# XTS Configuration Process...

BECKHOFF

- Add XTS Mover

- Mover List and Mover Details

## Mover List

	Name	Axis	SoftDrive	Source Set	Parameter Set	Simu
✓	Mover 1	Mover Axis 1	SoftDrive 1		@D	Part 1
✓	Mover 2	Mover Axis 2	SoftDrive 2		@D	Part 1
✓	Mover 3	Mover Axis 3	SoftDrive 3		@D	Part 1
✓	Mover 4	Mover Axis 4	SoftDrive 4		@D	Part 1
✓	Mover 5	Mover Axis 5	SoftDrive 5		@D	Part 1

## Mover Details

Name:

Axis Name:

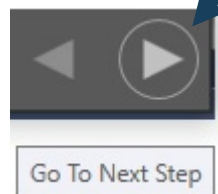
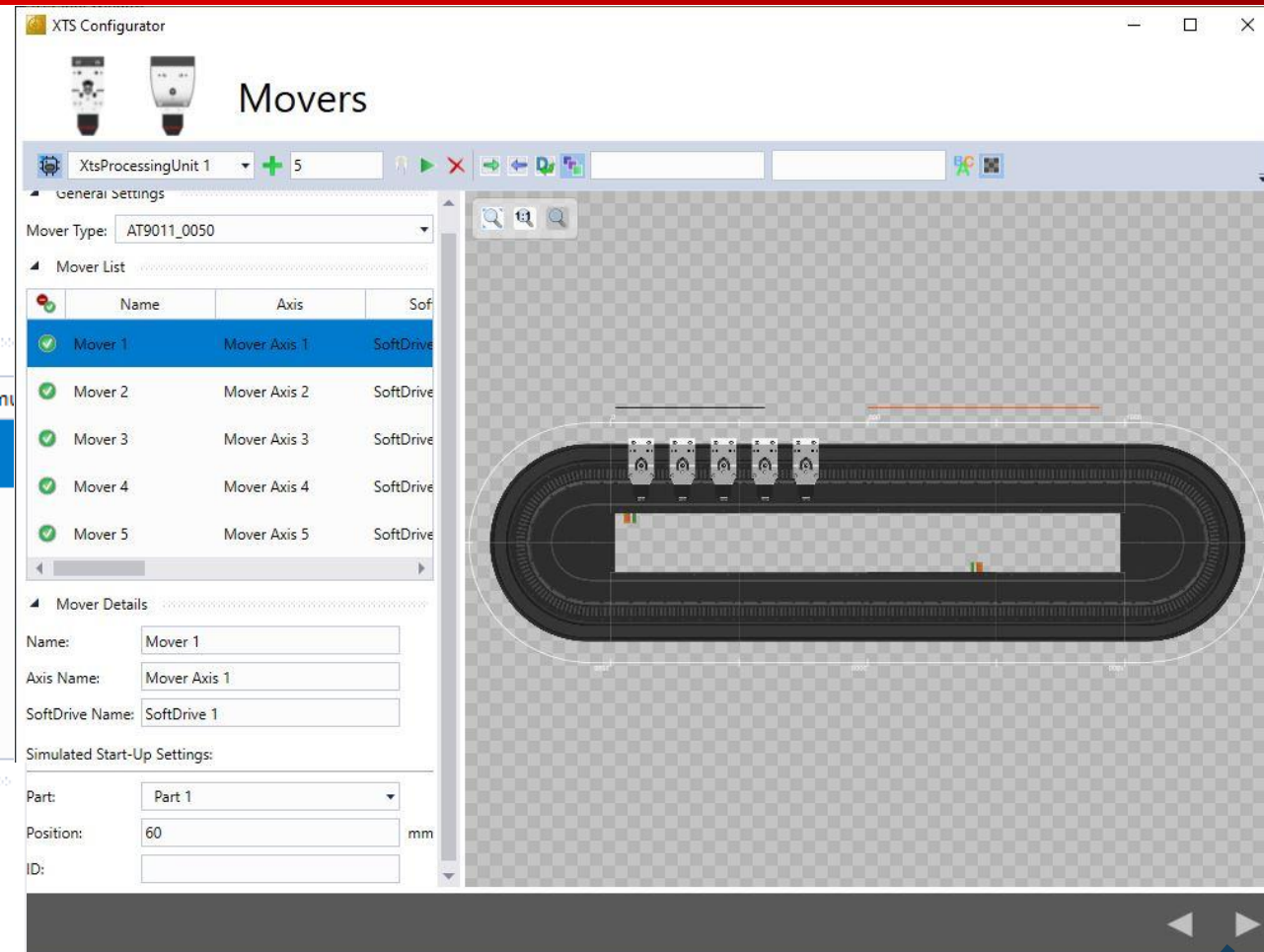
SoftDrive Name:

Simulated Start-Up Settings:

Part:

Position:  mm

ID:



# XTS Configuration Process...

BECKHOFF

- Add XTS Mover
  - choose names for Mover, Axis and Softdrive



**BCA** Choose names for the Movers, Axes and SoftDrive objects.

⚠ Be careful to generate names that are unique and will not match names of existing objects.

XtsProcessingUnit 1 0

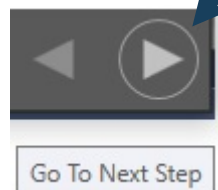
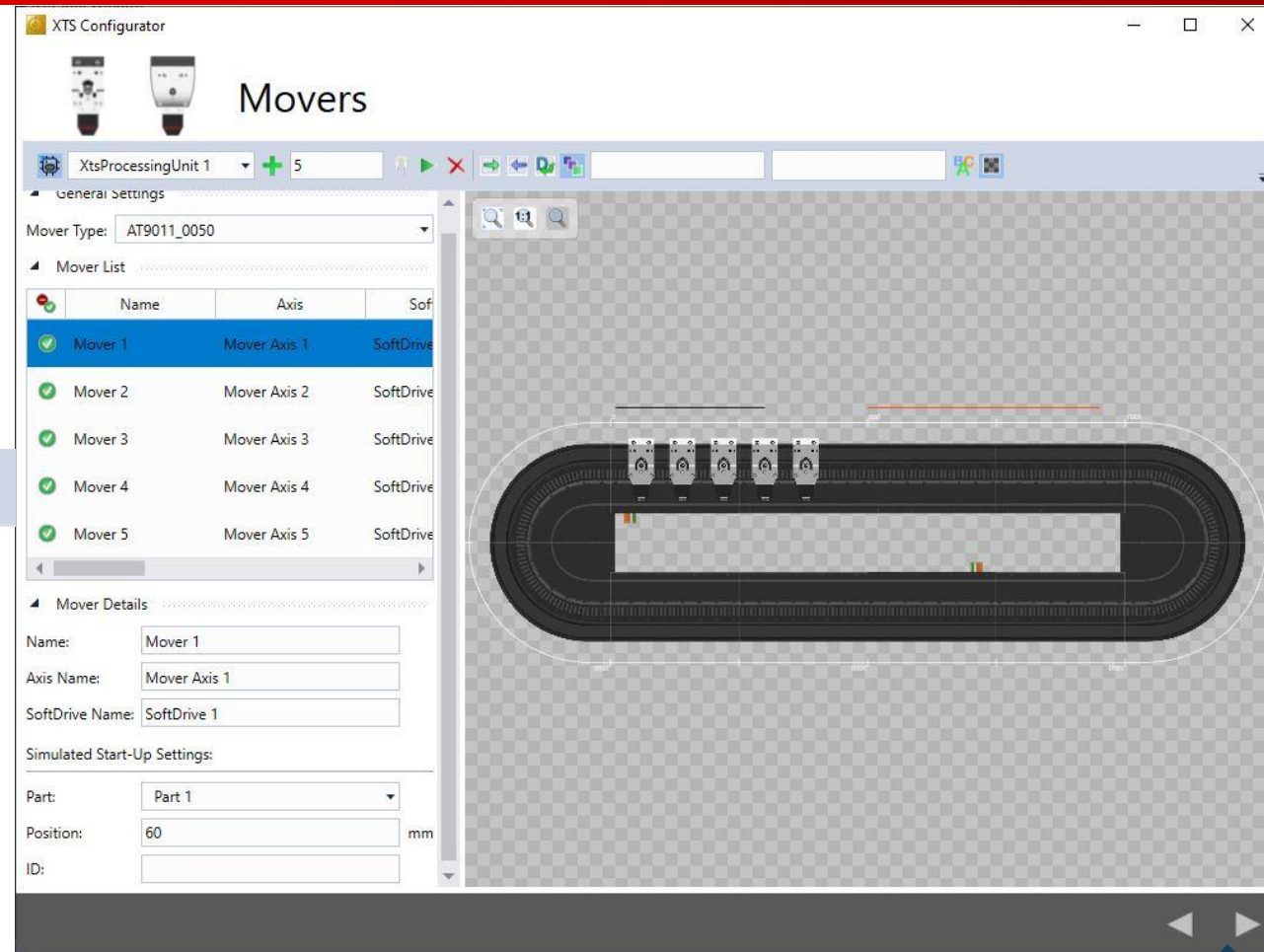
Apply a naming pattern to the selected items:

Mover Base Name: Mover  
Axis Base Name: Axis  
SoftDrive Base Name: SoftDrive  
Starting Number: 1

Apply Naming Pattern (0)

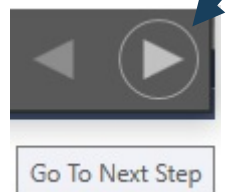
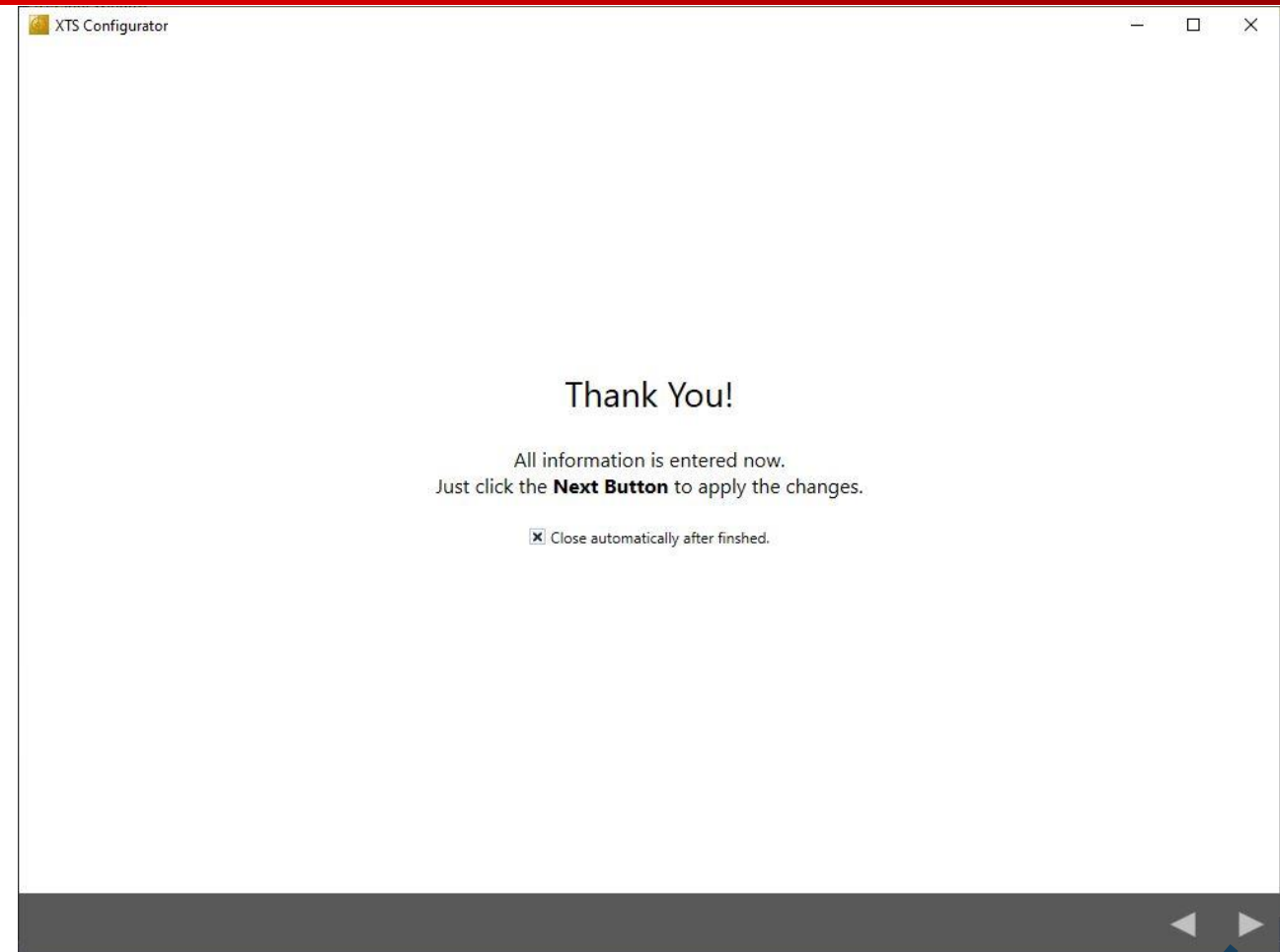
Mover Current Name	Mover New Name	Axis Current Name	Axis
Mover 1	Mover 1	Mover Axis 1	Mover
Mover 2	Mover 2	Mover Axis 2	Mover
Mover 3	Mover 3	Mover Axis 3	Mover
Mover 4	Mover 4	Mover Axis 4	Mover
Mover 5	Mover 5	Mover Axis 5	Mover

Apply (0) Close





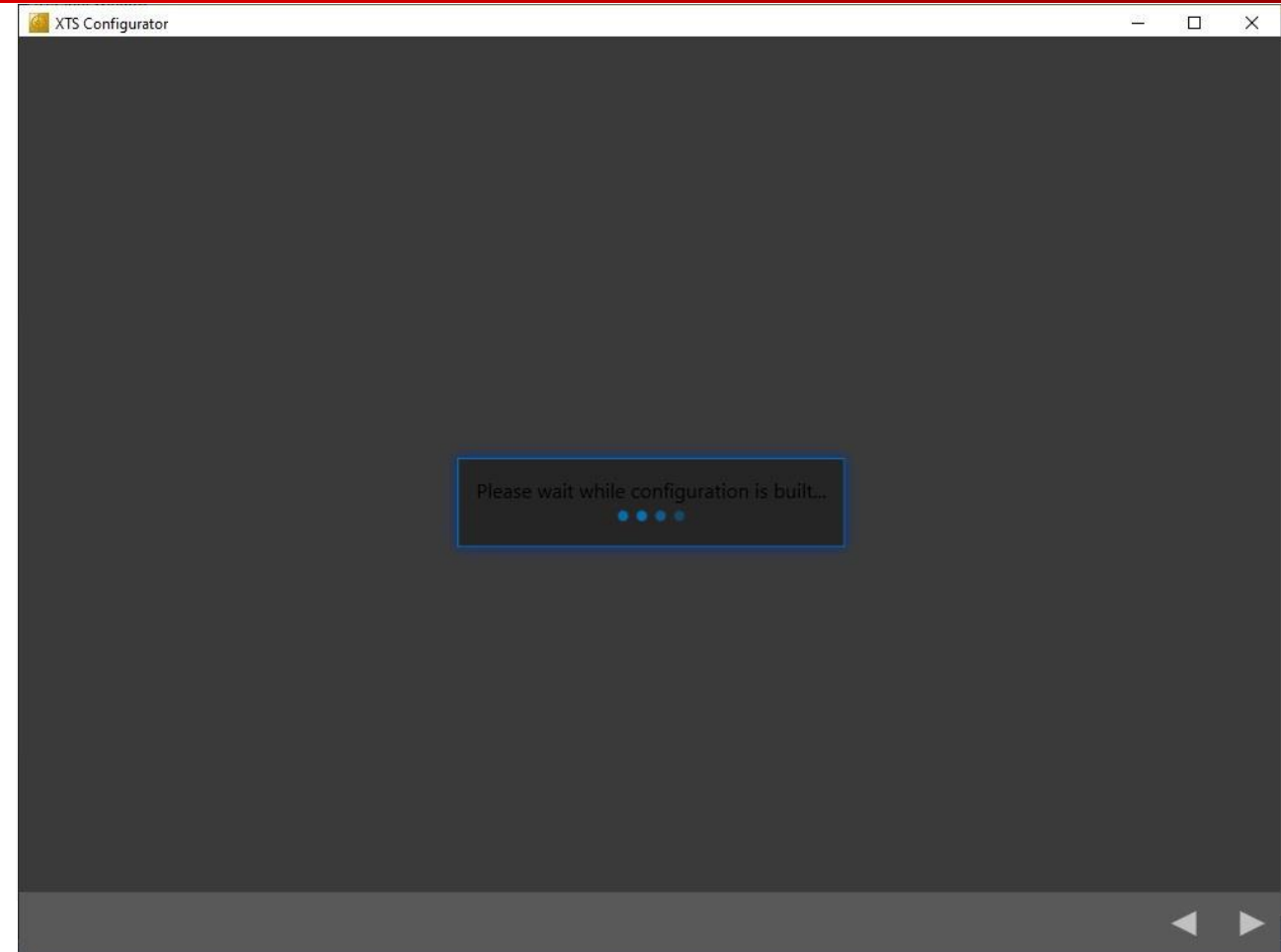
- Finished Configuration process



- Finished Configuration process

The manager creates the configuration of the system:

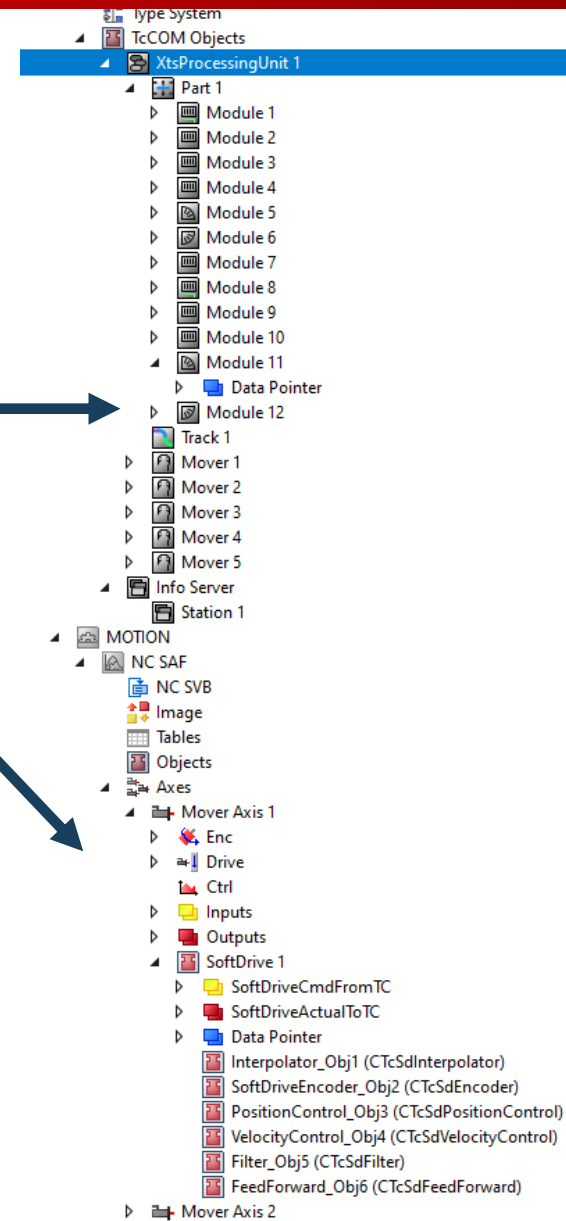
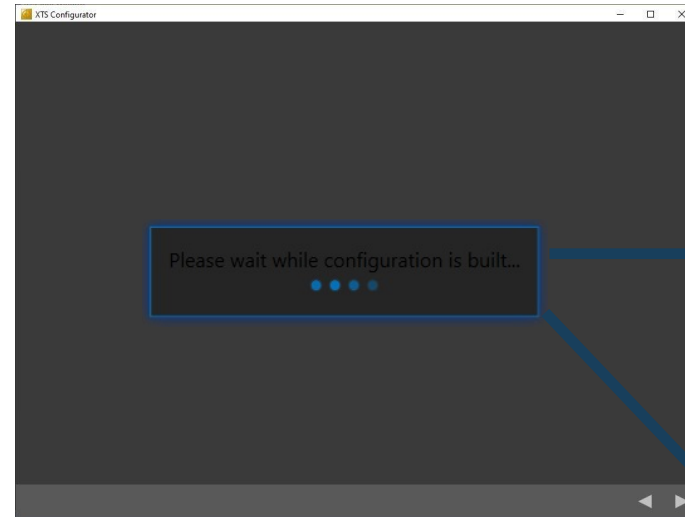
- Creates the XTS task.
- Creates the child objects of the TcloXtsProcessingUnit (modules & movers)
- Adds the Movers to the NC configuration (with a SoftDrive object for each mover)
- Context (task) of all XPU objects and SoftDrive objects are set.



# XTS Configuration Process...

BECKHOFF

- Complete the configuration



## Info

- Module objects are linked with the IO.
- Mover objects are linked with the SoftDrive.

# XTS Configuration Process...

BECKHOFF

- Communication between the Modules:

- via Data Pointers
- No mapping object
- No copy process

- Warning**

Use of data pointers is very fast but if used incorrectly data may be corrupted...

First\_XTS\_Project

Name	[X]	Online	Type	Size	>Addr...	In/Out	Linked to
Control	X		UINT	2.0	0.0	Output	Control . CC Outputs . Term 19 (AT...
CurrentSetpoint...	X		INT	2.0	2.0	Output	Current setpoint value Ch.1 . CC O
CurrentSetpoint...	X		INT	2.0	4.0	Output	Current setpoint value Ch.2 . CC O
CurrentSetpoint...	X		INT	2.0	6.0	Output	Current setpoint value Ch.3 . CC O
CurrentSetpoint...	X		INT	2.0	8.0	Output	Current setpoint value Ch.4 . CC O
CurrentSetpoint...	X		INT	2.0	10.0	Output	Current setpoint value Ch.5 . CC O
CurrentSetpoint...	X		INT	2.0	12.0	Output	Current setpoint value Ch.6 . CC O
CurrentSetpoint...	X		INT	2.0	14.0	Output	Current setpoint value Ch.7 . CC O
CurrentSetpoint...	X		INT	2.0	16.0	Output	Current setpoint value Ch.8 . CC O
CurrentSetpoint...	X		INT	2.0	18.0	Output	Current setpoint value Ch.9 . CC O
CurrentSetpoint...	X		INT	2.0	20.0	Output	Current setpoint value Ch.10 . CC
CurrentSetpoint...	X		INT	2.0	22.0	Output	Current setpoint value Ch.11 . CC
CurrentSetpoint...	X		INT	2.0	24.0	Output	Current setpoint value Ch.12 . CC
CurrentSetpoint...	X		INT	2.0	26.0	Output	Current setpoint value Ch.13 . CC
CurrentSetpoint...	X		INT	2.0	28.0	Output	Current setpoint value Ch.14 . CC
CurrentSetpoint...	X		INT	2.0	30.0	Output	Current setpoint value Ch.15 . CC
Status	V		UINT	2.0	32.0	Output	Status . CC Inputs . Term 10 (AT200

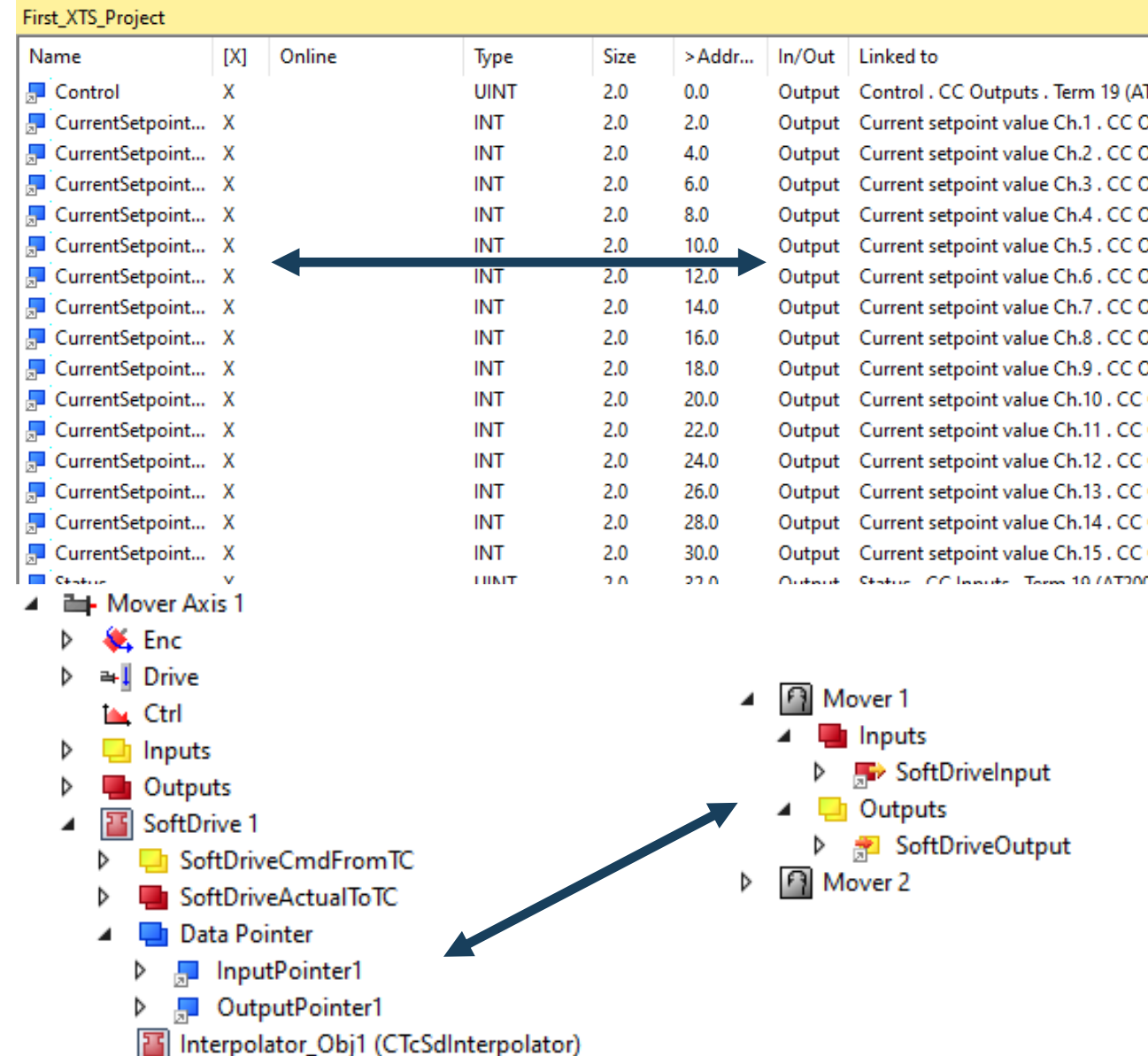
  

▲ Mover Axis 1

- ▶ Enc
- ▶ Drive
- ▶ Ctrl
- ▶ Inputs
- ▶ Outputs
- ▶ SoftDrive 1
  - ▶ SoftDriveCmdFromTC
  - ▶ SoftDriveActualToTC
  - ▶ Data Pointer
    - ▶ InputPointer1
    - ▶ OutputPointer1
  - ▶ Interpolator\_Obj1 (CTcSdInterpolator)

▲ Mover 1

- ▶ Inputs
  - ▶ SoftDriveInput
- ▶ Outputs
  - ▶ SoftDriveOutput
- ▶ Mover 2



# XTS Configuration Process...

BECKHOFF

- Manual settings Real-Time
  - Change base time to 250  $\mu$ s.
  - Change XTS task settings.

