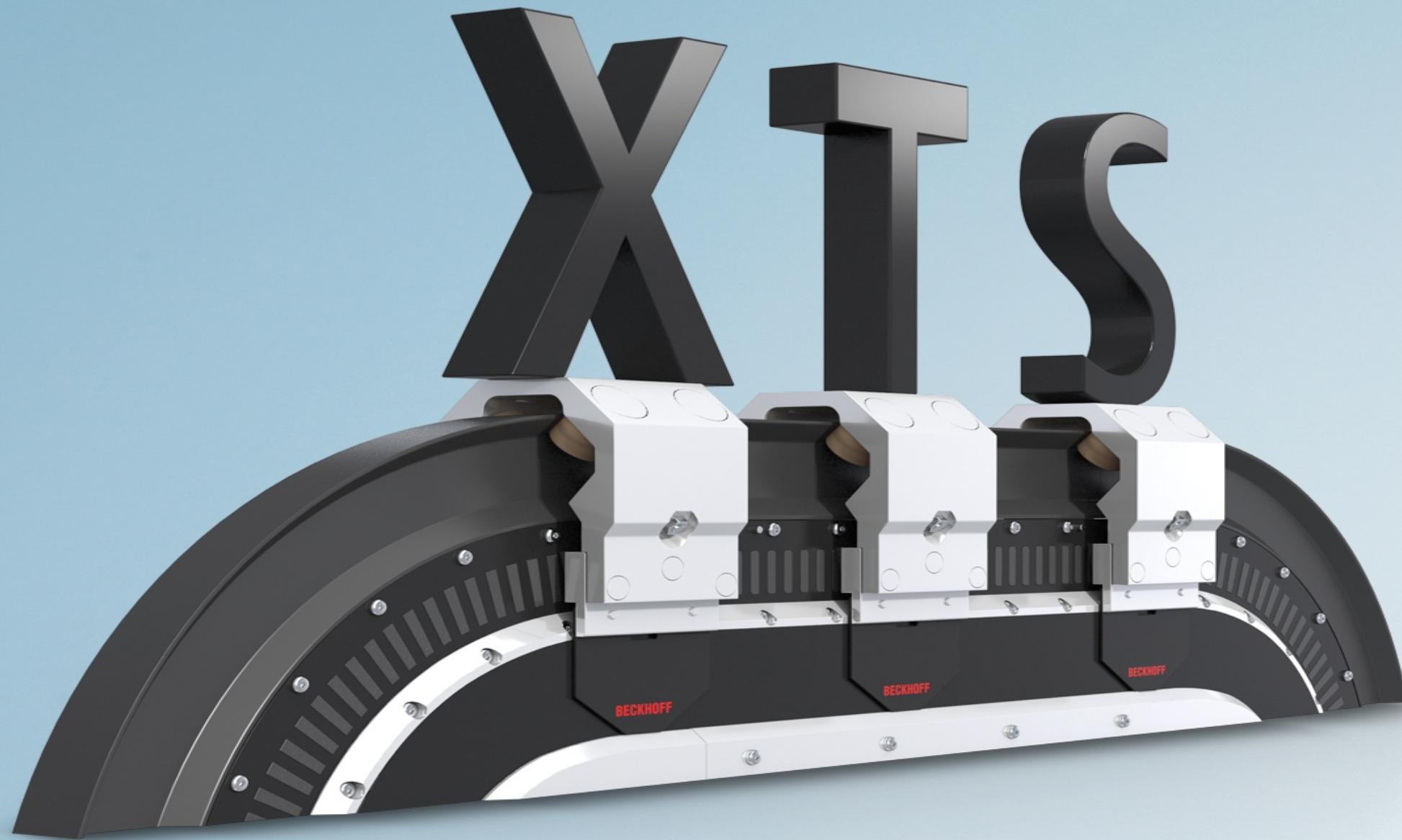


# New Automation Technology

## Beckhoff Automation

BECKHOFF





# BECKHOFF

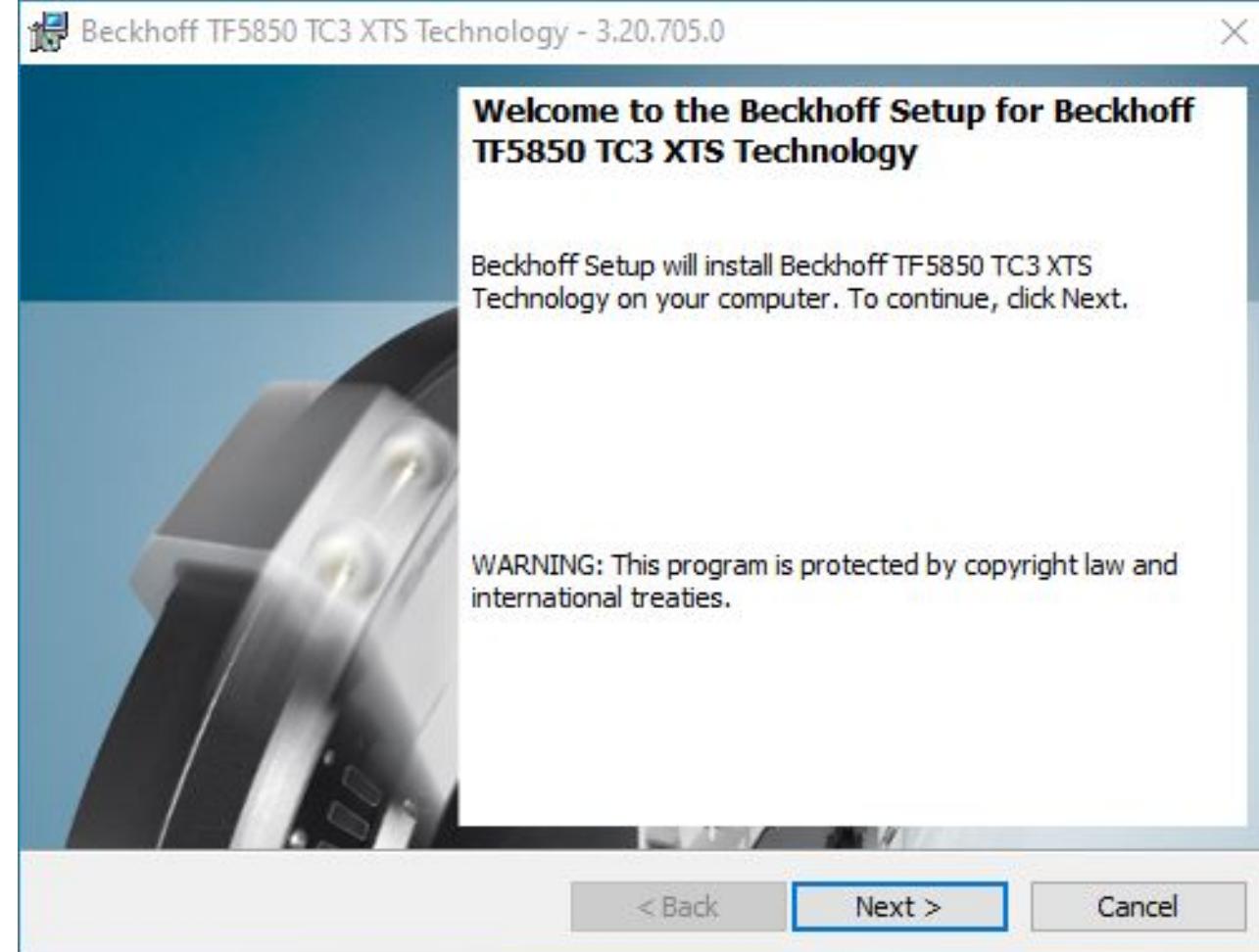