The screenshot displays the Beckhoff XTS configuration interface. The top tree view shows the project structure: First\_XTS\_Project > SYSTEM > License > Real-Time > Tasks > XTS Task 1. The main window is titled 'First\_XTS\_Project' and has tabs for Settings, Online, Priorities, and C++ Debugger. The 'Settings' tab is active, showing 'Router Memory' (Configured Size: 32 MB, Allocated / Available: 32 / 31) and 'Global Task Config' (Maximal Stack Size: 64KB). Below these, 'Available cores (Shared/Isolated):' shows 1 and 3 cores. A 'Read from Target' button and a 'Set on target' button are also present. The 'Core' table is shown with columns: Core, RT-Core, Base Time, Core Limit, and Latency Warning. Core 3 (Isolated) is selected, and its 'Base Time' is set to 250  $\mu$ s. A dropdown menu for 'Base Time' is open, showing options: (none), 1 ms, 500  $\mu$ s, 250  $\mu$ s, 125  $\mu$ s, and 100  $\mu$ s. The '250  $\mu$ s' option is highlighted. Below the 'Core' table, the 'Object' table is visible, showing 'XTS Task 1' assigned to 'Core 3' with a 'Base Time' of 250  $\mu$ s.

Core	RT-Core	Base Time	Core Limit	Latency Warning
0 (Shared)	<input type="checkbox"/>			
1 (Isolated)	<input checked="" type="checkbox"/> Default	1 ms	100 %	(none)
2 (Isolated)	<input checked="" type="checkbox"/>	1 ms	100 %	(none)
3 (Isolated)	<input checked="" type="checkbox"/>	250 $\mu$ s	100 %	(none)

Object	RT-Core	Base Time (ms)	Cycle Time (ms)	Cycle Ticks
XTS Task 1	Core 3	250 $\mu$ s	1 ms	4
NC SAF	Core 2	1 ms	2 ms	2
...	...	...	...	...



# XTS Configuration Process...

BECKHOFF

- Suggested settings Real-Time (small XTS-Systems)
  - It is suggested to use one core just for the fast 250  $\mu$ s XTS task (100% isolated).
  - use 1 core just for windows and three cores as isolated real time cores

The screenshot displays the Beckhoff XTS configuration software interface. The top part shows a project tree for 'First\_XTS\_Project' with a 'Real-Time' configuration node selected. Below this, the 'Real-Time' settings window is open, showing various configuration options.

**Project Tree:**

- First\_XTS\_Project
  - SYSTEM
    - License
    - Real-Time**
      - Tasks
        - PlcTask
        - XTS Task 1
      - Routes
      - Type System
      - TcCOM Objects

**Real-Time Settings Window:**

Router Memory: Configured Size [MB]: 32, Allocated / Available: 32 / 31

Global Task Config: Maximal Stack Size [KB]: 64KB

Available cores (Shared/Isolated): 1, 3

Read from Target, Set on target

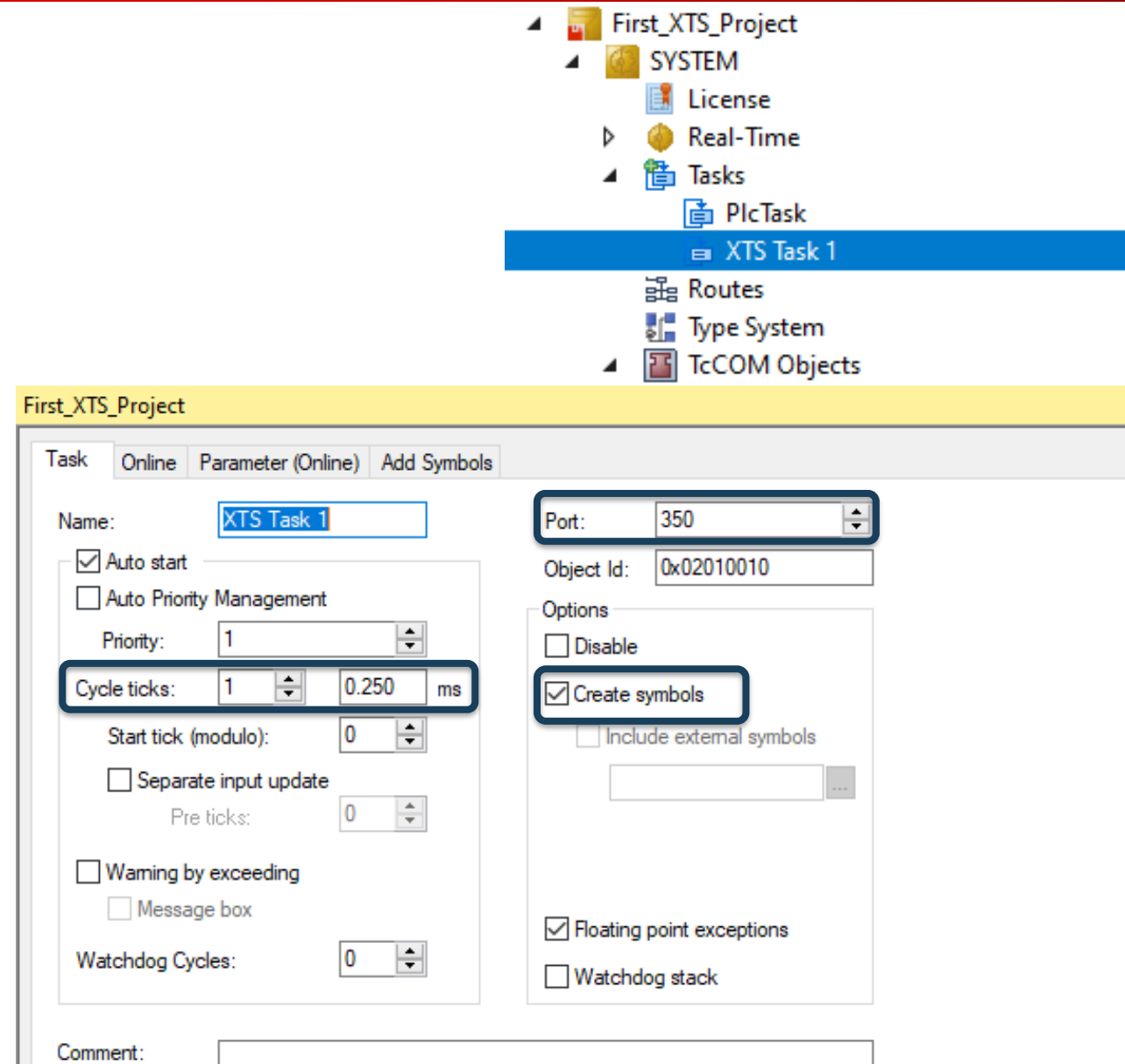
Core	RT-Core	Base Ti...	Core Limit	Latency Warning
0 (Shared)	<input type="checkbox"/>			
1 (Isolated)	<input checked="" type="checkbox"/> Default	1 ms	100 %	(none)
2 (Isolated)	<input checked="" type="checkbox"/>	1 ms	100 %	(none)
3 (Isolated)	<input checked="" type="checkbox"/>	250 $\mu$ s	100 %	(none)

Object	RT-Core	Base Time (ms)	Cycle Time (ms)	Cycle Ticks	Priority
XTS Task 1	Core 3	250 $\mu$ s	0.250 ms	1	1
NC SAF	Core 2	1 ms	2 ms	2	4
I/O Idle Task	Default (1)	1 ms	1 ms	1	11
PlcTask	Default (1)	1 ms	10 ms	10	20

# XTS Configuration Process...

BECKHOFF

- Manual settings XTS Task
  - Change Cycle time to 250  $\mu$ s
  - Port must be greater or equal to 350
  - 'Create symbols' is useful to simplify measurements with TC3 Scope




# XTS Configuration Process...

BECKHOFF

- First activation...



General Settings Parameter Dynamics **Online** Functions Coupling Compensation

 **144.3394** Setpoint Position: [mm] 0.0000

Lag Distance (min/max): [mm] 0.0000 (0.000, 0.000) Actual Velocity: [mm/s] -0.1154 Setpoint Velocity: [mm/s] 0.0000

Override: [%] 0.0000 % Total / Control Output: [%] 0.00 / 0.00 % Error: 0 (0x0)

**Status (log.)** **Status (phys.)** **Enabling**

☐ Ready ☒ NOT Moving ☐ Coupled Mode ☐ Controller

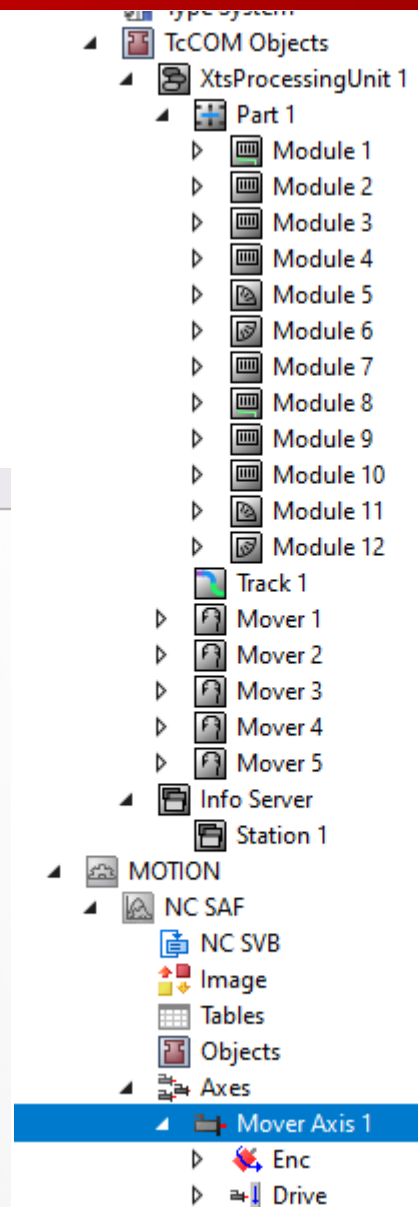
☐ Calibrated ☐ Moving Fw ☐ In Target Pos. ☐ Feed Fw

☐ Has Job ☐ Moving Bw ☐ In Pos. Range ☐ Feed Bw

Controller Kv-Factor: [mm/s/mm] 1 Reference Velocity: [mm/s] 2200

Target Position: [mm] 0 Target Velocity: [mm/s] 0

**F1** **F2** **F3** **F4** **F5** **F6** **F8** **F9**



# XTS Configuration Process...

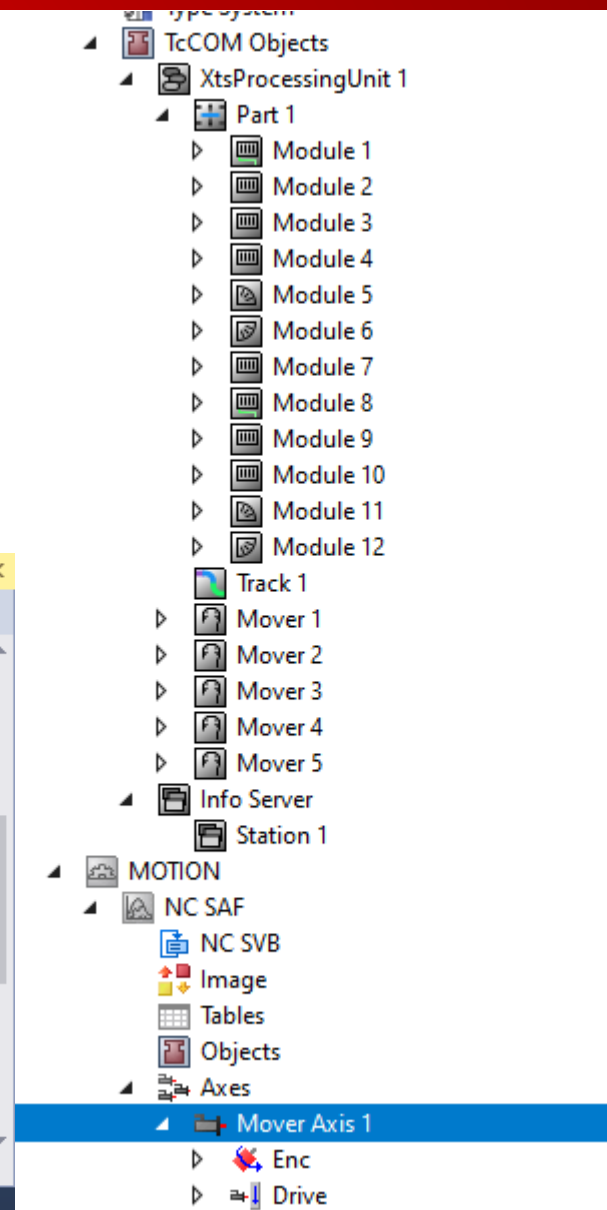
BECKHOFF

- First activation...
  - Output Window

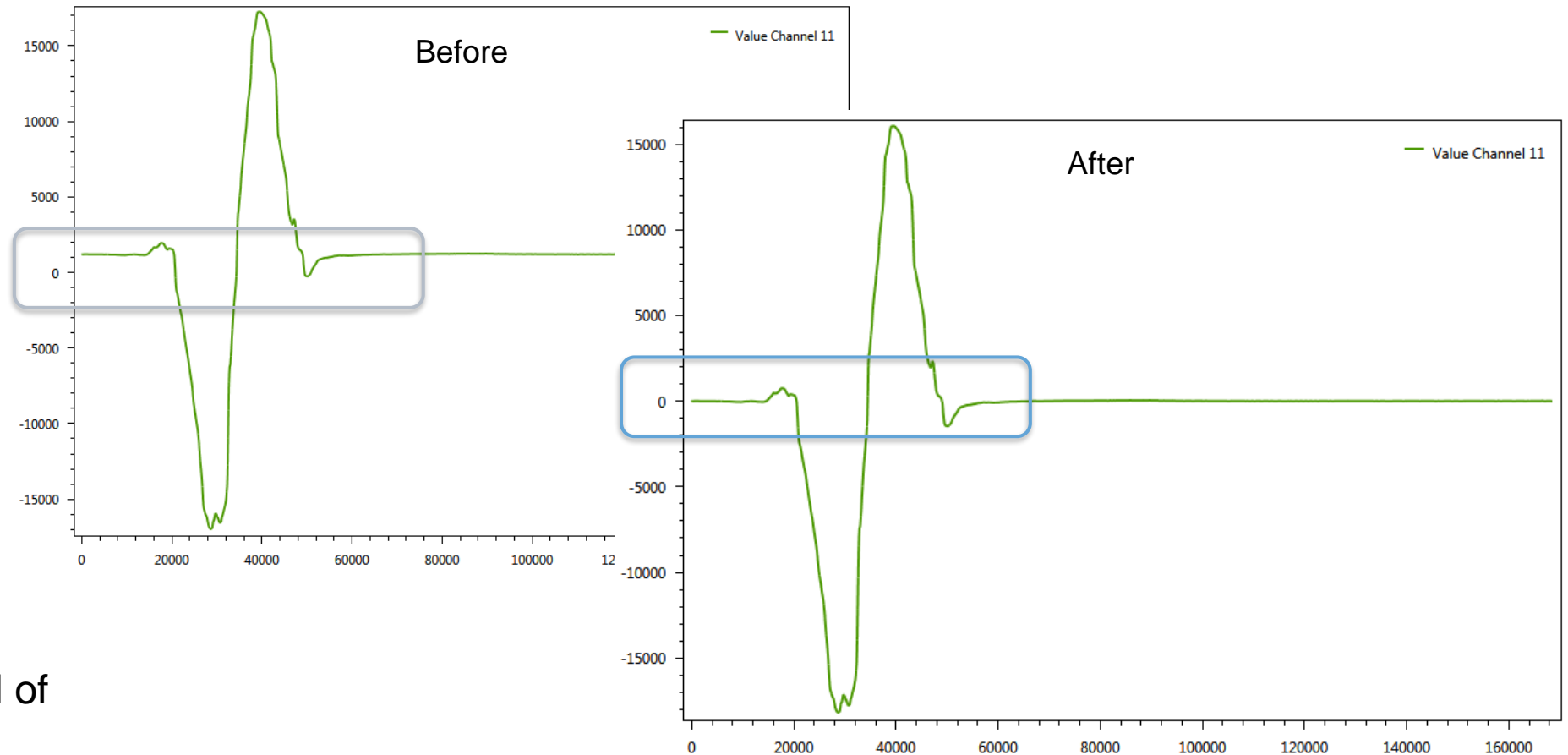
Output

Show output from: TwinCAT

```
MSG | 03/01/2021 12:15:49 029 ms | XtsProcessingUnit 1 (0x01010010): Version 3.20.711.0 Build date: Dec 17 2020 Build time: 14:22:27
MSG | 03/01/2021 12:15:49 029 ms | XtsProcessingUnit 1 (0x01010010): 12 XTS module(s) are loaded.
MSG | 03/01/2021 12:15:49 029 ms | XtsProcessingUnit 1 (0x01010010): 5 XTS mover(s) are loaded.
MSG | 03/01/2021 12:15:49 029 ms | XtsProcessingUnit 1 (0x01010010): Path length is 3000.000000 mm.
WRN | 03/01/2021 12:15:53 516 ms | XtsProcessingUnit 1 (0x01010010): Teaching data TcIoXts.TeachingData.202102001 is missing.
MSG | 03/01/2021 12:15:54 045 ms | XtsProcessingUnit 1 (0x01010010): 12 modules will be initialized...
MSG | 03/01/2021 12:15:54 467 ms | XtsProcessingUnit 1 (0x01010010): 768 DataPointers are initialized.
MSG | 03/01/2021 12:15:54 467 ms | XtsProcessingUnit 1 (0x01010010): Is registered by all tasks as IO driver.
MSG | 03/01/2021 12:15:54 467 ms | XtsProcessingUnit 1 (0x01010010): Enable time is set.
WRN | 03/01/2021 12:15:54 472 ms | XtsProcessingUnit 1 (0x01010010): IO Processing Unit (ID = 1) is waiting for infeed2 (EtherCAT) (3010070) to start up.
MSG | 03/01/2021 12:15:54 496 ms | 'TCOM Server' (10): Cu2508 fifo sizes: 1:16 2:8 3:8 4:8 5:16 6:8 7:8 8:8
WRN | 03/01/2021 12:15:55 472 ms | XtsProcessingUnit 1 (0x01010010): IO Processing Unit (ID = 1) is waiting for Infeed1 (EtherCAT) (3010060) to start up.
MSG | 03/01/2021 12:15:56 144 ms | XtsProcessingUnit 1 (0x01010010): IO Processing Unit (ID = 1): EtherCAT is ready now (2 device(s) are checked).
MSG | 03/01/2021 12:15:56 219 ms | 'TwinCAT System' (10000): Starting COM Server TcEventLogger !
MSG | 03/01/2021 12:15:56 441 ms | XtsProcessingUnit 1 (0x01010010): Teaching data Default is loaded.
MSG | 03/01/2021 12:15:56 457 ms | XtsProcessingUnit 1 (0x01010010): All XTS mover(s) are detected.
```



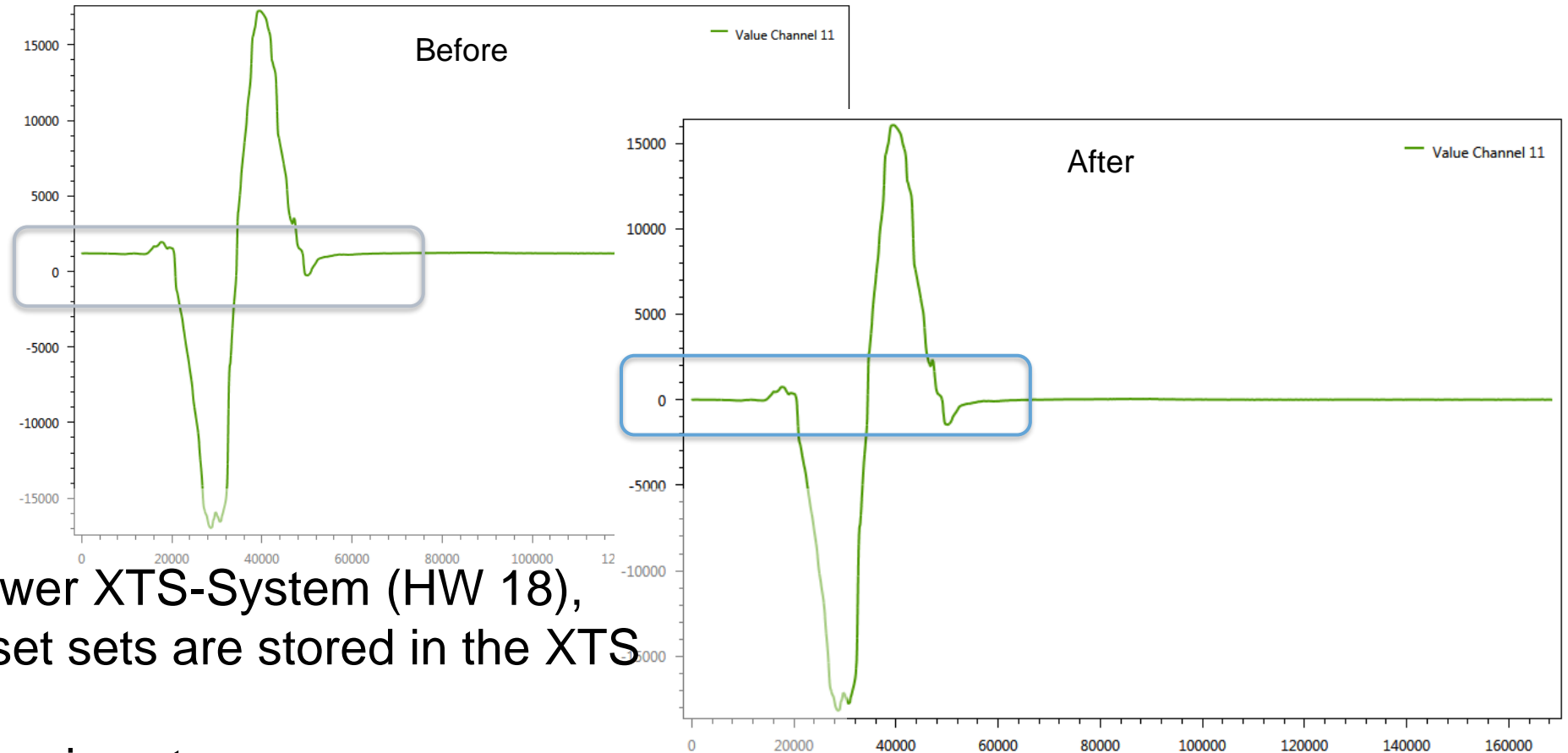
## ■ Teaching Process



Analog position signal of  
an XTS-Module



- Teaching Process



## Info


In the case of newer XTS-System (HW 18), the analogue offset sets are stored in the XTS modules.

A teaching process is not necessary

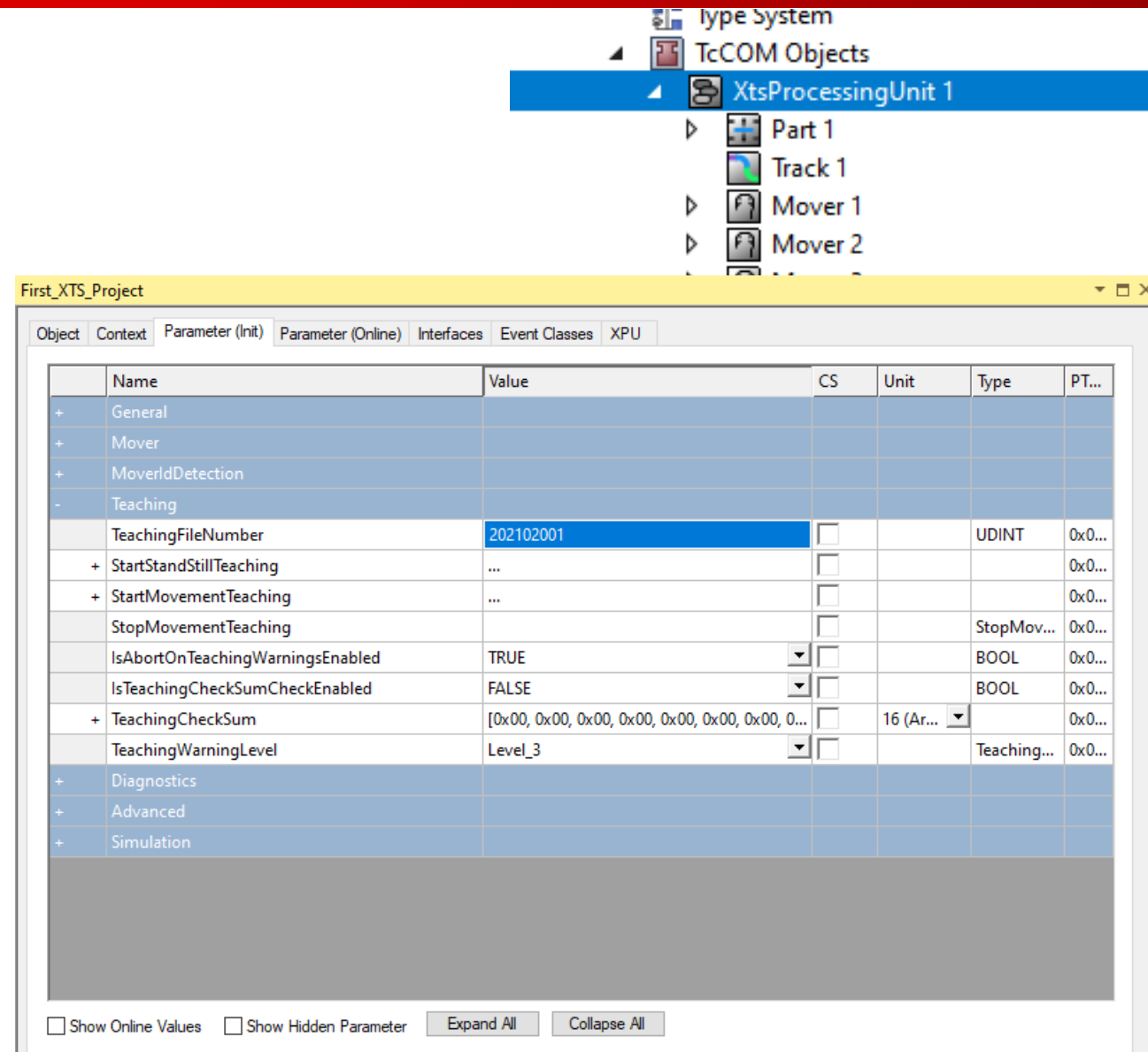
## ■ Teaching Process | first Step

- set a number for the teaching file which represents the current date.

## ■ Info

Changes to the 'TeachingFileNumber' are not recognized until after an 'Activate Configuration' is performed. 

Before the teaching procedure is started, it must be activated so that the teaching data is saved in the correct file



Name	Value	CS	Unit	Type	PT...
General					
Mover					
MoverIdDetection					
Teaching					
TeachingFileNumber	202102001	<input type="checkbox"/>		UDINT	0x0...
StartStandStillTeaching	...	<input type="checkbox"/>			0x0...
StartMovementTeaching	...	<input type="checkbox"/>			0x0...
StopMovementTeaching		<input type="checkbox"/>		StopMov...	0x0...
IsAbortOnTeachingWarningsEnabled	TRUE	<input type="checkbox"/>		BOOL	0x0...
IsTeachingChecksumCheckEnabled	FALSE	<input type="checkbox"/>		BOOL	0x0...
TeachingChecksum	[0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00]	<input type="checkbox"/>	16 (Ar...		0x0...
TeachingWarningLevel	Level_3	<input type="checkbox"/>		Teaching...	0x0...
Diagnostics					
Advanced					
Simulation					

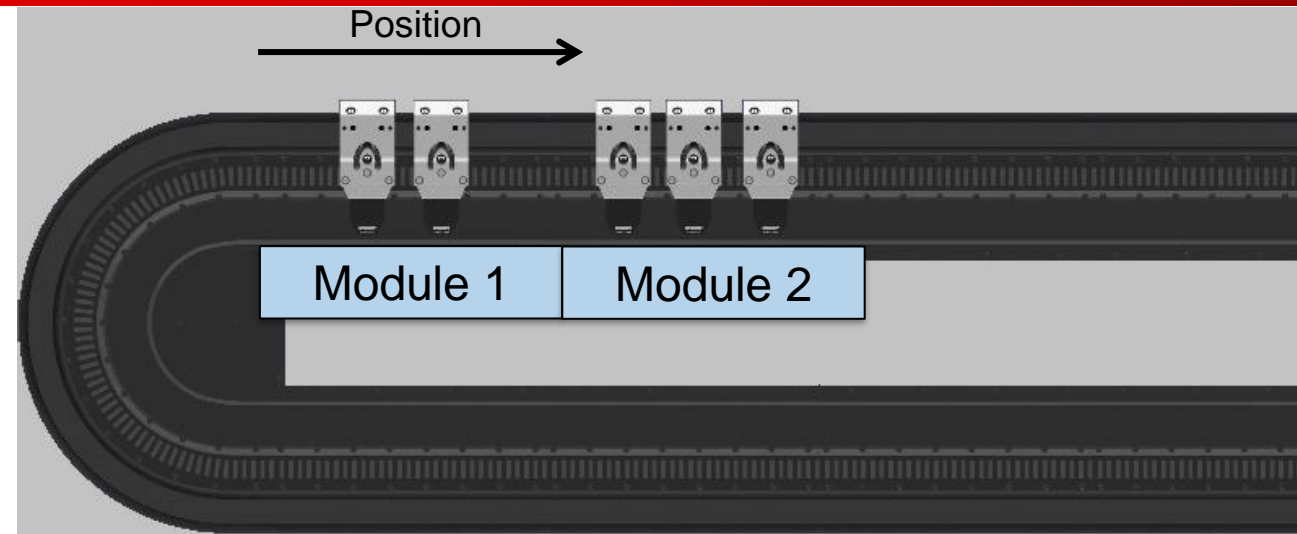
☐ Show Online Values ☐ Show Hidden Parameter

## ■ Teaching Process | next Step

1. Move the Mover to a defined Position
2. Define Exclude Specified Items.

## ■ Info

.selectionString Format  
X, Y, Z or X-Z



Teaching		
	TeachingFileNumber	202102001
-	StartStandStillTeaching	...
	.teachingSelection	ExcludeSpecifiedItems
	.selectionString	1-2
+	StartMovementTeaching	...
	StopMovementTeaching	
	IsAbortOnTeachingWarningsEnabled	TRUE
	IsTeachingChecksumCheckEnabled	FALSE
+	TeachingChecksum	[0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00]
	TeachingWarningLevel	Level_3

# XTS Configuration Process...

BECKHOFF

- Teaching Process | next Step

### 3. StartStandStillTeaching

The diagram shows a robotic arm with two modules, Module 1 and Module 2, moving along a track. A 'Position' arrow indicates the direction of movement. Below the diagram is a configuration table with a context menu open over the 'StartStandStillTeaching' row.

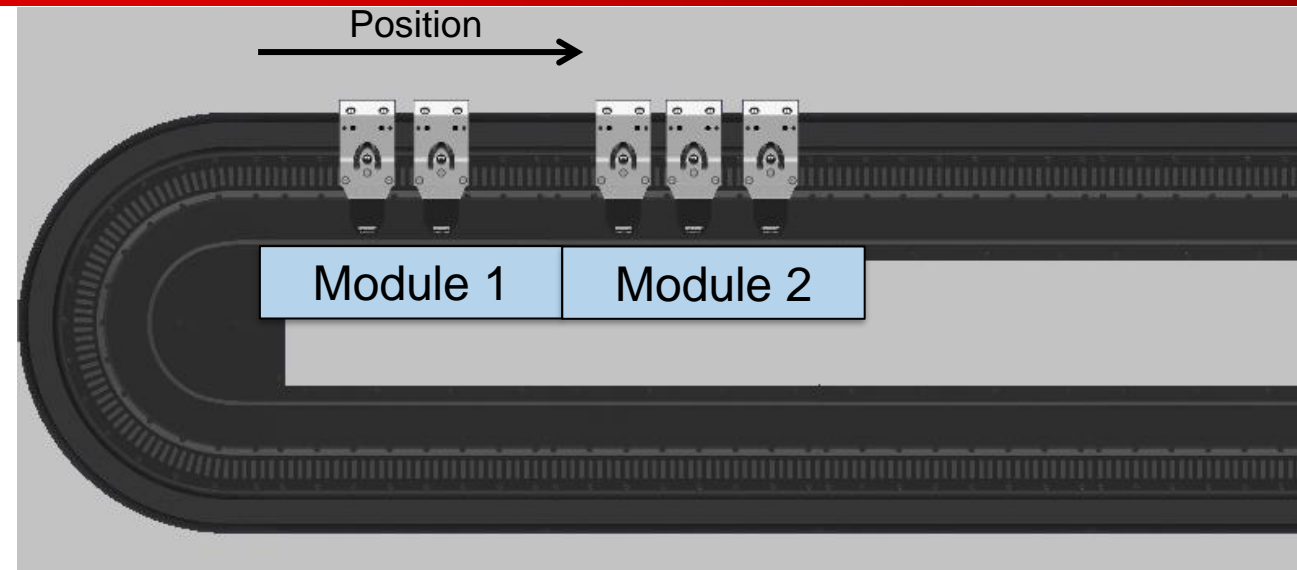
Teaching	
TeachingFileNumber	202102001
- StartStandStillTeaching	...
.teachingSelection	Exclud
.selectionString	1-2
+ StartMovementTeaching	...
StopMovementTeaching	
IsAbortOnTeachingWarningsEnabled	TRUE
IsTeachingChecksumCheckEnabled	FALSE
+ TeachingChecksum	[0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00]
TeachingWarningLevel	Level_3

Context Menu:

- Download
- Upload
- Copy To...

- Teaching Process

## 4. Teaching Stops automatically



Output

Show output from: TwinCAT

```
| XtsProcessingUnit 1 (0x01010010): Teaching is started on 10 modules.  
| XtsProcessingUnit 1 (0x01010010): Teaching is stopped on 10 modules.  
| XtsProcessingUnit 1 (0x01010010): Teaching data plausibility check is passed successfully.
```

Error List Output

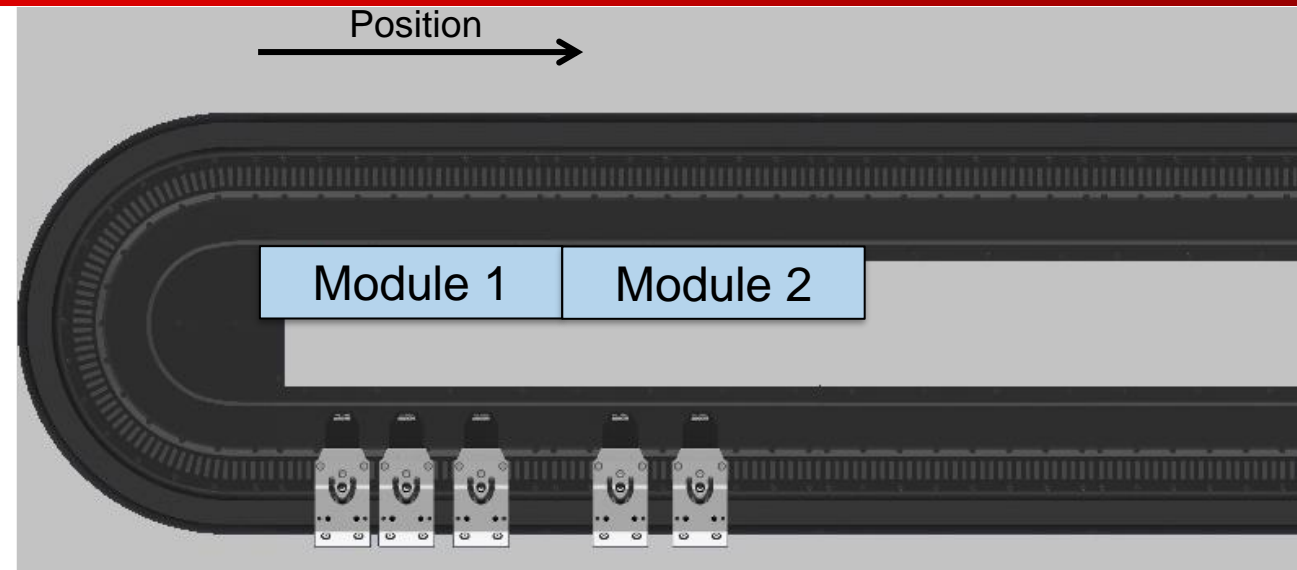
- Teaching Process | next Step

5. Move the Mover to a different defined Position

6. Change “.teachingSelection”

- Warning**

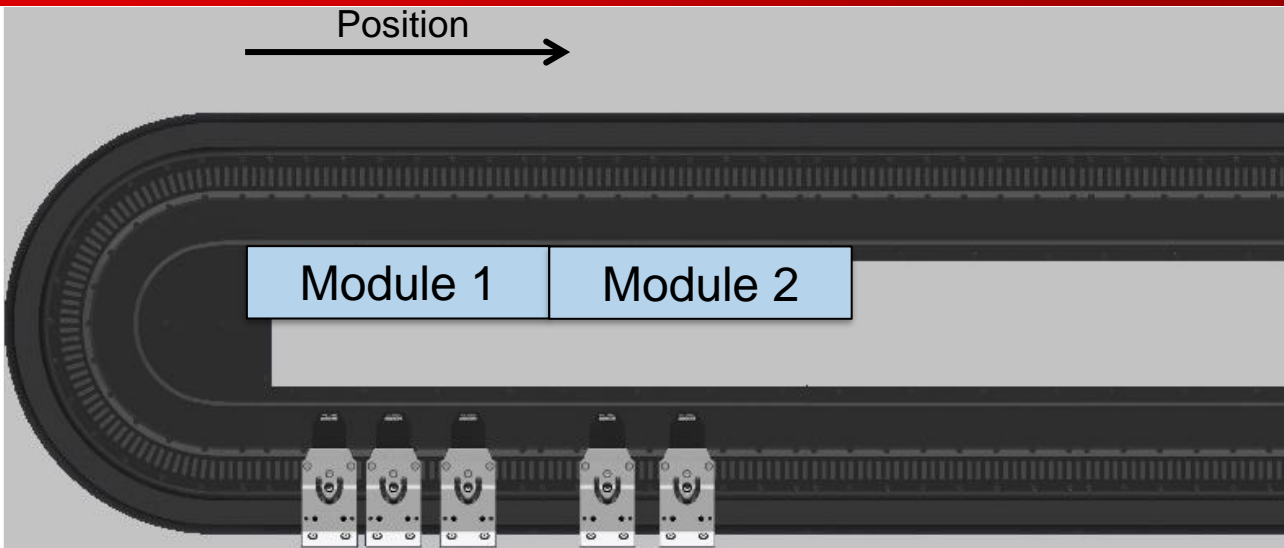
Do not place movers at crossings where the module is active during teaching. Otherwise the feedback system will not work correctly.




-	Teaching	
	TeachingFileNumber	202102001
-	StartStandStillTeaching	...
	.teachingSelection	IncludeSpecifiedItems
	.selectionString	1-2
+	StartMovementTeaching	...
	StopMovementTeaching	
	IsAbortOnTeachingWarningsEnabled	TRUE
	IsTeachingChecksumCheckEnabled	FALSE
+	TeachingChecksum	[0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00]
	TeachingWarningLevel	Level_3


- Teaching Process | next Step


7. StartStandStillTeaching



-	Teaching	
	TeachingFileNumber	202102001
-	StartStandStillTeaching	...
	.teachingSelection	IncludeSp
	.selectionString	1-2
+	StartMovementTeaching	...
	StopMovementTeaching	
	IsAbortOnTeachingWarningsEnabled	TRUE
	IsTeachingChecksumCheckEnabled	FALSE
+	TeachingChecksum	[0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00]
	TeachingWarningLevel	Level_3

Download

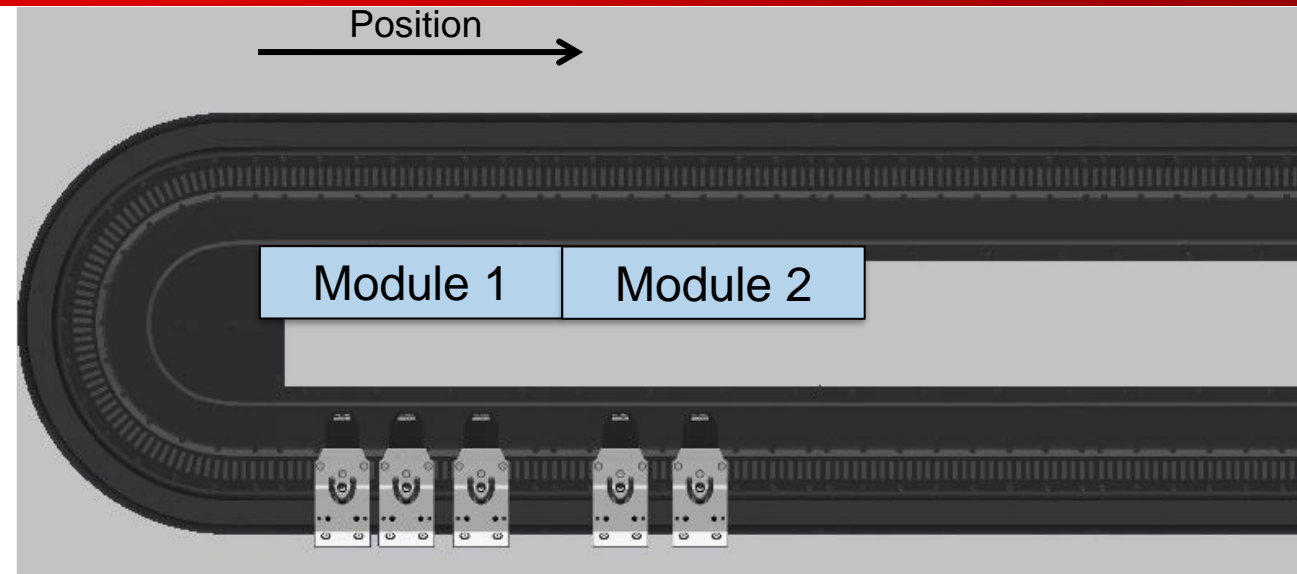
Upload

Copy To...



- Teaching Process

- 8. Teaching Stops automatically



Output

Show output from: TwinCAT

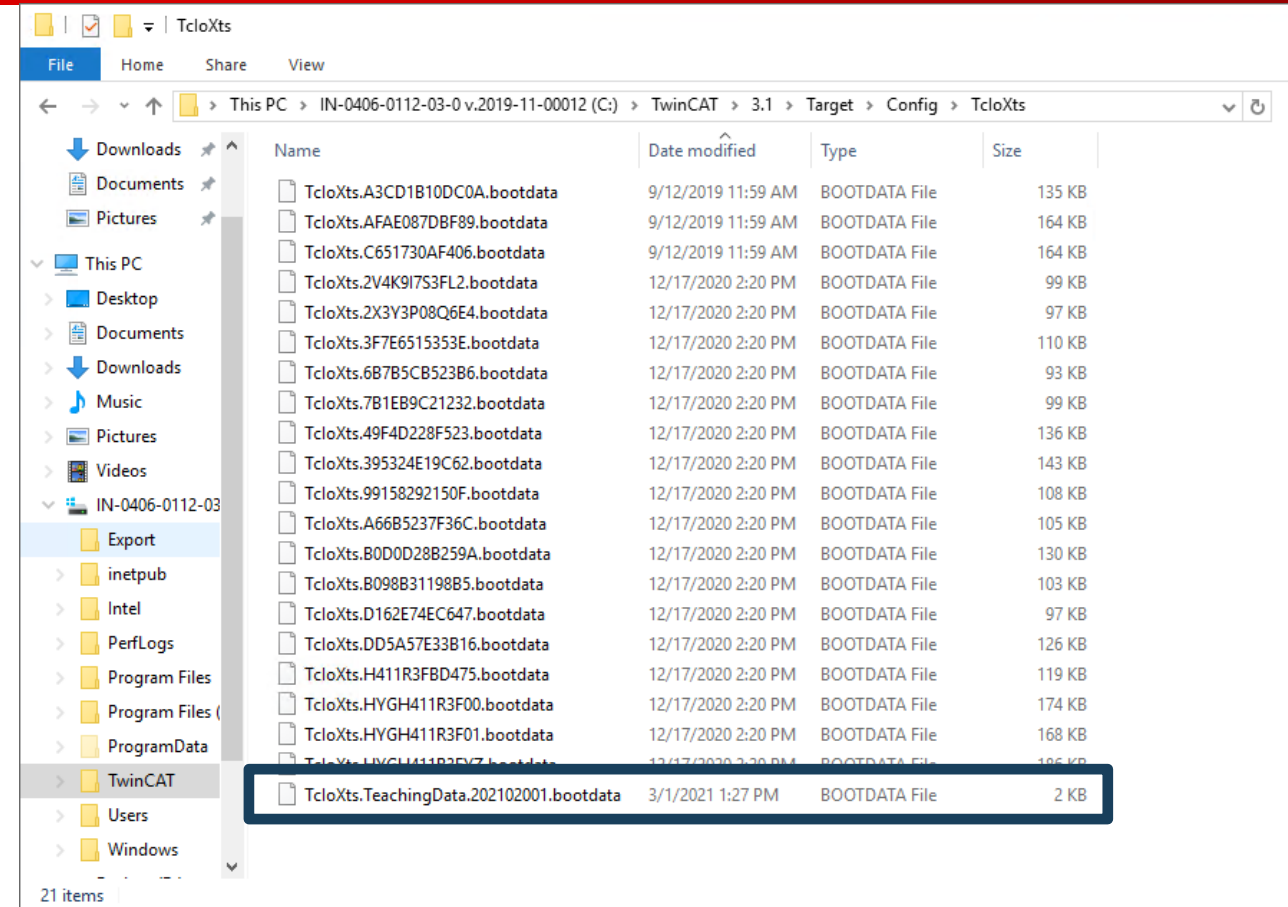
```
| XtsProcessingUnit 1 (0x01010010): Teaching is started on 10 modules.  
| XtsProcessingUnit 1 (0x01010010): Teaching is stopped on 10 modules.  
| XtsProcessingUnit 1 (0x01010010): Teaching data plausibility check is passed successfully.  
| XtsProcessingUnit 1 (0x01010010): Teaching is started on 2 modules.  
| XtsProcessingUnit 1 (0x01010010): Teaching is stopped on 2 modules.  
| XtsProcessingUnit 1 (0x01010010): Teaching data plausibility check is passed successfully.
```

Error List Output

## ■ Teaching Process



– Set TwinCAT in Config Mode



- **Advice:** Make a backup after the teaching file is created the first time

- Teaching Process



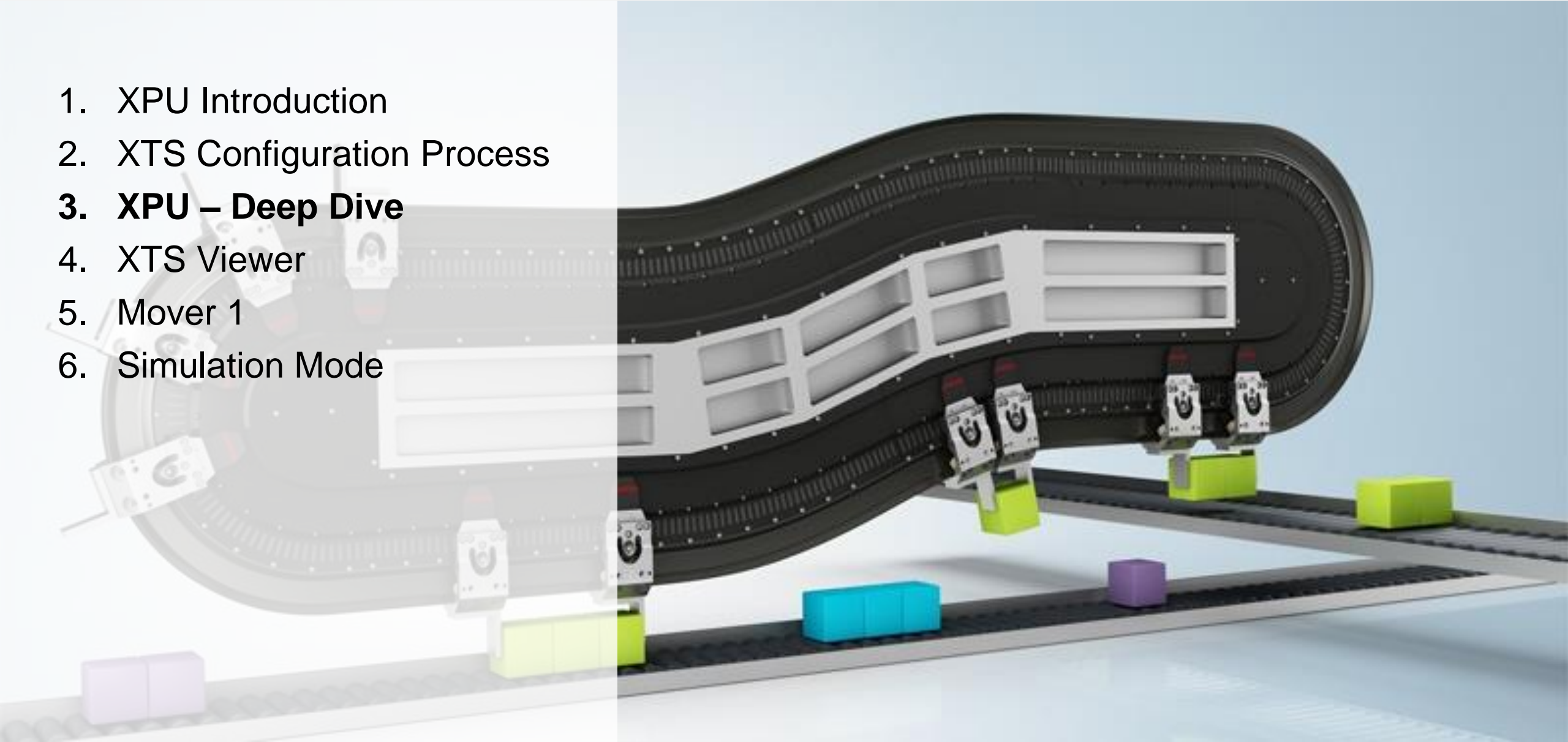
- Set TwinCAT in Run-Mode

Output

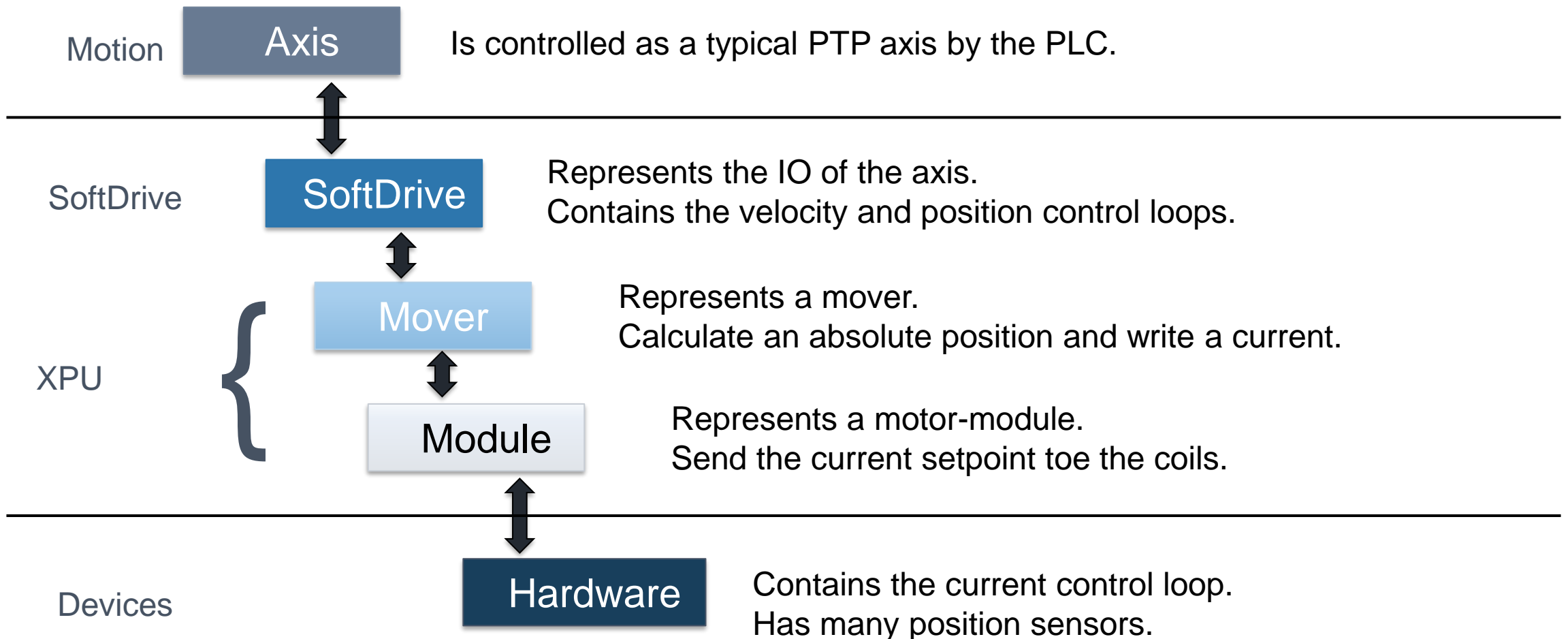
Show output from: TwinCAT

```
| XtsProcessingUnit 1 (0x01010010): Version 3.20.711.0 Build date: Dec 17 2020 Build time: 14:22:27
| XtsProcessingUnit 1 (0x01010010): 12 XTS module(s) are loaded.
| XtsProcessingUnit 1 (0x01010010): 5 XTS mover(s) are loaded.
| XtsProcessingUnit 1 (0x01010010): Path length is 3000.000000 mm.
| XtsProcessingUnit 1 (0x01010010): Teaching data TcIoXts.TeachingData.202102001 is loaded.
| XtsProcessingUnit 1 (0x01010010): 12 modules will be initialized...
| XtsProcessingUnit 1 (0x01010010): 768 DataPointers are initialized.
| XtsProcessingUnit 1 (0x01010010): Is registered by all tasks as IO driver.
| XtsProcessingUnit 1 (0x01010010): Enable time is set.
| XtsProcessingUnit 1 (0x01010010): IO Processing Unit (ID = 1) is waiting for infeed2 (EtherCAT) (3010070) to start up.
| 'TCOM Server' (10): Cu2508 fifo sizes: 1:16 2:8 3:8 4:8 5:16 6:8 7:8 8:8
| XtsProcessingUnit 1 (0x01010010): IO Processing Unit (ID = 1) is waiting for Infeed1 (EtherCAT) (3010060) to start up.
| XtsProcessingUnit 1 (0x01010010): IO Processing Unit (ID = 1): EtherCAT is ready now (2 device(s) are checked).
| 'TwinCAT System' (10000): Starting COM Server TcEventLogger !
| XtsProcessingUnit 1 (0x01010010): Module identity check for teaching is passed successfully.
| XtsProcessingUnit 1 (0x01010010): Teaching data plausibility check is passed successfully.
| XtsProcessingUnit 1 (0x01010010): All XTS mover(s) are detected.
```