## XTS – TcloXtsProcessingUnit (XPU)



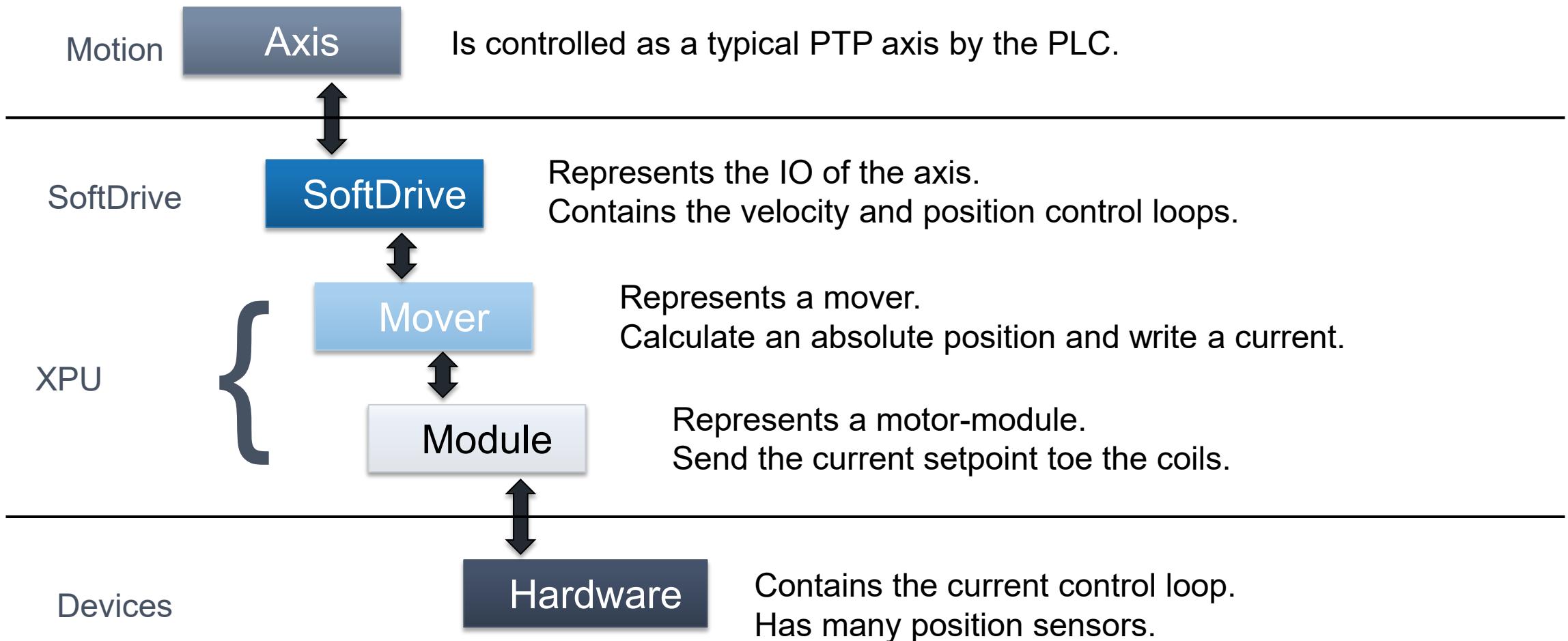
- 1. XPU Introduction
- 2. XTS Configuration Process
- 3. XPU – Deep Dive
- 4. XTS Viewer
- 5. Mover 1
- 6. Simulation Mode