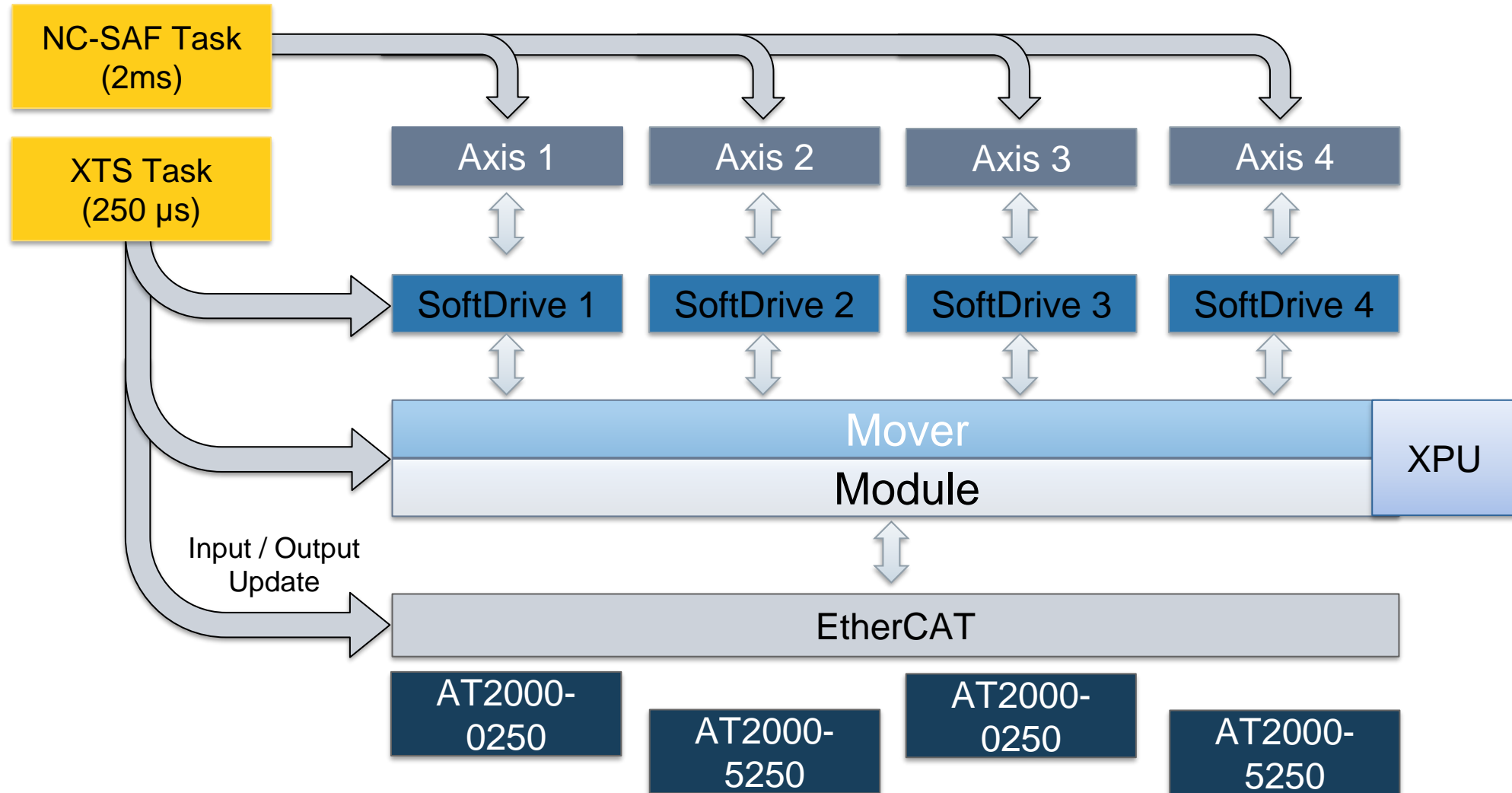
1. XPU Introduction
2. XTS Configuration Process
3. **XPU – Deep Dive**
4. XTS Viewer
5. Mover 1
6. Simulation Mode



- TcIoXtsProcessingUnit is the link between the Motion and the hardware.

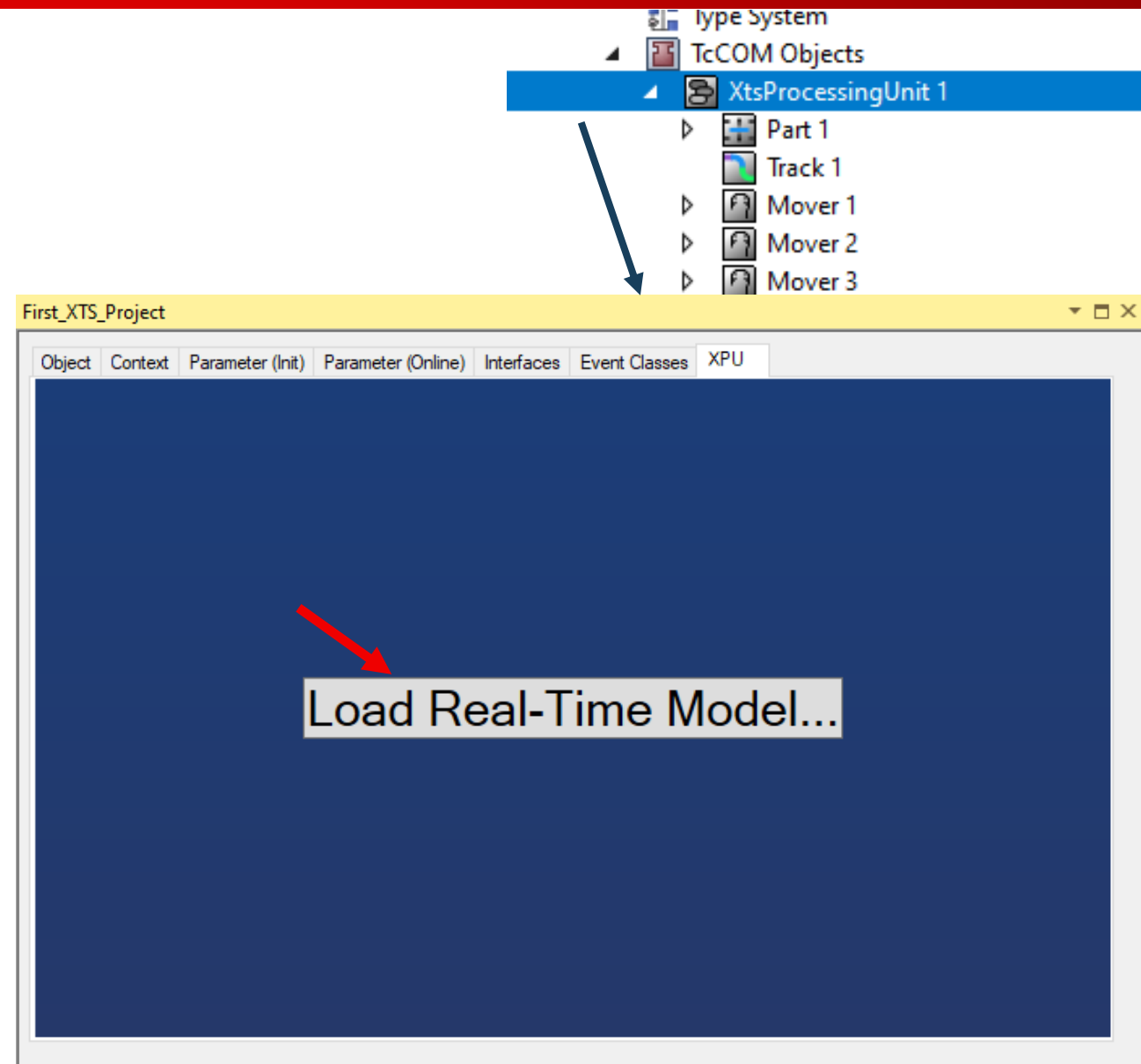


- Cycle Update of SoftDrive & Axis

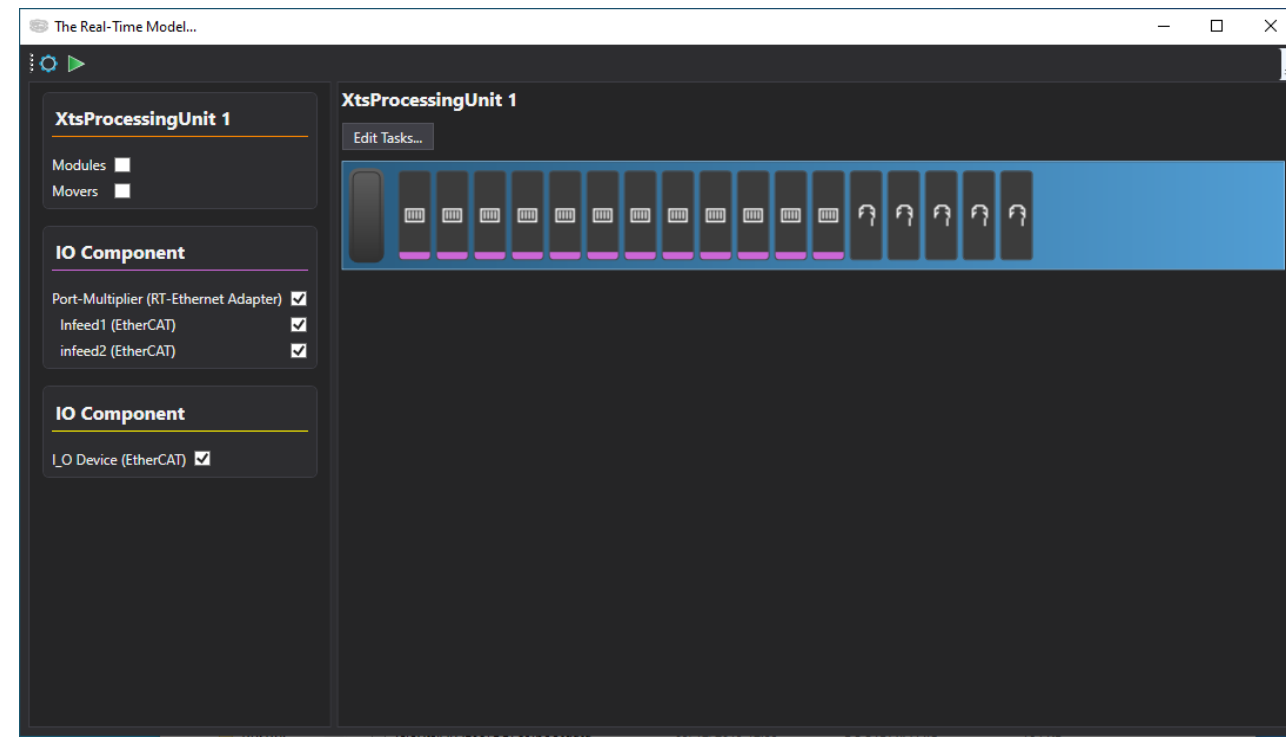




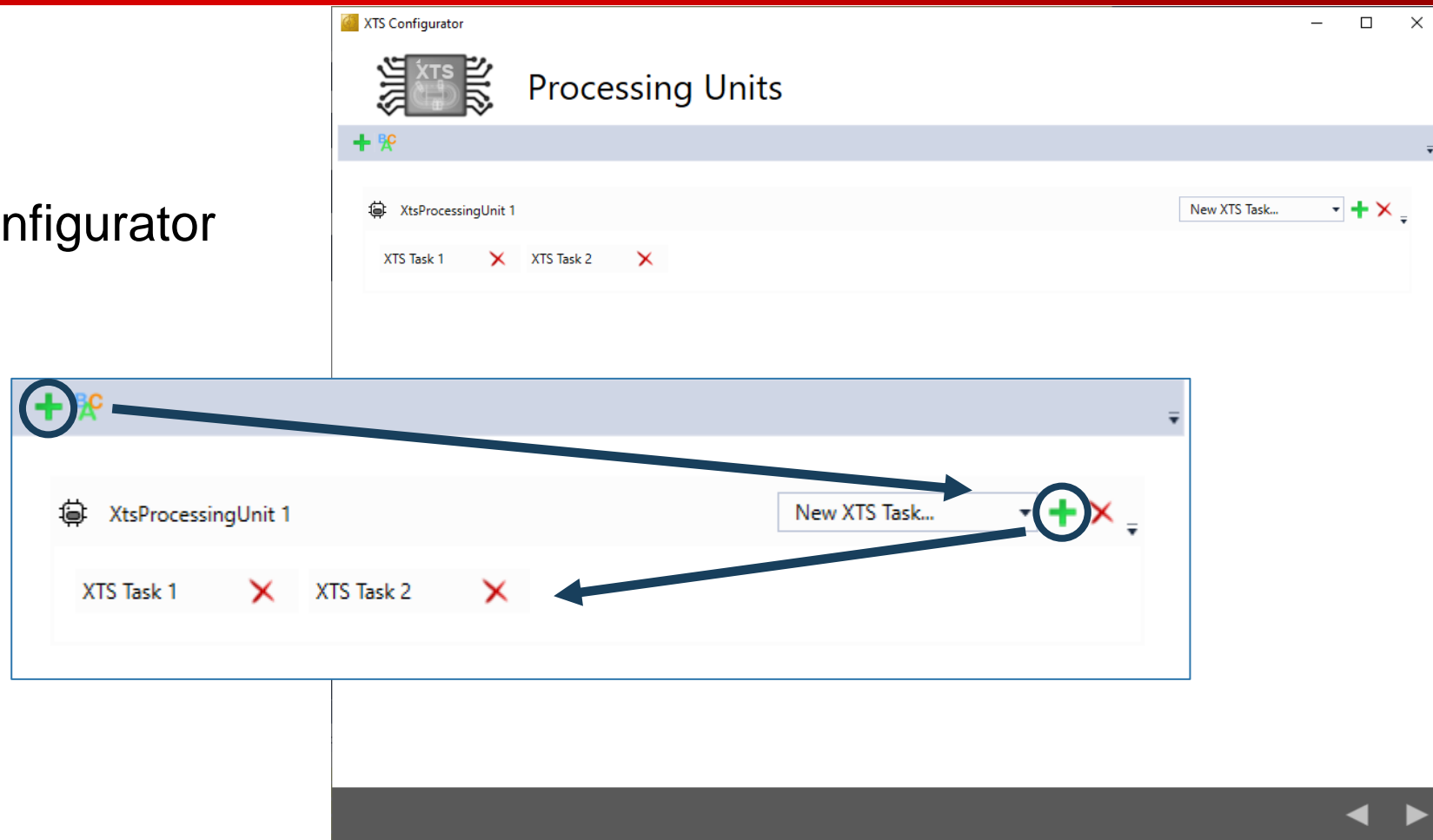
- Real-Time Model
  - click on Load Real-Time Model...



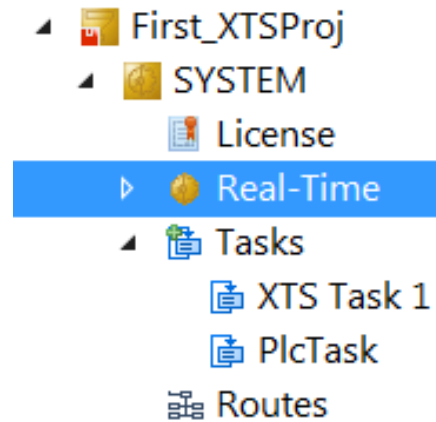
- Real-Time Model
  - Show the act. Real-Time Model
  - Can use to adjust  
(better via Configurator)



- Real-Time Model
  - Create XTS Task 2 via Configurator



- Real-Time Model
  - Setup Real-Time



First\_XTS\_Project

Settings Online Priorities C++ Debugger

Router Memory

Configured Size [MB]: 32

Allocated / Available: 32 / 31

Global Task Config

Maximal Stack Size [KB]: 64KB

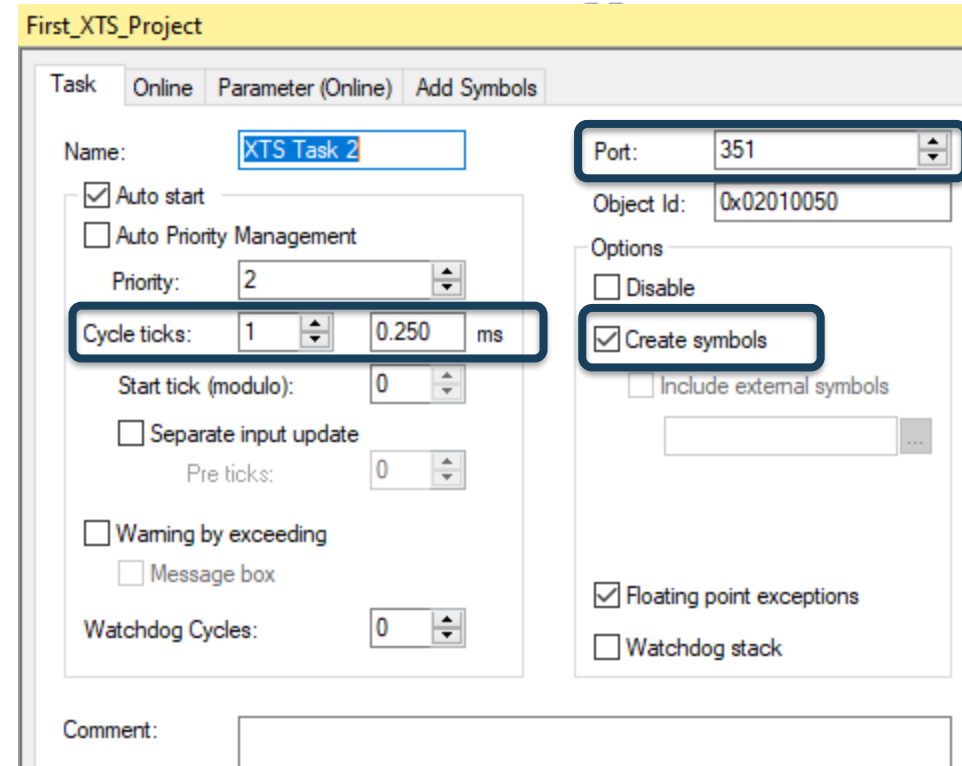
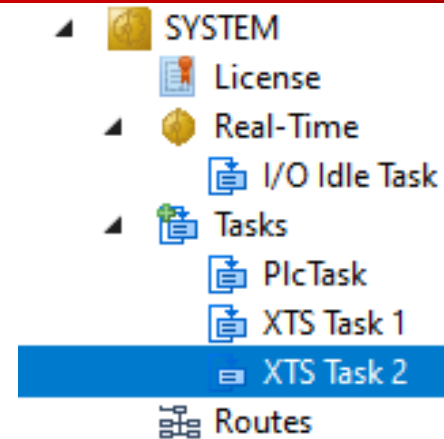
Available cores (Shared/Isolated): 1 3

Read from Target Set on target

Core	RT-Core	Base Time	Core Limit	Latency Warning
0 (Shar...				
1 (Isol...	<input checked="" type="checkbox"/> Default	1 ms	100 %	(none)
2 (Isol...	<input checked="" type="checkbox"/>	250 µs	100 %	(none)
3 (Isol...	<input checked="" type="checkbox"/>	250 µs	100 %	(none)

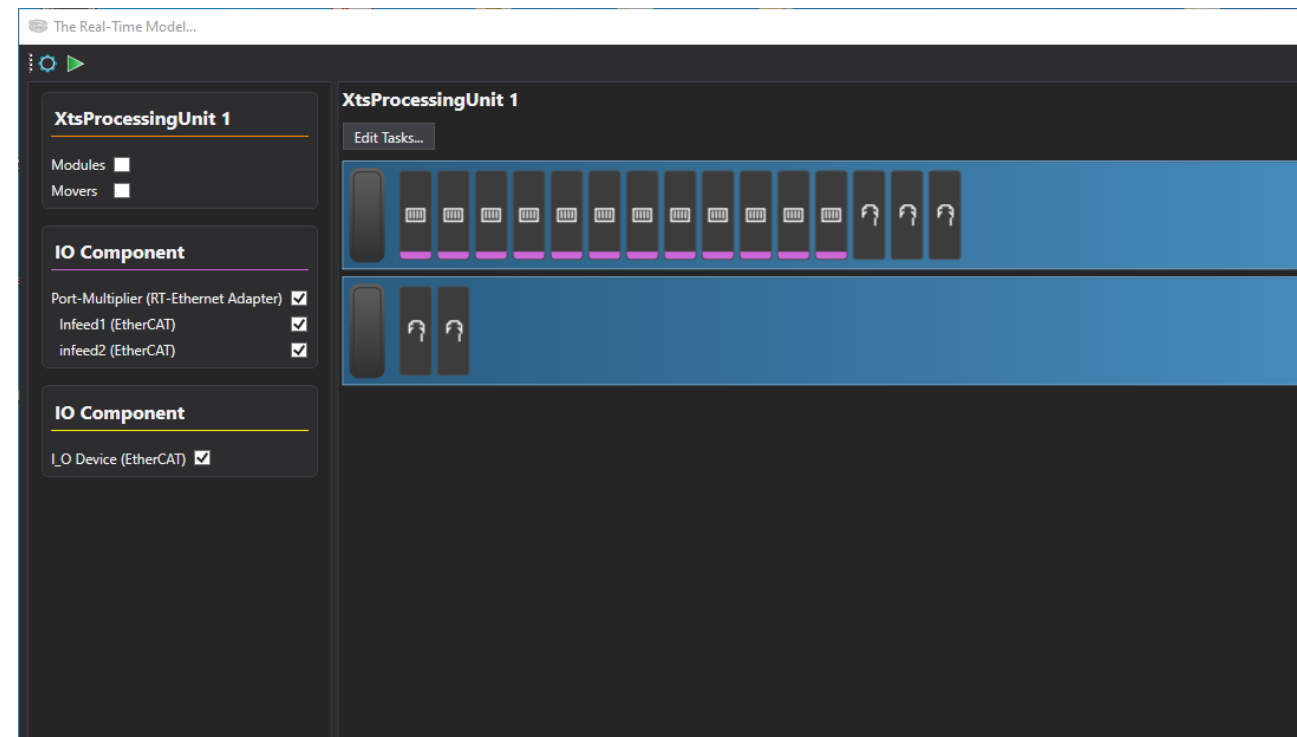
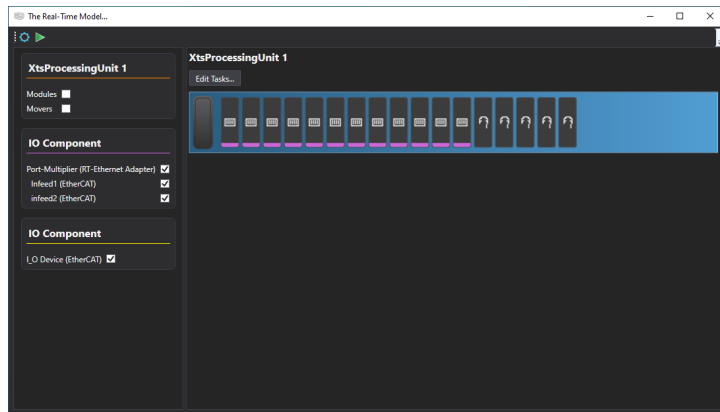
Object	RT-Core	Base Time (ms)	Cycle Time (ms)	Cycle Ticks	Priority
XTS Task 1	Core 3	250 µs	1 ms	4	1
XTS Task 2	Core 2	250 µs	1 ms	4	2
NC SAF	Default (1)	1 ms	2 ms	2	4
I/O Idle Task	Default (1)	1 ms	1 ms	1	11
PlcTask	Default (1)	1 ms	10 ms	10	20

- Real-Time Model
  - Setup XTS Task 2



- Real-Time Model

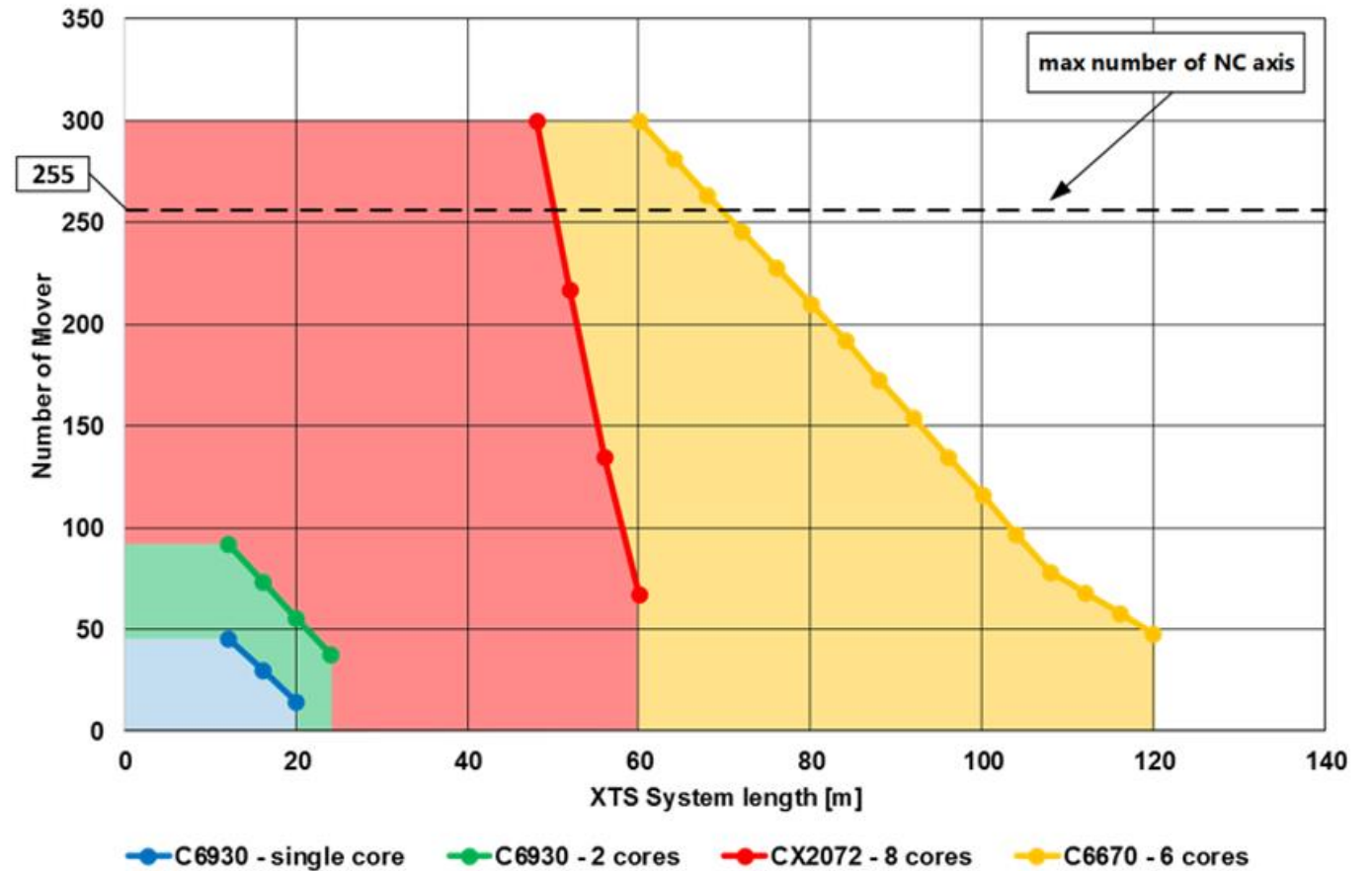
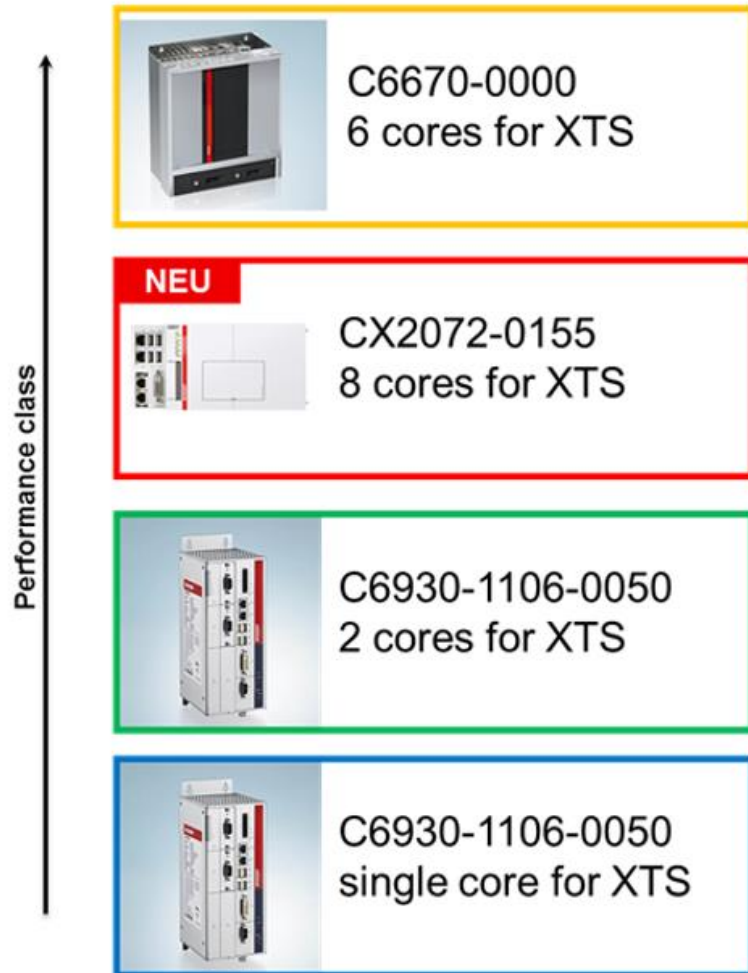
- new setup



- Info

- This setup should not be used in a real machine. It is only an example.

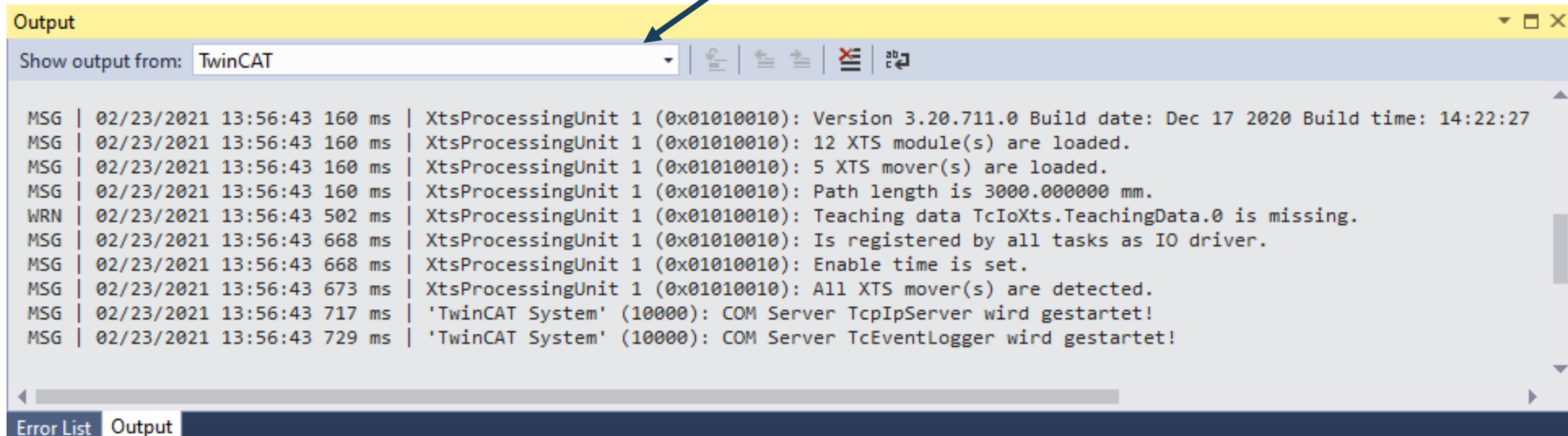
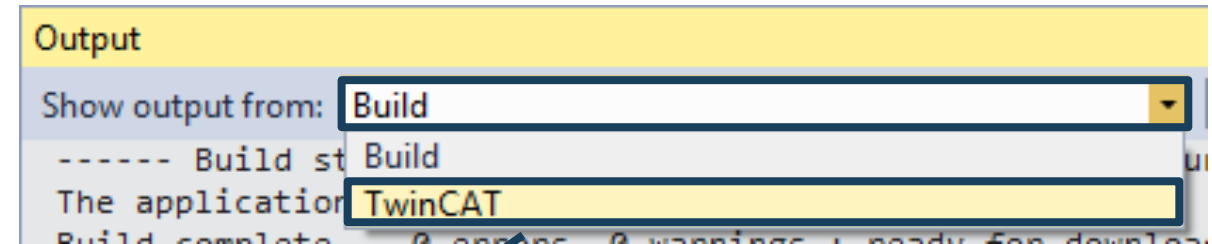
## Real-Time Model





- Diagnosis

- output Window from Visual Studio



- Diagnosis
  - Module Diagnostic History

The screenshot displays the Beckhoff XPU diagnostic software interface. On the right, a tree view shows the project structure under 'I/O' > 'Devices'. The selected path is 'Device 6 (EtherCAT)' > 'Box 1 (CU2508)' > 'Term 2 (AT2001-0250)'. A blue arrow points from this selection to the 'Diag History' tab in the main window.

The main window, titled 'BaseProject3', has several tabs: 'General', 'EtherCAT', 'DC', 'Process Data', 'Startup', 'CoE - Online', 'Diag History' (selected), and 'Online'. Below the tabs are several buttons: 'Update History' (highlighted in blue), 'Auto Update' (checkbox), 'Only new Messages' (checkbox), 'Ack. Messages', 'Export Diag History', and 'Advanced...'. Below these buttons is a table showing the diagnostic history.

Type	Flags	Timestamp	Message
Warning	N	19.12.2016 14:46:03 5...	(0x4411) Undervoltage DC-Link

- Diagnosis
  - Parameter (Online)

The screenshot displays the Beckhoff XPU diagnostic tool interface. The top tree view shows the hierarchy: Type System > TcCOM Objects > XtsProcessingUnit 1. The main window is titled 'First\_XTS\_Project' and has tabs for Object, Context, Parameter (Init), Parameter (Online), Interfaces, Event Classes, and XPU. The 'Parameter (Online)' tab is active, showing a table of parameters. A blue box highlights the 'MoverDetection' section of the table. An arrow points from the 'XtsProcessingUnit 1' node in the tree to the table.

Name	Online	CS	Unit	Type	PT...
- MoverDetection					
AreAllPositionsValid	TRUE	<input type="checkbox"/>		BOOL	0x0...
DetectionCycleCount	1	<input type="checkbox"/>		UDINT	0x0...
DetectedMoverCount	5	<input type="checkbox"/>		UDINT	0x0...
ExpectedMoverCount	5	<input type="checkbox"/>		UDINT	0x0...
ScannedModuleCount	0	<input type="checkbox"/>		UDINT	0x0...
+ MoverPositions	[...]	<input type="checkbox"/>	20 (Array ...)		0x0...
+ MoverIdDetection					
- Teaching					
IsTeachingChanged	FALSE	<input type="checkbox"/>		BOOL	0x0...
IsTeachingValid	TRUE	<input type="checkbox"/>		BOOL	0x0...
- Info					
DriveState	ReadyToSwitchOn	<input type="checkbox"/>		DriveState	0x0...
+ PartOrigins	[...]	<input type="checkbox"/>	3 (Array E...)		0x0...
VersionString	3.20.711.0	<input type="checkbox"/>		STRING(31)	0x0...
+ Structure					

At the bottom, there are checkboxes for 'Show Online Values' and 'Show Hidden Parameter', and buttons for 'Expand All' and 'Collapse All'.

## ■ Diagnosis

- Info's from EL9576  
(Break Chopper Terminal)

The screenshot displays the Beckhoff TwinCAT software interface. The top right shows a device tree for 'Device 7 (EtherCAT)'. Under 'Term 30 (EL9576)', the 'Terminal Overtemperature' variable is highlighted with a blue box. A blue arrow points from this box to the 'Terminal Overtemperature' row in the data table below.

**Device 7 (EtherCAT)**

- Image
- Image-Info
- SyncUnits
- Inputs
- Outputs
- InfoData
- Term 26 (EK1100)
  - InfoData
- Term 27 (EL1008)
- Term 28 (EL2008)
- Term 29 (EL5101)
- Term 30 (EL9576)**
  - BCT Inputs
    - Terminal Overtemperature

**BaseProject3**

Name	Online	Type	Size	> Addr...	I
Terminal Overtemperature	0	BIT	0.1	70.0	I
I2T error	0	BIT	0.1	70.1	I
I2T warning	0	BIT	0.1	70.2	I
Overvoltage	0	BIT	0.1	70.3	I
Undervoltage	0	BIT	0.1	70.4	I
Chopper on	0	BIT	0.1	70.5	I
Input cycle counter	0x2 (2)	BIT2	0.2	71.6	I
DC link voltage	48021	UDINT	4.0	72.0	I
Resistor Current	0	DINT	4.0	76.0	I
Duty Cycle	0	USINT	1.0	80.0	I

- Error Moverdetection
  - Too few movers detected

Output

Show output from: TwinCAT

```
MSG | 03/01/2021 14:12:29 905 ms | XtsProcessingUnit 1 (0x01010010): Enable time is set.
WRN | 03/01/2021 14:12:29 910 ms | XtsProcessingUnit 1 (0x01010010): IO Processing Unit (ID = 1) is waiting for infeed2 (EtherCAT) (3010070) to start up.
MSG | 03/01/2021 14:12:29 934 ms | 'TCOM Server' (10): Cu2508 fifo sizes: 1:16 2:8 3:8 4:8 5:16 6:8 7:8 8:8
WRN | 03/01/2021 14:12:30 910 ms | XtsProcessingUnit 1 (0x01010010): IO Processing Unit (ID = 1) is waiting for Infeed1 (EtherCAT) (3010060) to start up.
MSG | 03/01/2021 14:12:31 578 ms | XtsProcessingUnit 1 (0x01010010): IO Processing Unit (ID = 1): EtherCAT is ready now (2 device(s) are checked).
MSG | 03/01/2021 14:12:31 652 ms | 'TwinCAT System' (10000): Starting COM Server TcEventLogger !
MSG | 03/01/2021 14:12:31 876 ms | XtsProcessingUnit 1 (0x01010010): Module identity check for teaching is passed successfully.
MSG | 03/01/2021 14:12:31 876 ms | XtsProcessingUnit 1 (0x01010010): Teaching data plausibility check is passed successfully.
WRN | 03/01/2021 14:12:34 928 ms | XtsProcessingUnit 1 (0x01010010): Too few movers are detected. Expected = 5, Detected = 4
WRN | 03/01/2021 14:12:39 944 ms | XtsProcessingUnit 1 (0x01010010): Too few movers are detected. Expected = 5, Detected = 4
WRN | 03/01/2021 14:12:44 960 ms | XtsProcessingUnit 1 (0x01010010): Too few movers are detected. Expected = 5, Detected = 4
WRN | 03/01/2021 14:12:49 976 ms | XtsProcessingUnit 1 (0x01010010): Too few movers are detected. Expected = 5, Detected = 4
```

Error List Output

- Error Moverdetection
  - Too many movers detected

Output

Show output from: TwinCAT

```
MSG | 03/01/2021 14:04:59 858 ms | XtsProcessingUnit 1 (0x01010010): Enable time is set.
WRN | 03/01/2021 14:04:59 863 ms | XtsProcessingUnit 1 (0x01010010): IO Processing Unit (ID = 1) is waiting for infeed2 (EtherCAT) (3010070) to start up.
MSG | 03/01/2021 14:04:59 887 ms | 'TCOM Server' (10): Cu2508 fifo sizes: 1:16 2:8 3:8 4:8 5:16 6:8 7:8 8:8
WRN | 03/01/2021 14:05:00 863 ms | XtsProcessingUnit 1 (0x01010010): IO Processing Unit (ID = 1) is waiting for Infeed1 (EtherCAT) (3010060) to start up.
MSG | 03/01/2021 14:05:01 524 ms | XtsProcessingUnit 1 (0x01010010): IO Processing Unit (ID = 1): EtherCAT is ready now (2 device(s) are checked).
MSG | 03/01/2021 14:05:01 598 ms | 'TwinCAT System' (10000): Starting COM Server TcEventLogger !
MSG | 03/01/2021 14:05:01 823 ms | XtsProcessingUnit 1 (0x01010010): Module identity check for teaching is passed successfully.
MSG | 03/01/2021 14:05:01 823 ms | XtsProcessingUnit 1 (0x01010010): Teaching data plausibility check is passed successfully.
WRN | 03/01/2021 14:05:04 875 ms | XtsProcessingUnit 1 (0x01010010): Too many movers are detected. Expected = 5, Detected = 6
WRN | 03/01/2021 14:05:09 891 ms | XtsProcessingUnit 1 (0x01010010): Too many movers are detected. Expected = 5, Detected = 6
WRN | 03/01/2021 14:05:14 907 ms | XtsProcessingUnit 1 (0x01010010): Too many movers are detected. Expected = 5, Detected = 6
WRN | 03/01/2021 14:05:19 923 ms | XtsProcessingUnit 1 (0x01010010): Too many movers are detected. Expected = 5, Detected = 6
```

Error List Output

## ■ Error Moverdetection

- Too few movers detected
- Too many movers detected

First\_XTS\_Project

Online

Name	Actual Pos.	Setp. Pos.	Lag Dist.	Setp. Velo	Error
Mover Axis 1	0.0000	0.0000	0.0000	0.0000	0x0
Mover Axis 2	0.0000	0.0000	0.0000	0.0000	0x0
Mover Axis 3	0.0000	0.0000	0.0000	0.0000	0x0
Mover Axis 4	0.0000	0.0000	0.0000	0.0000	0x0
Mover Axis 5	0.0000	0.0000	0.0000	0.0000	0x0

– – F1   – F2   + F3   ++ F4   ⓘ F8   Select Columns

Number	Axes	Link to I/O	Link to PLC
1 (Id 1)	Mover Axis 1	SoftDrive 1	
2 (Id 2)	Mover Axis 2	SoftDrive 2	
3 (Id 3)	Mover Axis 3	SoftDrive 3	
4 (Id 4)	Mover Axis 4	SoftDrive 4	
5 (Id 5)	Mover Axis 5	SoftDrive 5	



- Collecting data...

- XTS-DUMP

The screenshot displays the Beckhoff TwinCAT software interface. At the top, the 'Type System' tree shows 'TcCOM Objects' expanded, with 'XtsProcessingUnit 1' selected. Below this, the 'First\_XTS\_Project' window is open, showing the 'Parameter (Online)' tab. The 'XPU' sub-tab is active, displaying a table of parameters for 'XtsProcessingUnit 1'. A context menu is open over the 'WriteDump' parameter, with the 'Download' option selected. The 'Output' window at the bottom shows the log of events, including the successful execution of the XTS-DUMP command.

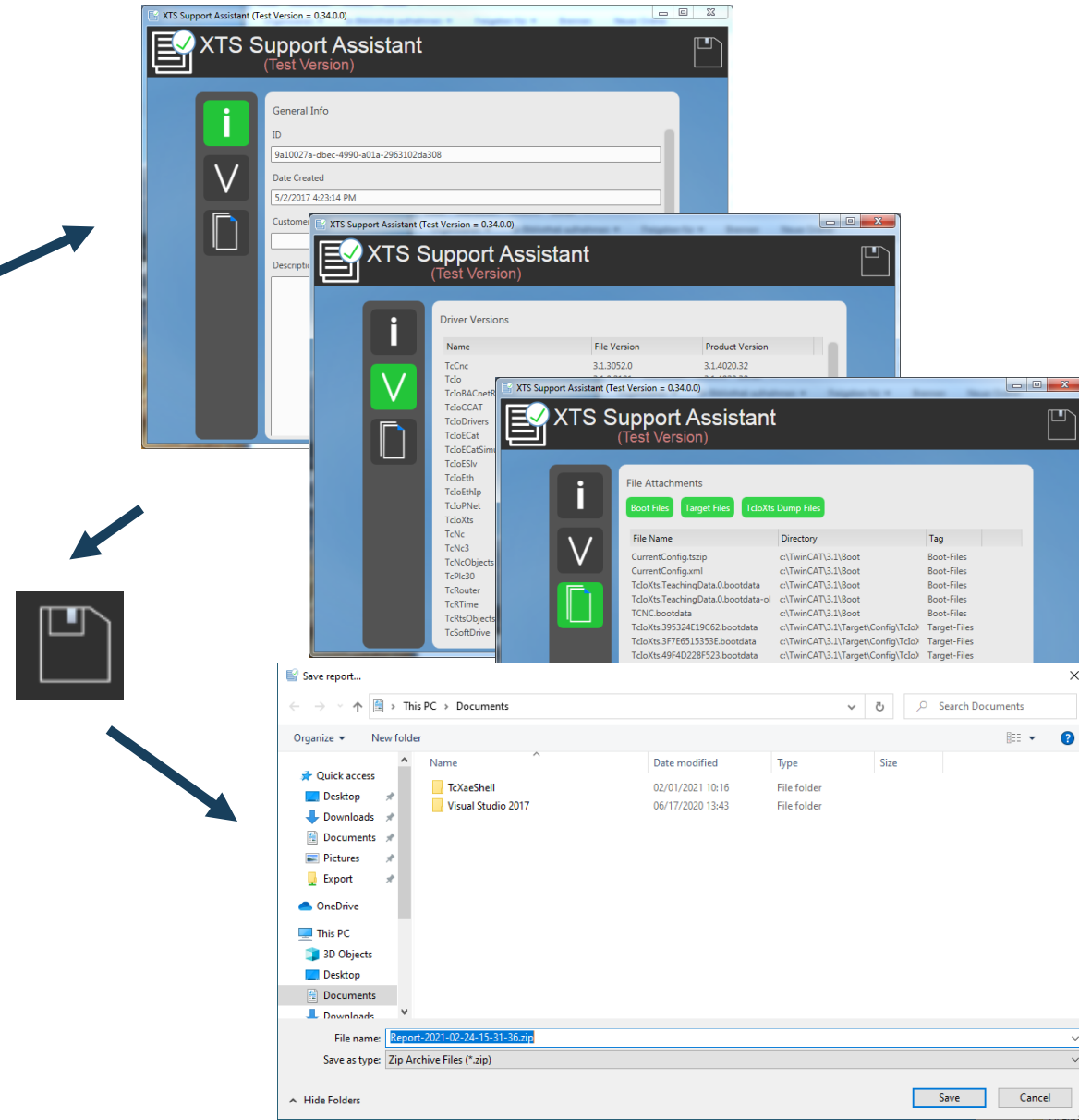
Object	Context	Parameter (Init)	Parameter (Online)	Interfaces	Event Classes	XPU	
		Name	Value	CS	Unit	Type	PT...
+	General						
-	Mover						
		MoverType	AT9011_0050			MoverType	0x0...
		MagnetPlateType	AT9001_0550			MagnetPI...	0x0...
		MoverSortOrder	Ascending			SortOrder...	0x0...
		MoverWidth	0.0			LREAL	0x0...
+	MoverIdDetection						
+	Teaching						
-	Diagnostics						
		IsAutoDumpWritingEnabled	FALSE			BOOL	0x0...
		IsInputCheckEnabled	FALSE			BOOL	0x0...
		WriteDump				WriteDu...	0x0...
		UsedEventLogger	Ev			EventMes...	0x0...
+	Advanced						
+	Simulation						

Output

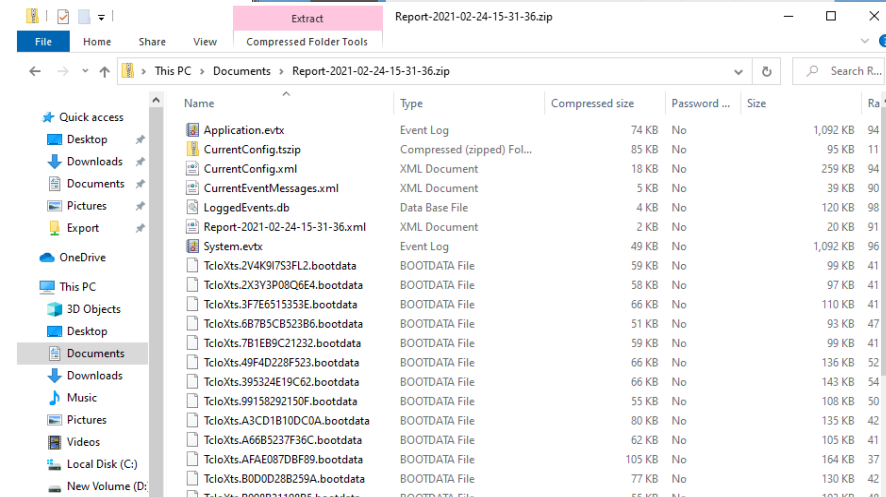
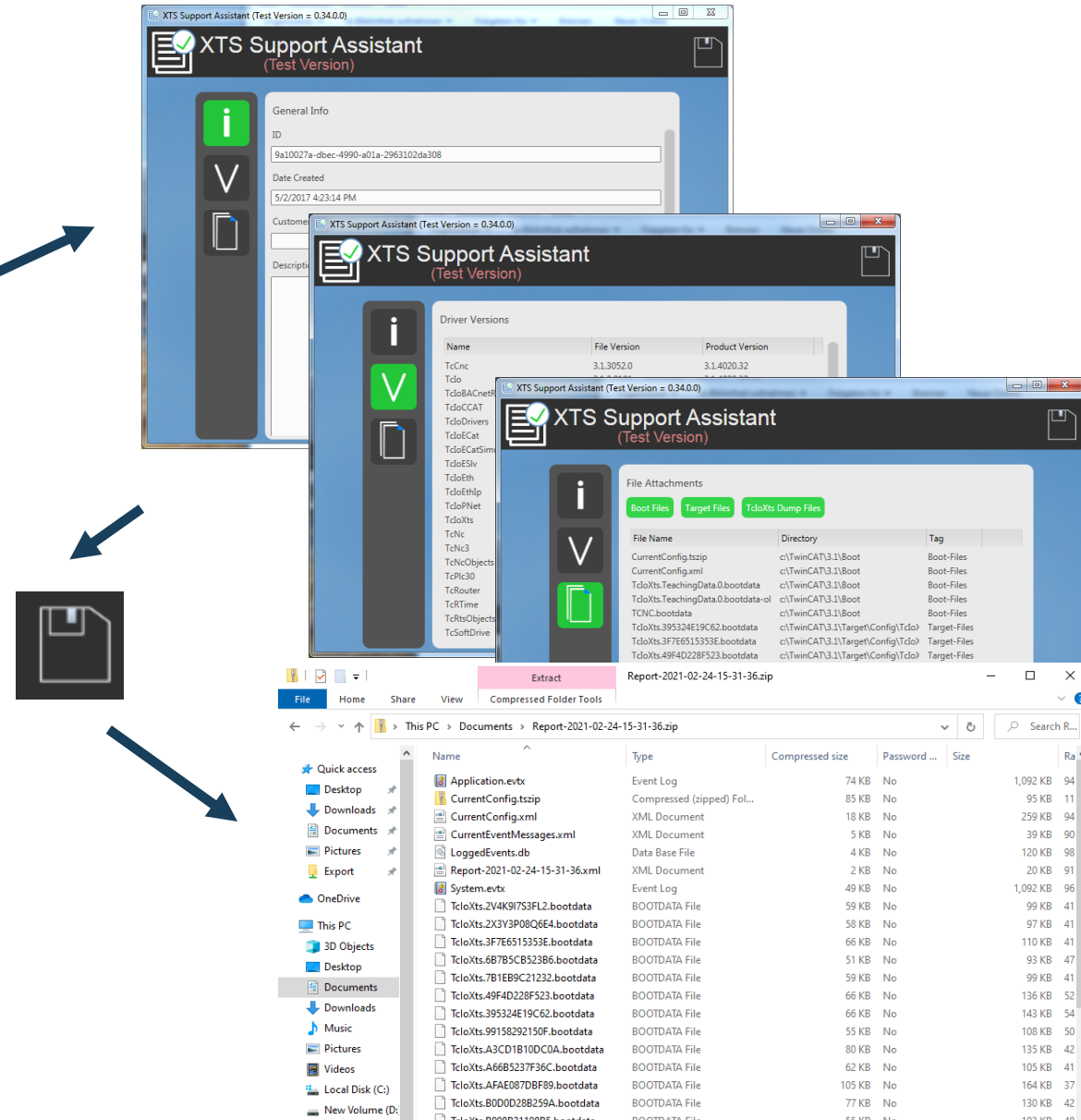
Show output from: TwinCAT

```
MSG | 02/24/2021 14:22:40 248 ms | XtsProcessingUnit 1 (0x01010010): Is registered by all tasks as IO driver.
MSG | 02/24/2021 14:22:40 248 ms | XtsProcessingUnit 1 (0x01010010): Enable time is set.
MSG | 02/24/2021 14:22:40 253 ms | XtsProcessingUnit 1 (0x01010010): All XTS mover(s) are detected.
MSG | 02/24/2021 14:22:40 298 ms | 'TwinCAT System' (10000): COM Server TcpIpServer wird gestartet!
MSG | 02/24/2021 14:22:40 314 ms | 'TwinCAT System' (10000): COM Server TcEventLogger wird gestartet!
MSG | 02/24/2021 15:24:37 991 ms | XtsProcessingUnit 1 (0x01010010): Writing dump file c:\TcIoXts.XtsProcessingUnit 1.20210224-142438.01.dump...
```

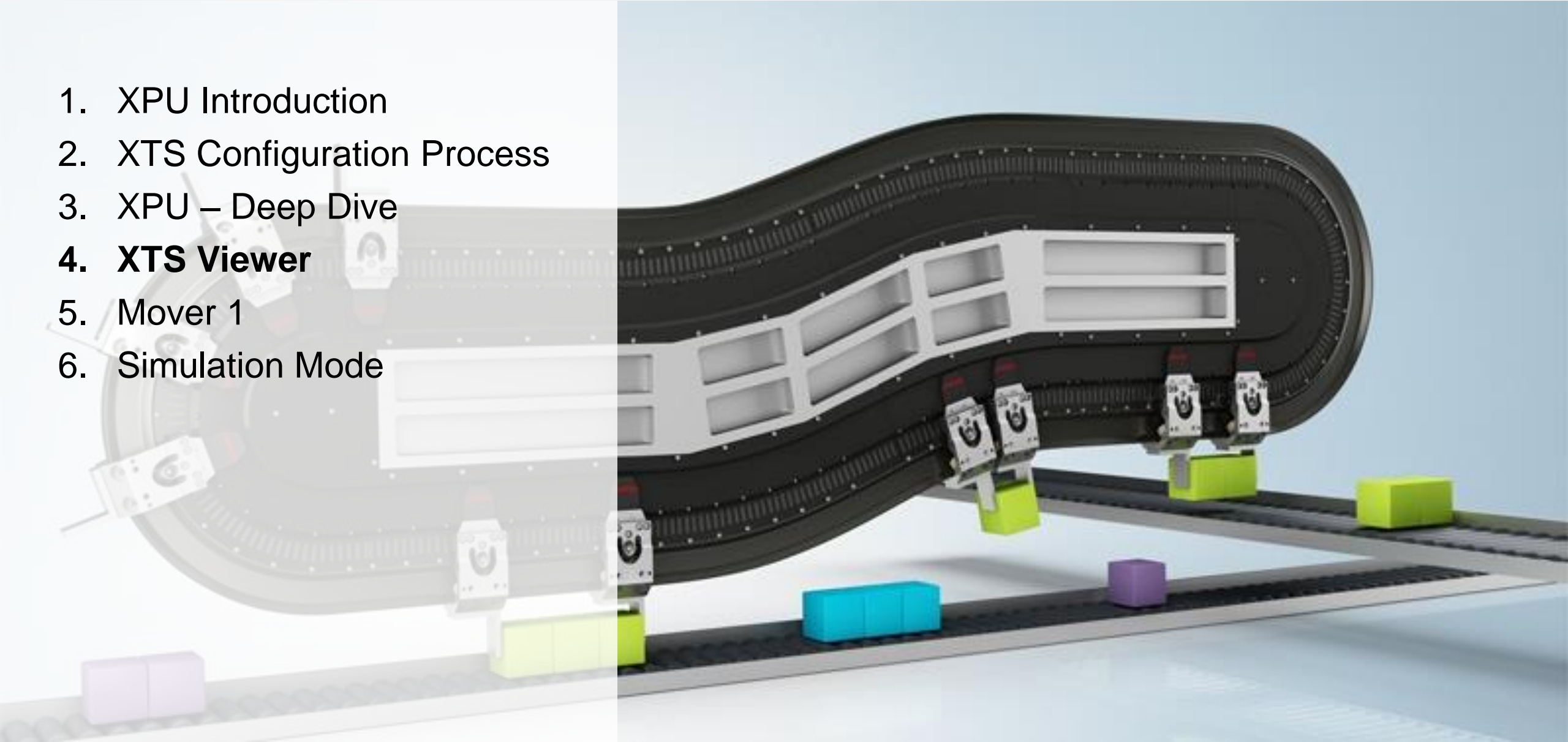
- Collecting data...
  - XTS-SupportAssistant



- Collecting data...
  - XTS-SupportAssistant

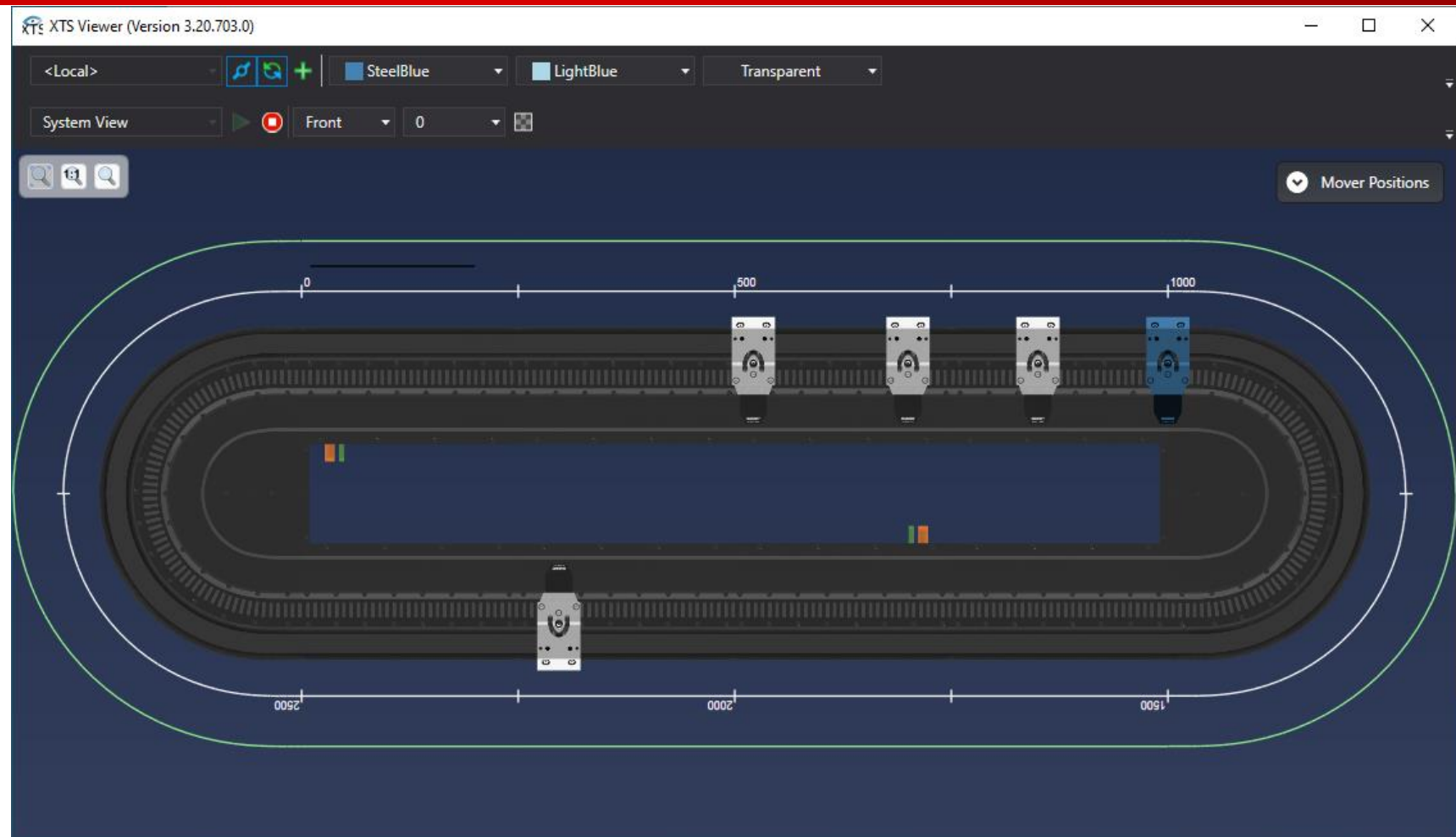


1. XPU Introduction
2. XTS Configuration Process
3. XPU – Deep Dive
- 4. XTS Viewer**
5. Mover 1
6. Simulation Mode



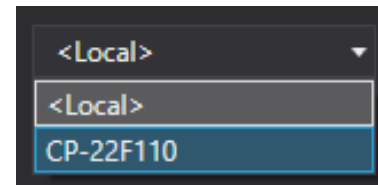
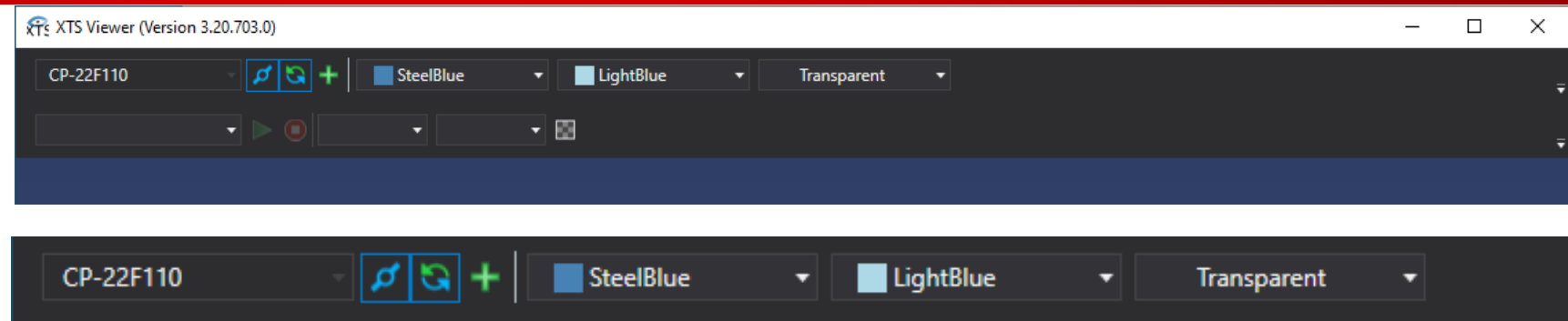
- XTS Viewer

– Start



- XTS Viewer

- Toolbar 1



choose Target



connect to selected target



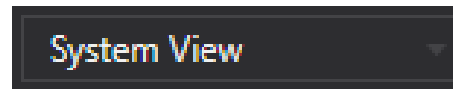
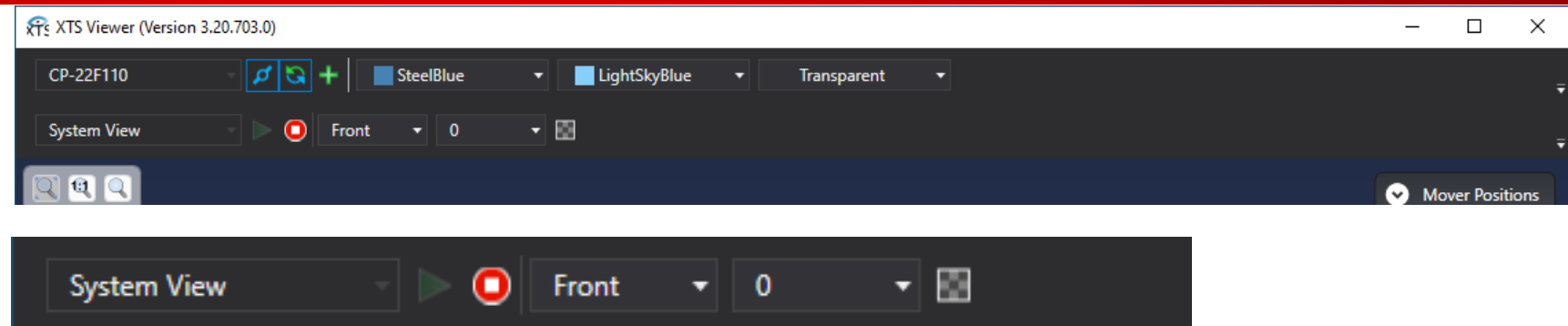
continuous update



open sup window

- XTS Viewer

- Toolbar 2



choose a view description



Start / Stop view

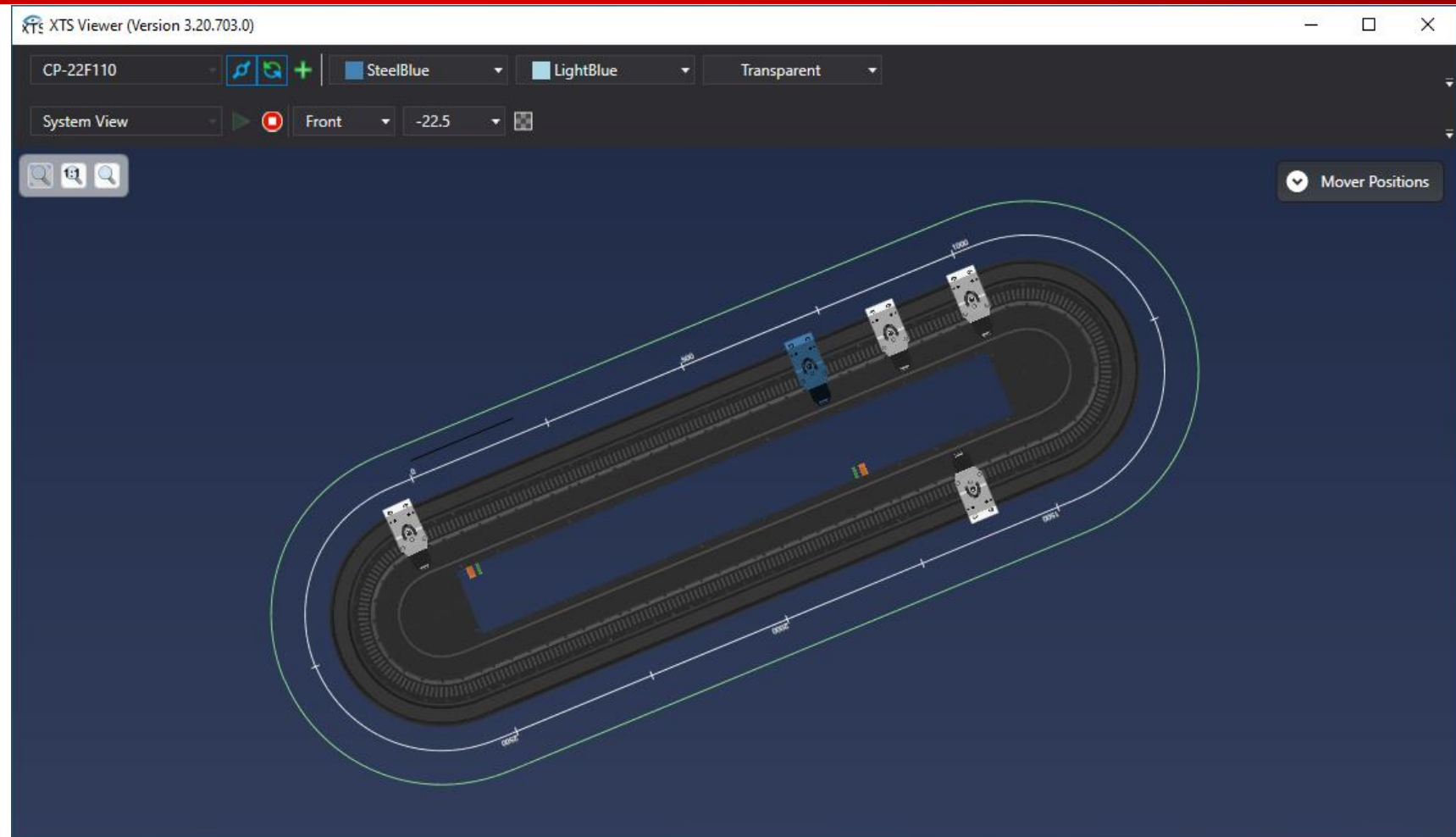


select module side and rotation degree



- XTS Viewer

- Complete view



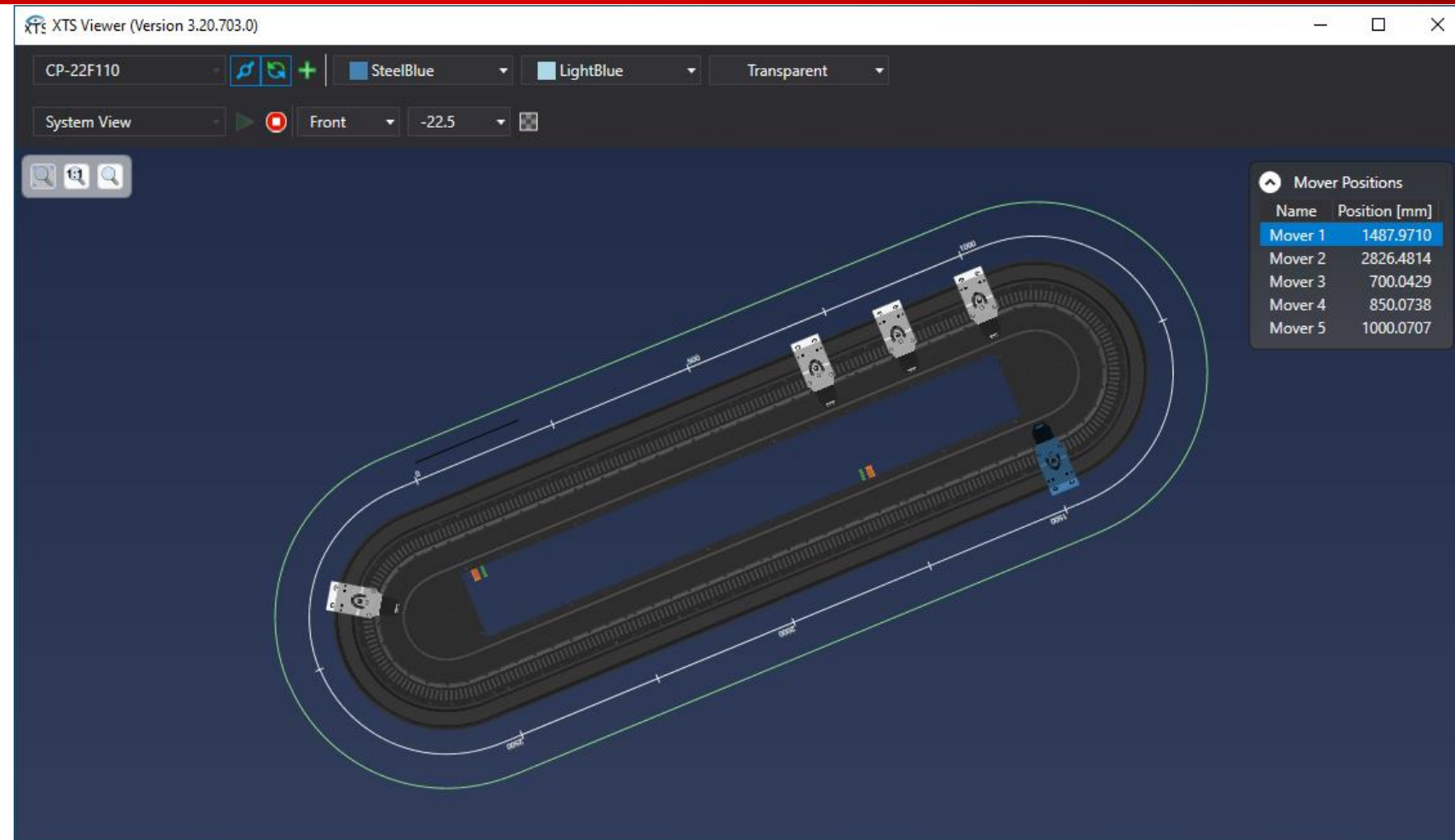
## ■ XTS Viewer

- Show Mover Positions (Modulo Value)

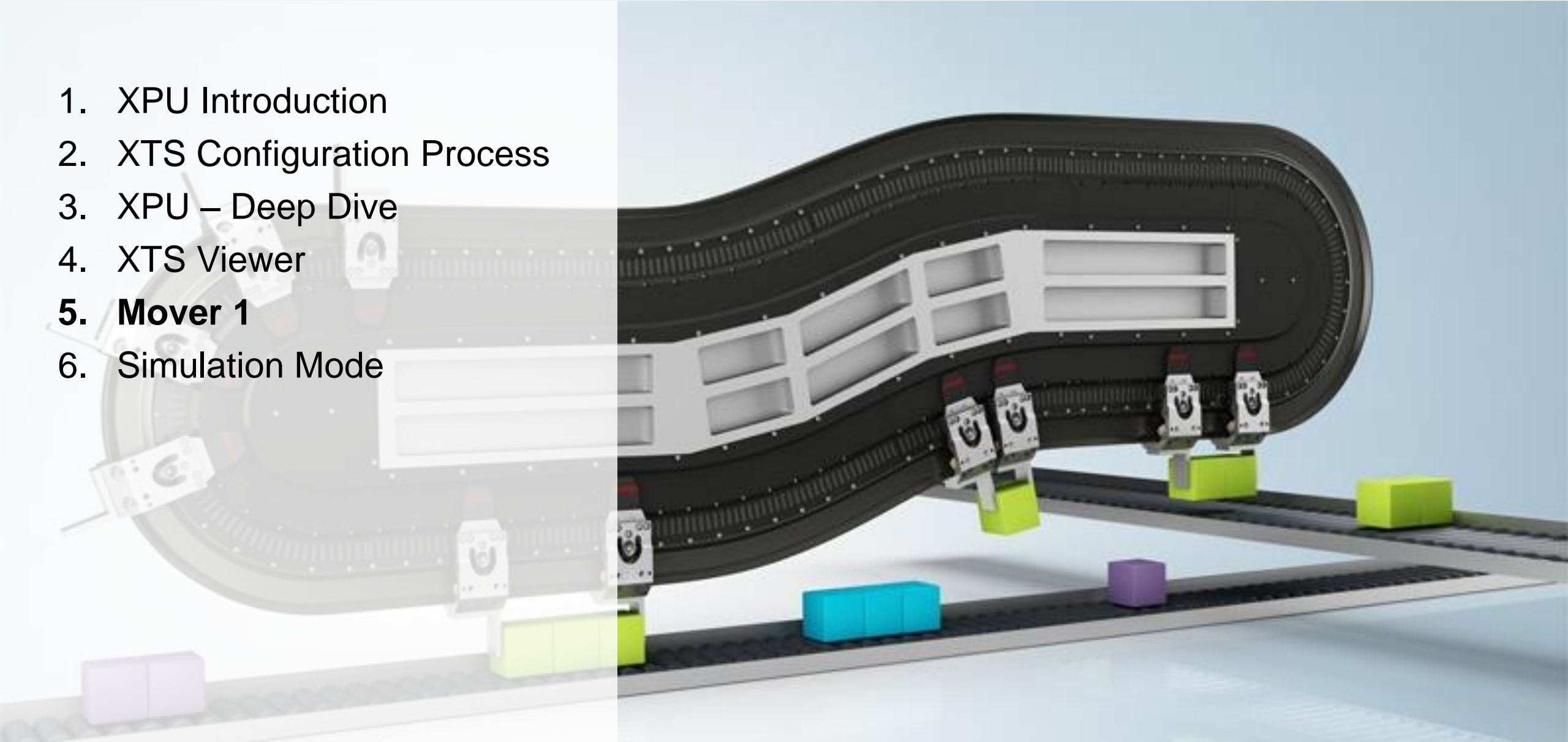
⌵ Mover Positions

⌵ Mover Positions

Name	Position [mm]
Mover 1	1487.9710
Mover 2	2826.4814
Mover 3	700.0429
Mover 4	850.0738
Mover 5	1000.0707



1. XPU Introduction
2. XTS Configuration Process
3. XPU – Deep Dive
4. XTS Viewer
5. **Mover 1**
6. Simulation Mode



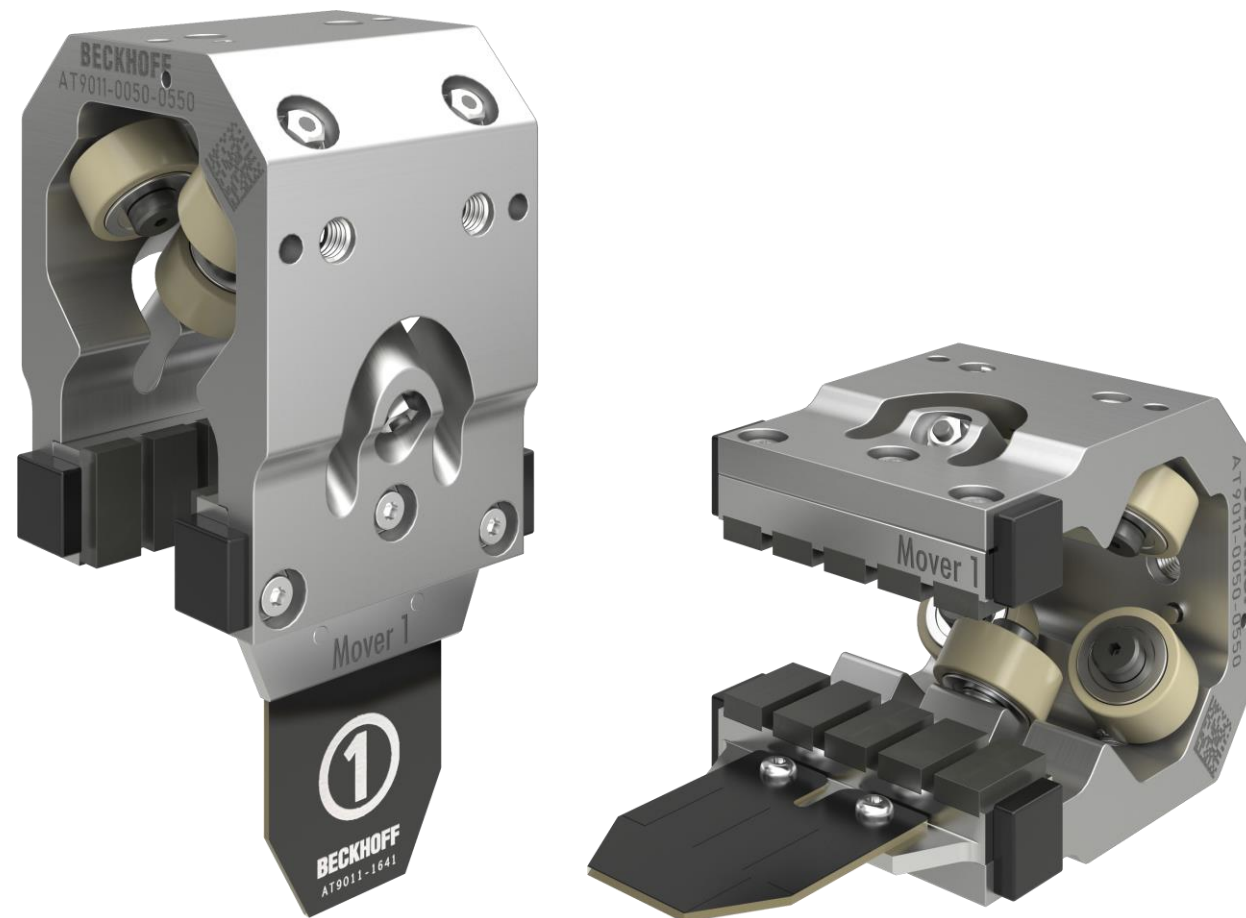
# Mover 1

BECKHOFF

- Mover 1 functionality

The purpose of the Mover 1 detection is to identify a mover as a main mover and to distinguish it from the subsequent movers.

This offers then advantage of a clear correlation between mover hardware and software axis.

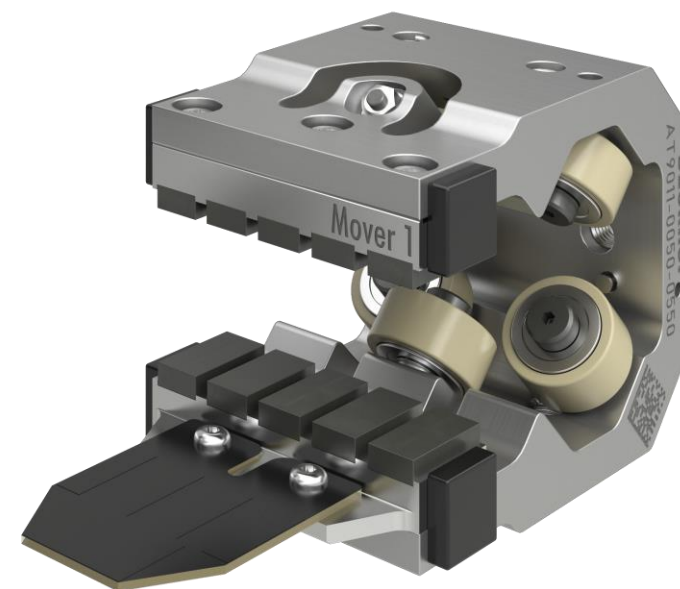


- Mover 1 functionality

Therefore one Mover with a special magnetic plate set is used (Mover1).

These magnets creates an inverted magnetic field.

This magnetic plate set exhibits a different behavior when the Mover1 search is triggered (MoverIdDetection)

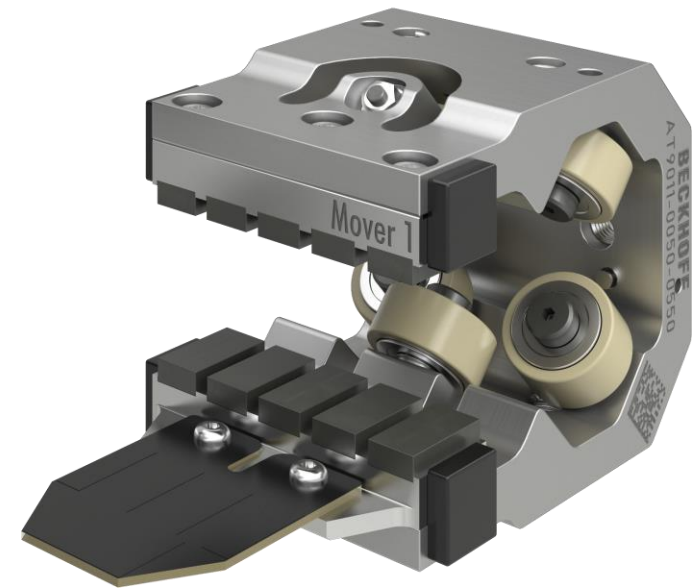
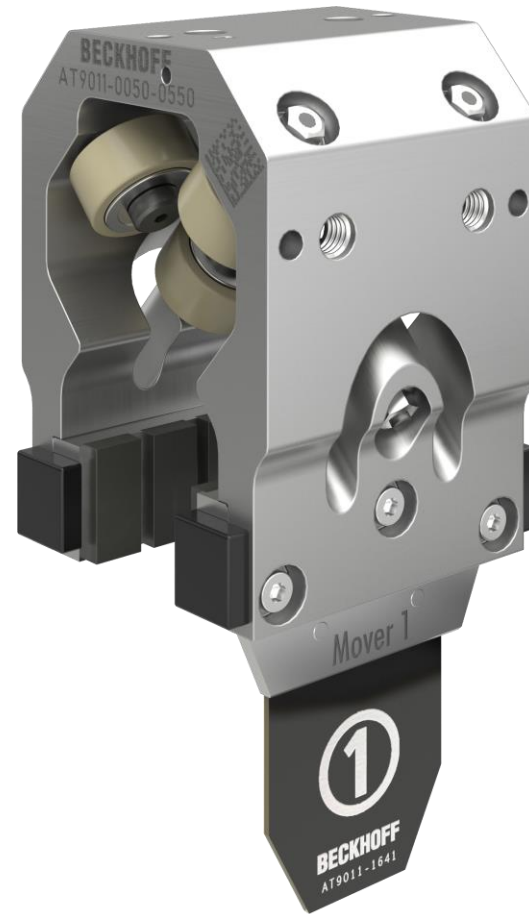




- MoverIdDetection

When MoverIdDetection is trigger, all Movers make a small movement like "Wake and Shake".

Therefore 48V power supply is required.



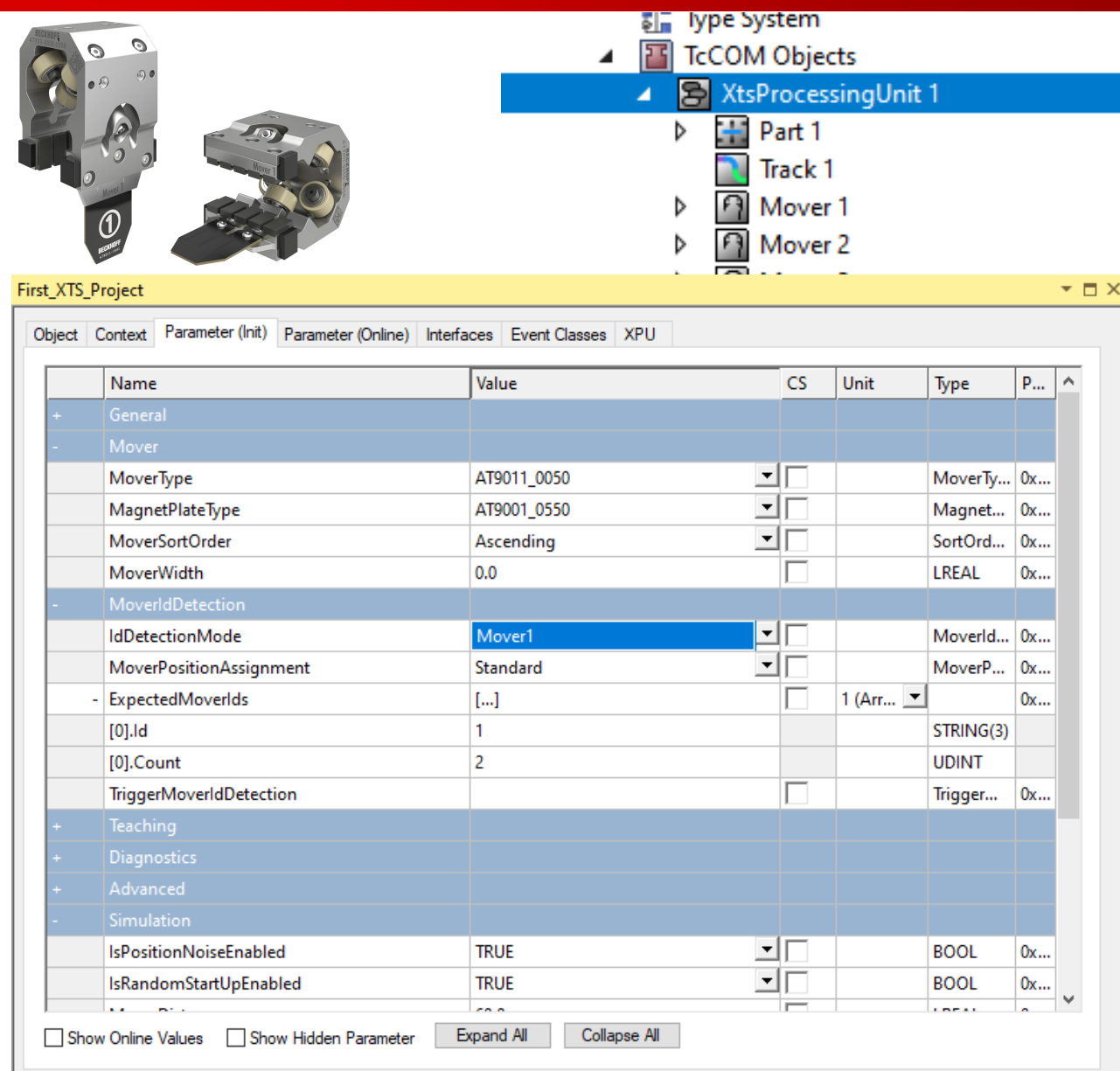
# Mover 1

BECKHOFF

## ■ MoverIdDetection

The mover detection across all movers is controlled via the TcIoXtsProcessingUnit (XPU) object.

You have the option to apply general detection parameters and to trigger the Mover 1 search manually.



The screenshot displays the Beckhoff TcCOM Objects configuration interface. On the left, there are two 3D models of the Mover 1 hardware. On the right, a tree view shows the configuration hierarchy: Type System > TcCOM Objects > XtsProcessingUnit 1. The XtsProcessingUnit 1 tree includes sub-objects: Part 1, Track 1, Mover 1, and Mover 2. Below the tree, the 'First\_XTS\_Project' window shows the 'Parameter (Init)' tab. This tab contains a table of parameters for the Mover 1 object.

Name	Value	CS	Unit	Type	P...
+ General					
- Mover					
MoverType	AT9011_0050	<input type="checkbox"/>		MoverTy...	0x...
MagnetPlateType	AT9001_0550	<input type="checkbox"/>		Magnet...	0x...
MoverSortOrder	Ascending	<input type="checkbox"/>		SortOrd...	0x...
MoverWidth	0.0	<input type="checkbox"/>		LREAL	0x...
- MoverIdDetection					
IdDetectionMode	Mover1	<input type="checkbox"/>		MoverId...	0x...
MoverPositionAssignment	Standard	<input type="checkbox"/>		MoverP...	0x...
- ExpectedMoverIds	[...]	<input type="checkbox"/>	1 (Arr...		0x...
[0].Id	1			STRING(3)	
[0].Count	2			UDINT	
TriggerMoverIdDetection		<input type="checkbox"/>		Trigger...	0x...
+ Teaching					
+ Diagnostics					
+ Advanced					
- Simulation					
IsPositionNoiseEnabled	TRUE	<input type="checkbox"/>		BOOL	0x...
IsRandomStartUpEnabled	TRUE	<input type="checkbox"/>		BOOL	0x...

At the bottom of the window, there are checkboxes for 'Show Online Values' and 'Show Hidden Parameter', and buttons for 'Expand All' and 'Collapse All'.



# Mover 1

BECKHOFF

## ■ MoverIdDetection

To use Mover Id detection the parameter "MoverIdDetectionMode" has to change to "Mover1".

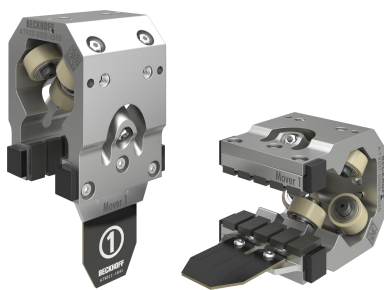
When a Mover with the certain magnetic plate is on the Track, this Parameter has to be setup.

Otherwise this leads to unforeseen movements of the mover.

Unforeseen movements can lead to injuries to people and damage to tools and the machine.



WARNING



type System  
TcCOM Objects  
XtsProcessingUnit 1  
Part 1  
Track 1  
Mover 1  
Mover 2

First\_XTS\_Project

Object	Context	Parameter (Init)	Parameter (Online)	Interfaces	Event Classes	XPU
+ General						
- Mover						
MoverType		AT9011_0050				MoverTy... 0x...
MagnetPlateType		AT9001_0550				Magnet... 0x...
MoverSortOrder		Ascending				SortOrd... 0x...
MoverWidth		0.0				LREAL 0x...
- MoverIdDetection						
IdDetectionMode		Mover1				MoverId... 0x...
MoverPositionAssignment						MoverP... 0x...
- ExpectedMoverIds						1 (Arr... 0x...
[0].Id		1				STRING(3)
[0].Count		2				UDINT
TriggerMoverIdDetection						Trigger... 0x...
+ Teaching						
+ Diagnostics						
+ Advanced						
- Simulation						
IsPositionNoiseEnabled		TRUE				BOOL 0x...
IsRandomStartUpEnabled		TRUE				BOOL 0x...

☐ Show Online Values ☐ Show Hidden Parameter

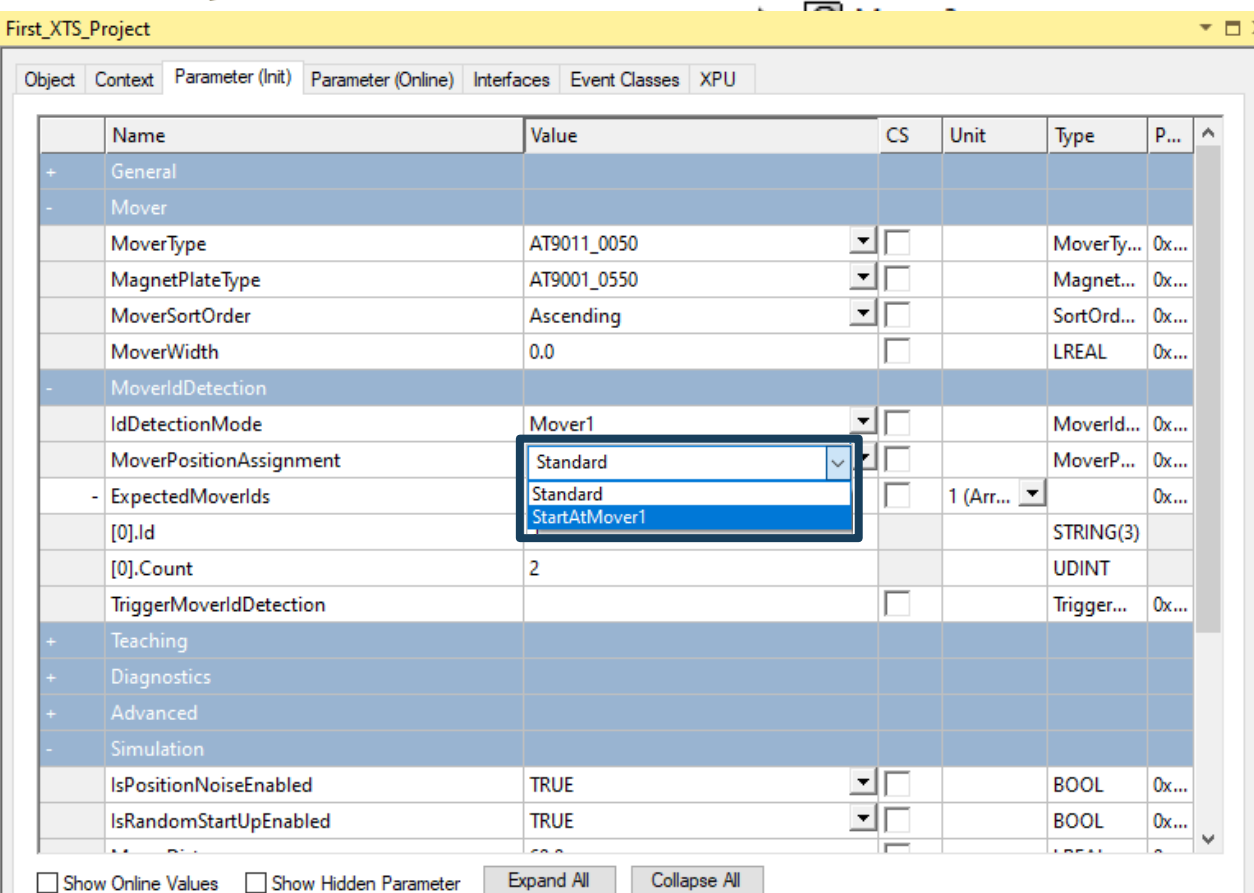
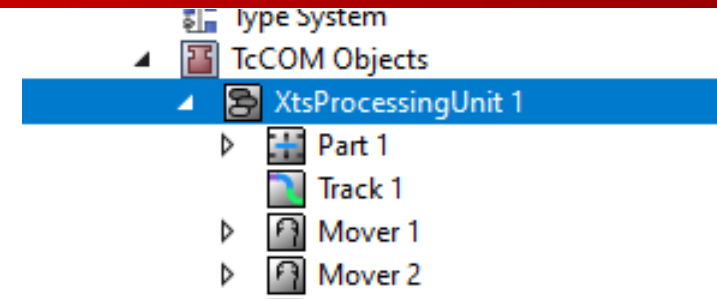
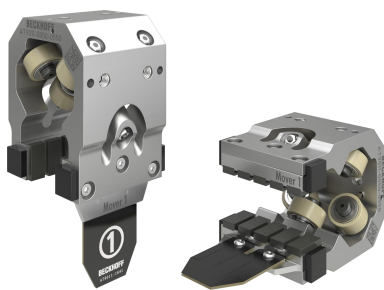
# Mover 1

BECKHOFF

- MoverPositionAssignment

The absolute Position is setup regarding this parameter.

If the Parameter is set to "StartAtMover1" the mover has the lowest or highest position, dependent and the sorting order.



Object	Context	Parameter (Init)	Parameter (Online)	Interfaces	Event Classes	XPU
+ General						
- Mover						
MoverType		AT9011_0050				MoverTy... 0x...
MagnetPlateType		AT9001_0550				Magnet... 0x...
MoverSortOrder		Ascending				SortOrd... 0x...
MoverWidth		0.0				LREAL 0x...
- MoverIdDetection						
IdDetectionMode		Mover1				MoverId... 0x...
MoverPositionAssignment		Standard				MoverP... 0x...
- ExpectedMoverIds						1 (Arr... 0x...
[0].Id						STRING(3)
[0].Count		2				UDINT
TriggerMoverIdDetection						Trigger... 0x...
+ Teaching						
+ Diagnostics						
+ Advanced						
- Simulation						
IsPositionNoiseEnabled		TRUE				BOOL 0x...
IsRandomStartUpEnabled		TRUE				BOOL 0x...

☐ Show Online Values ☐ Show Hidden Parameter

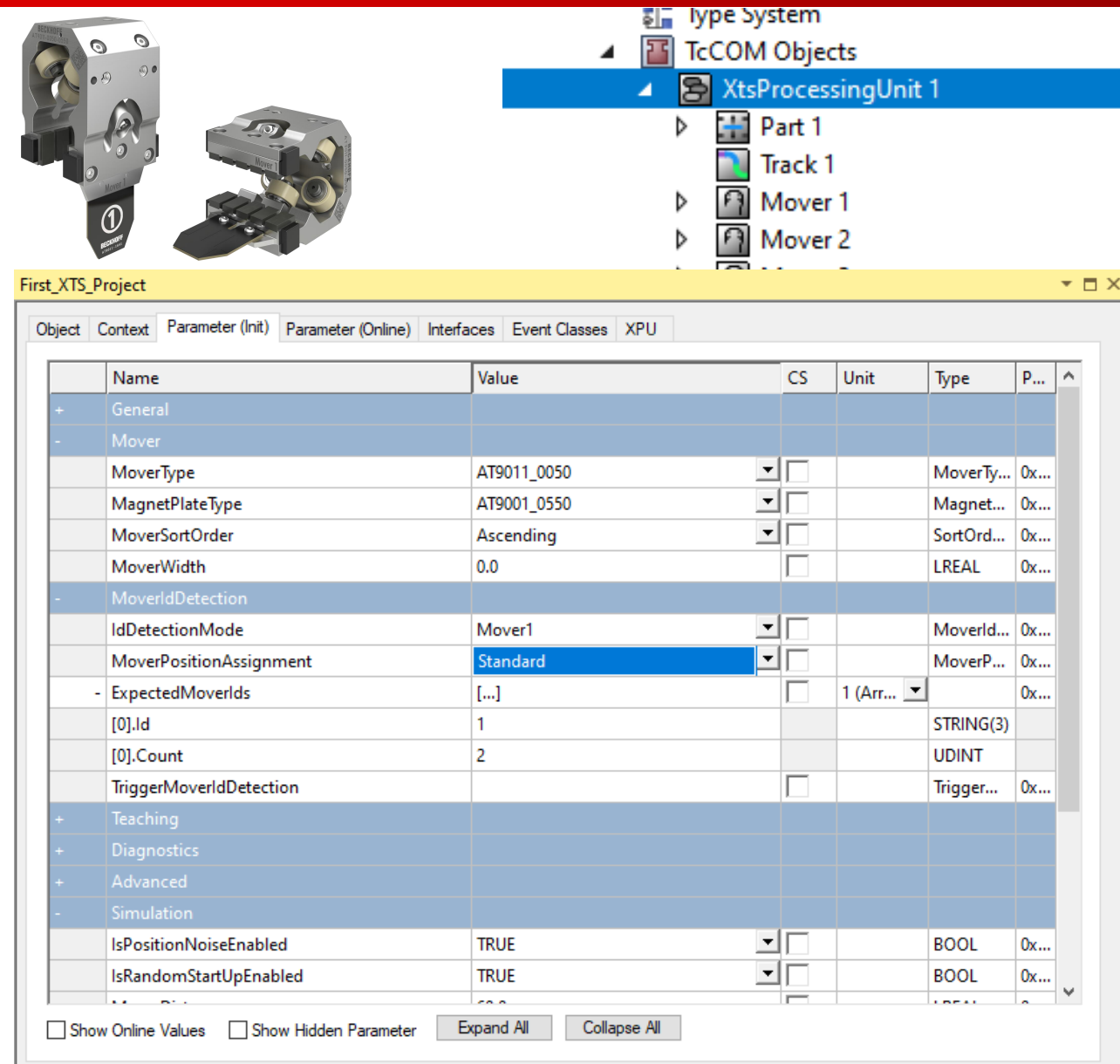
# Mover 1

BECKHOFF

- MoverIdDetectionMode
- MoverPositionAssignment

Change of these parameters requires  
at TwinCAT

→  Activate Configuration



The image displays two 3D CAD models of Beckhoff movers on the left. On the right, a screenshot of the TwinCAT configuration software is shown. The 'Type System' tree on the right side of the window shows the hierarchy: 'TcCOM Objects' > 'XtsProcessingUnit 1' > 'Part 1' > 'Track 1' > 'Mover 1' > 'Mover 2'. The main window shows the 'Parameter (Init)' tab for 'Mover 1'. The table below lists the parameters for Mover 1.

Name	Value	CS	Unit	Type	P...
+ General					
- Mover					
MoverType	AT9011_0050	<input type="checkbox"/>		MoverTy...	0x...
MagnetPlateType	AT9001_0550	<input type="checkbox"/>		Magnet...	0x...
MoverSortOrder	Ascending	<input type="checkbox"/>		SortOrd...	0x...
MoverWidth	0.0	<input type="checkbox"/>		LREAL	0x...
- MoverIdDetection					
IdDetectionMode	Mover1	<input type="checkbox"/>		MoverId...	0x...
MoverPositionAssignment	Standard	<input type="checkbox"/>		MoverP...	0x...
- ExpectedMoverIds	[...]	<input type="checkbox"/>	1 (Arr...		0x...
[0].Id	1			STRING(3)	
[0].Count	2			UDINT	
TriggerMoverIdDetection		<input type="checkbox"/>		Trigger...	0x...
+ Teaching					
+ Diagnostics					
+ Advanced					
- Simulation					
IsPositionNoiseEnabled	TRUE	<input type="checkbox"/>		BOOL	0x...
IsRandomStartUpEnabled	TRUE	<input type="checkbox"/>		BOOL	0x...

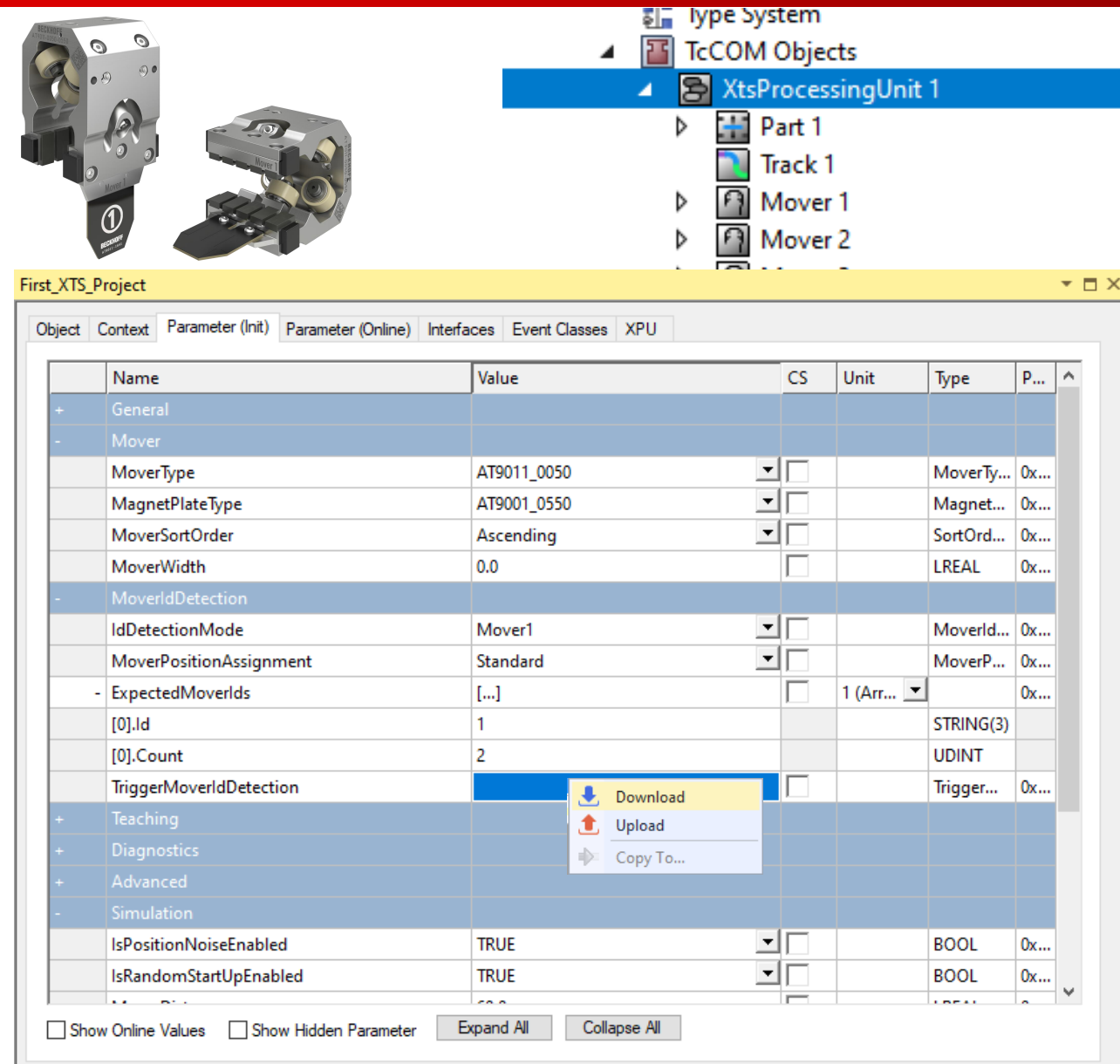
At the bottom of the window, there are checkboxes for 'Show Online Values' and 'Show Hidden Parameter', and buttons for 'Expand All' and 'Collapse All'.

# Mover 1

BECKHOFF

- TriggerMoverIdDetection

By selecting the parameter "TrigerMoverIdDetection" and ,via right Mous-Click, download the Parameter,  
the Mover 1 detection is triggered manually



The screenshot displays the Beckhoff TcCOM Objects interface. On the left, there are 3D models of two different mover components. On the right, a tree view shows the hierarchy: Type System > TcCOM Objects > XtsProcessingUnit 1 > Part 1 > Track 1 > Mover 1 > Mover 2. The main window, titled 'First\_XTS\_Project', shows a table of parameters for the selected mover. The 'TriggerMoverIdDetection' parameter is highlighted in blue, and a context menu is open over it, showing options: Download, Upload, and Copy To... The table has columns for Name, Value, CS, Unit, Type, and P... (Parameter ID). The 'TriggerMoverIdDetection' parameter has a value of 1 and a parameter ID of 0x...

Name	Value	CS	Unit	Type	P...
General					
Mover					
MoverType	AT9011_0050			MoverTy...	0x...
MagnetPlateType	AT9001_0550			Magnet...	0x...
MoverSortOrder	Ascending			SortOrd...	0x...
MoverWidth	0.0			LREAL	0x...
MoverIdDetection					
IdDetectionMode	Mover1			MoverId...	0x...
MoverPositionAssignment	Standard			MoverP...	0x...
ExpectedMoverIds	[...]		1 (Arr...		0x...
[0].Id	1			STRING(3)	
[0].Count	2			UDINT	
TriggerMoverIdDetection	1			Trigger...	0x...
Teaching					
Diagnostics					
Advanced					
Simulation					
IsPositionNoiseEnabled	TRUE			BOOL	0x...
IsRandomStartUpEnabled	TRUE			BOOL	0x...

# Mover 1

BECKHOFF

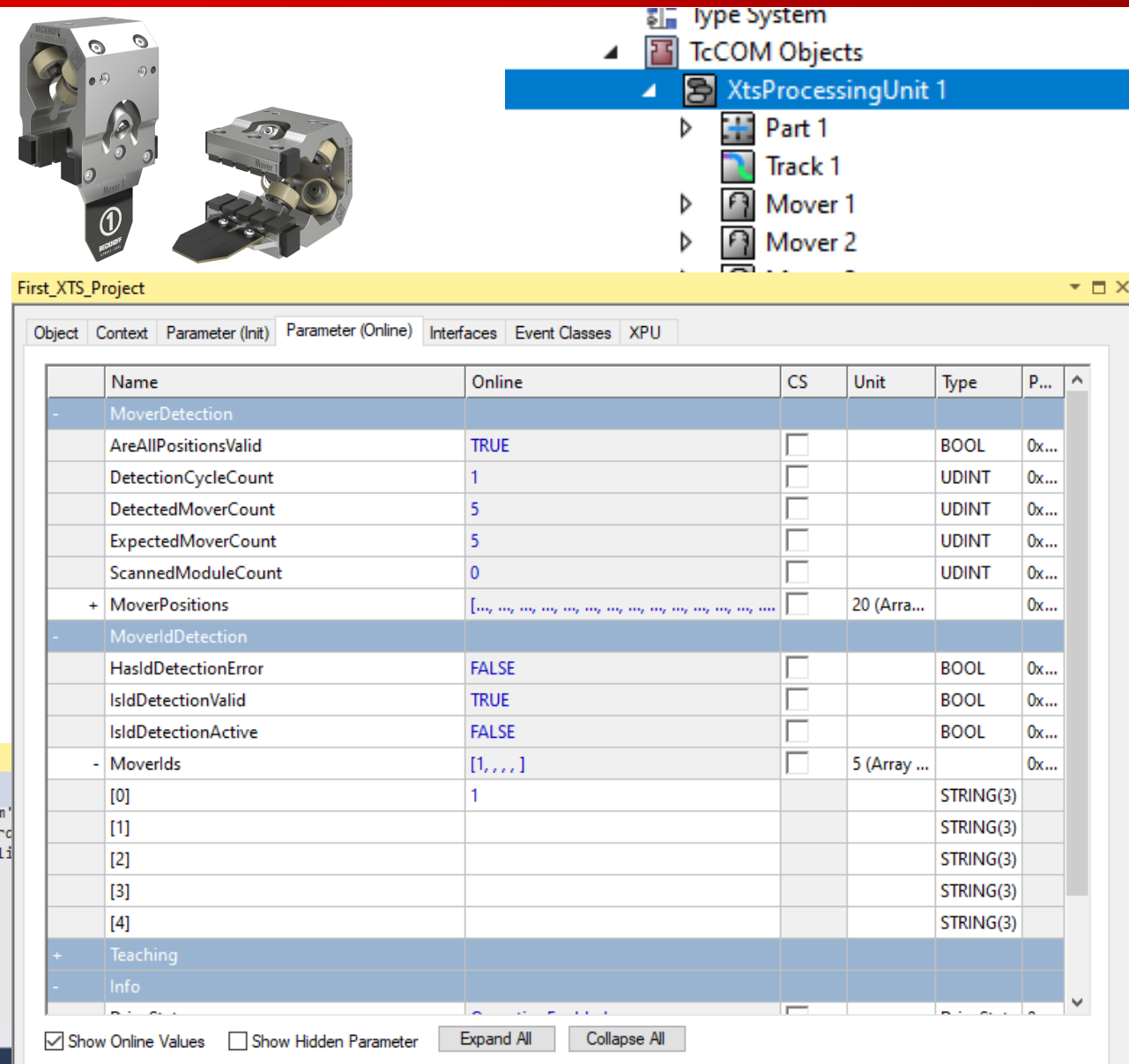
- Feedback Mover Id detection

Messages from the Mover Id detection

→ shown in the Output Window

State of Mover Id detection

→ as Parameter in "Parameter (Online)"



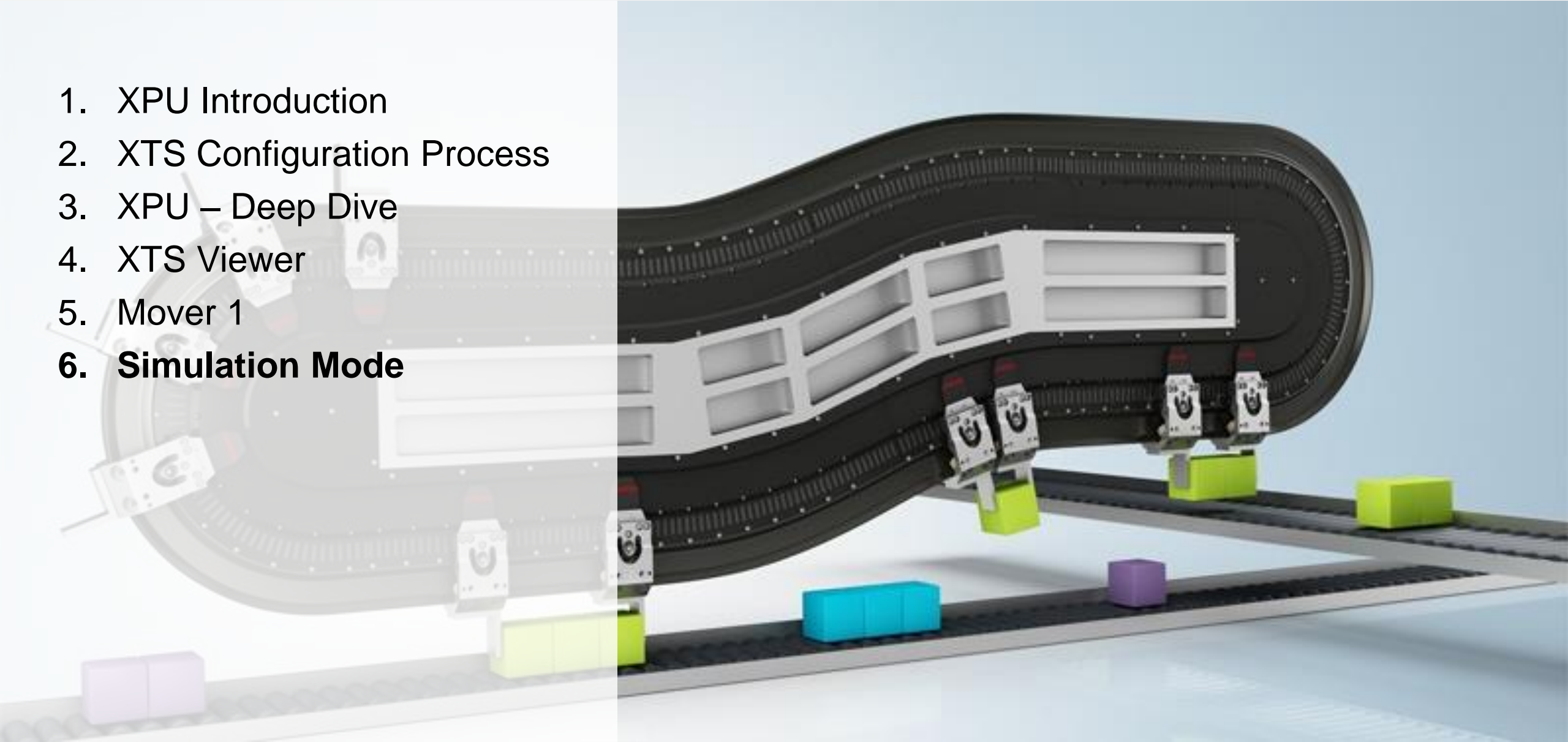
The screenshot displays the Beckhoff TwinCAT software interface. At the top, there is a 3D model of the Mover 1 and a tree view showing the 'XtsProcessingUnit 1' structure. Below this, the 'First\_XTS\_Project' window is open, showing the 'Parameter (Online)' tab. This tab contains a table with various parameters related to the Mover 1 Id detection.

Name	Online	CS	Unit	Type	P...
MoverDetection					
AreAllPositionsValid	TRUE			BOOL	0x...
DetectionCycleCount	1			UDINT	0x...
DetectedMoverCount	5			UDINT	0x...
ExpectedMoverCount	5			UDINT	0x...
ScannedModuleCount	0			UDINT	0x...
MoverPositions	[...]		20 (Arra...		0x...
MoverIdDetection					
HasIdDetectionError	FALSE			BOOL	0x...
IsIdDetectionValid	TRUE			BOOL	0x...
IsIdDetectionActive	FALSE			BOOL	0x...
MoverIds	[1,...]		5 (Array ...		0x...
[0]	1			STRING(3)	
[1]				STRING(3)	
[2]				STRING(3)	
[3]				STRING(3)	
[4]				STRING(3)	
Teaching					
Info					

At the bottom of the screenshot, there is an 'Output' window showing messages from the TwinCAT system. The messages indicate that the Mover ID detection has been triggered and that the Mover ID is detected.

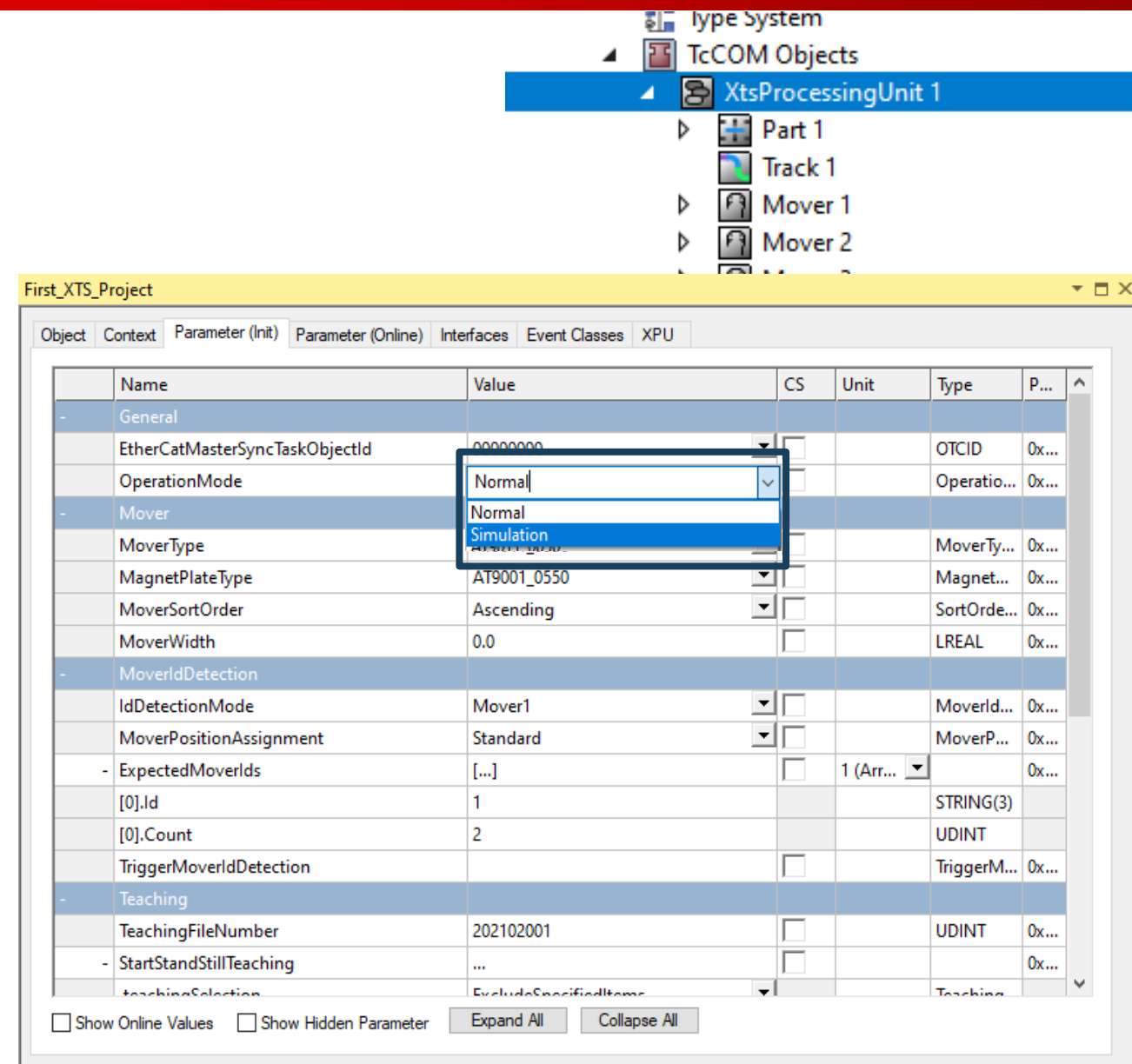
```
MSG | 02/25/2021 11:34:29 400 ms | 'TwinCAT XAE': No deployment information found for class factory 'CLib_Tc3_System'
MSG | 02/25/2021 11:34:29 400 ms | 'TwinCAT XAE': No deployment information found for class factory 'CLib_Tc3_McCoord
MSG | 02/25/2021 11:34:29 400 ms | 'TwinCAT XAE': No deployment information found for class factory 'CLib_Tc3_McColli
MSG | 02/25/2021 14:29:30 931 ms | XtsProcessingUnit 1 (0x01010010): The Mover ID Detection has been triggered.
MSG | 02/25/2021 14:29:30 931 ms | XtsProcessingUnit 1 (0x01010010): Mover ID is detected.
```

1. XPU Introduction
2. XTS Configuration Process
3. XPU – Deep Dive
4. XTS Viewer
5. Mover 1
6. **Simulation Mode**





- Simulation Mode
  - Change Parameter „OperationMode“
  - Setup Mover Simulation parameter
  - Deactivate I/O Devices
  - Activate Configuration





- Simulation Mode

- Setup Mover Simulation parameter

▲ Mover List

	Name	Axis	SoftDrive	Source Set	Parameter Set	Simu
✓	Mover 1	Mover Axis 1	SoftDrive 1		@D	Part 1
✓	Mover 2	Mover Axis 2	SoftDrive 2		@D	Part 1
✓	Mover 3	Mover Axis 3	SoftDrive 3		@D	Part 1
✓	Mover 4	Mover Axis 4	SoftDrive 4		@D	Part 1
✓	Mover 5	Mover Axis 5	SoftDrive 5		@D	Part 1

▲ Mover Details

Name: Mover 1

Axis Name: Mover Axis 1

SoftDrive Name: SoftDrive 1

Simulated Start-Up Settings:

Part: Part 1

Position: 60 mm

ID: 1

XTS Configurator

Movers

XtsProcessingUnit 1 + 5

General Settings

Mover Type: AT9011\_0050

Mover List

	Name	Axis	SoftDrive
✓	Mover 1	Mover Axis 1	SoftDrive 1
✓	Mover 2	Mover Axis 2	SoftDrive 2
✓	Mover 3	Mover Axis 3	SoftDrive 3
✓	Mover 4	Mover Axis 4	SoftDrive 4
✓	Mover 5	Mover Axis 5	SoftDrive 5

Mover Details

Name: Mover 1

Axis Name: Mover Axis 1

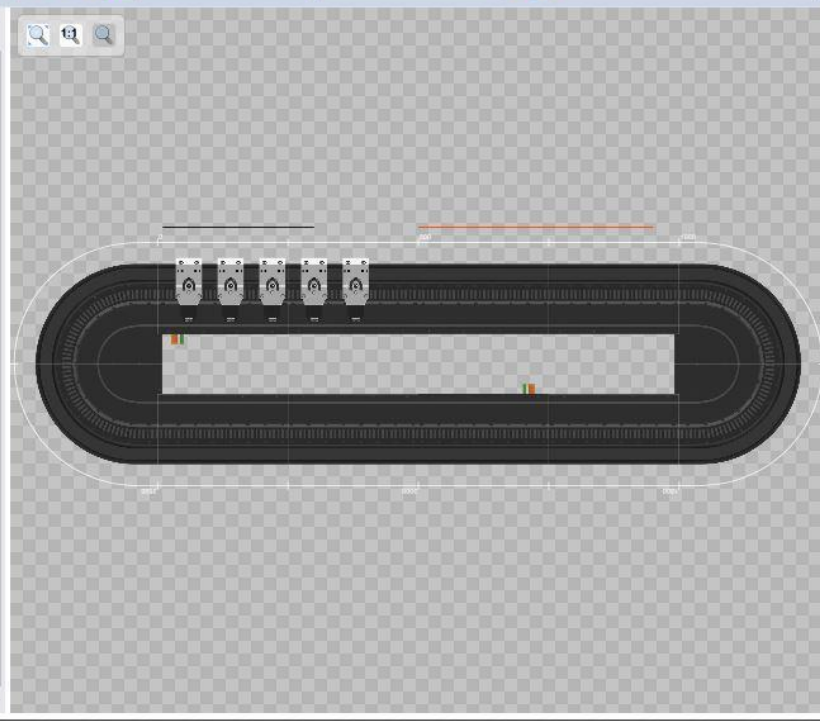
SoftDrive Name: SoftDrive 1

Simulated Start-Up Settings:

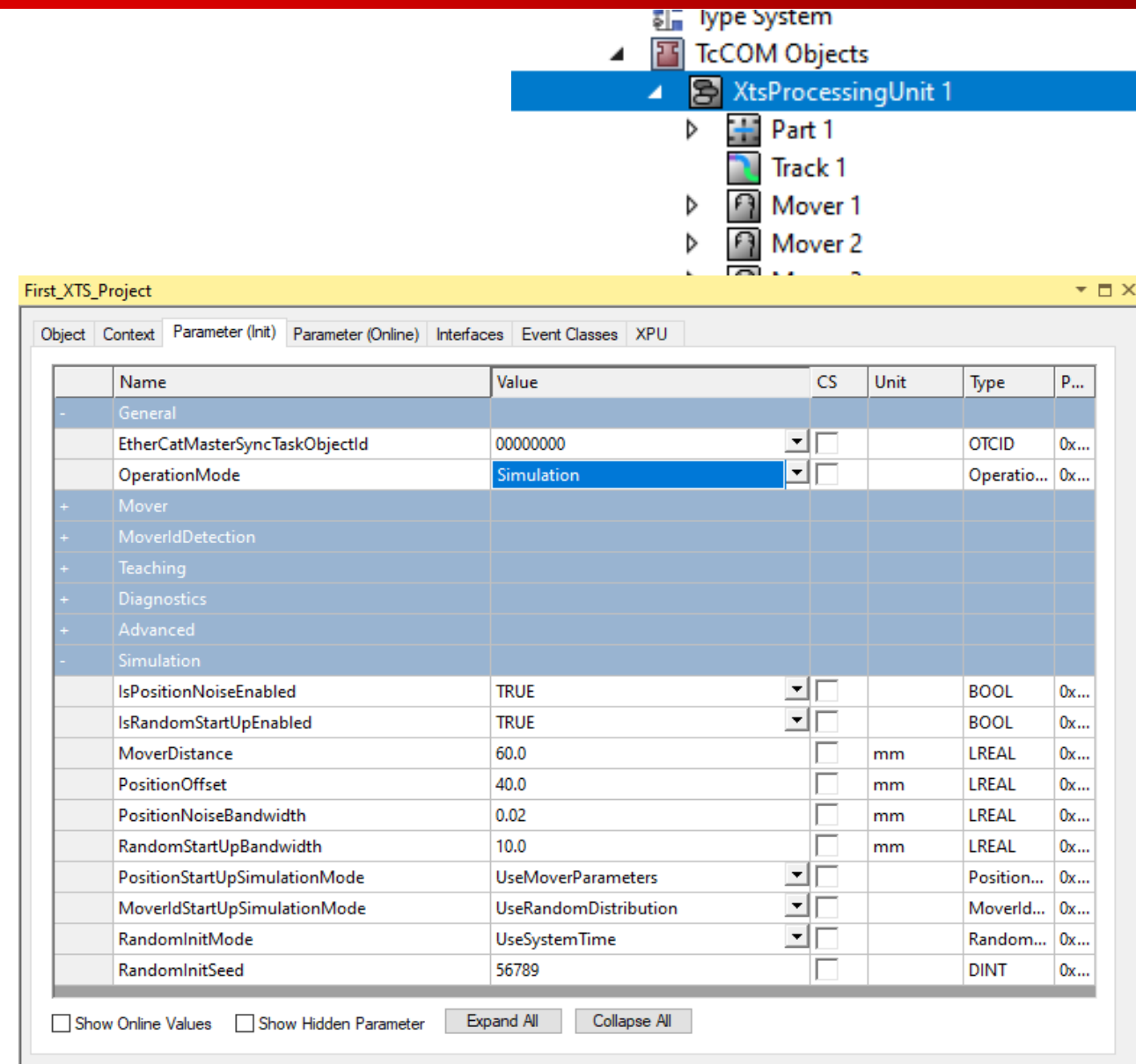
Part: Part 1

Position: 60 mm

ID:



- Simulation Mode
  - Simulation Mode Parameter



The screenshot displays the Beckhoff TcCOM Objects configuration window. The 'XtsProcessingUnit 1' tree is expanded, showing 'Part 1', 'Track 1', 'Mover 1', and 'Mover 2'. The 'Parameter (Init)' tab is selected, showing a table of parameters for the 'Simulation' mode.

Name	Value	CS	Unit	Type	P...
General					
EtherCatMasterSyncTaskObjectId	00000000	<input type="checkbox"/>		OTCID	0x...
OperationMode	Simulation	<input type="checkbox"/>		Operatio...	0x...
Mover					
MoverIdDetection					
Teaching					
Diagnostics					
Advanced					
Simulation					
IsPositionNoiseEnabled	TRUE	<input type="checkbox"/>		BOOL	0x...
IsRandomStartUpEnabled	TRUE	<input type="checkbox"/>		BOOL	0x...
MoverDistance	60.0	<input type="checkbox"/>	mm	LREAL	0x...
PositionOffset	40.0	<input type="checkbox"/>	mm	LREAL	0x...
PositionNoiseBandwidth	0.02	<input type="checkbox"/>	mm	LREAL	0x...
RandomStartUpBandwidth	10.0	<input type="checkbox"/>	mm	LREAL	0x...
PositionStartUpSimulationMode	UseMoverParameters	<input type="checkbox"/>		Position...	0x...
MoverIdStartUpSimulationMode	UseRandomDistribution	<input type="checkbox"/>		MoverId...	0x...
RandomInitMode	UseSystemTime	<input type="checkbox"/>		Random...	0x...
RandomInitSeed	56789	<input type="checkbox"/>		DINT	0x...

At the bottom, there are checkboxes for 'Show Online Values' and 'Show Hidden Parameter', and buttons for 'Expand All' and 'Collapse All'.



**Complex sequences – simplified solution:  
XTS**

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