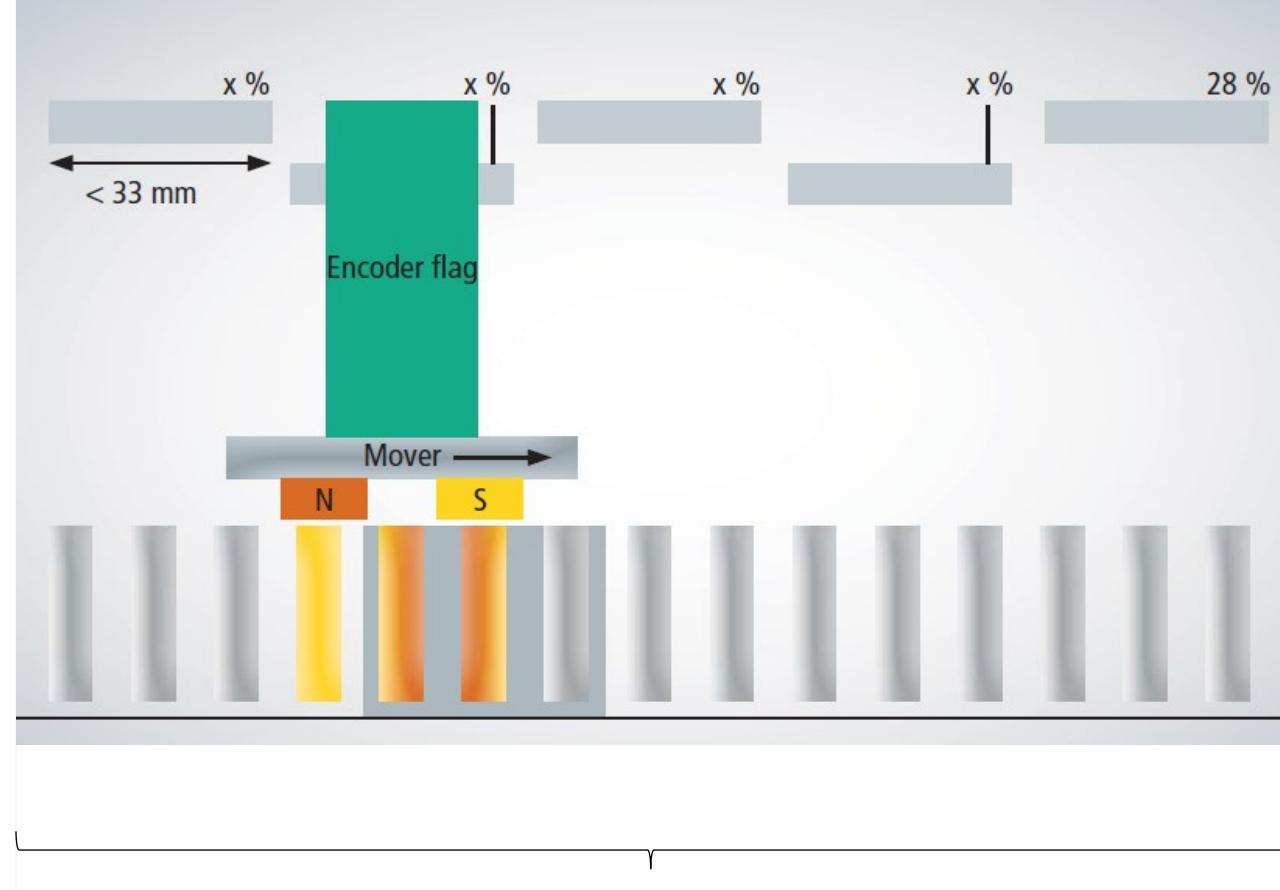
- TcloXtsProcessingUnit as TcCOM Module (TwinCAT Component Object Models)
- TF5850 | TC3 XTS Extension
  - Included
    - TcloXtsProcessingUnit
    - TcloXtsDrv (obsolete)
    - SoftDrive
- TF5400 | TC3 Advanced Motion Pack
  - Included
    - TC3 Collision Avoidance



- `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

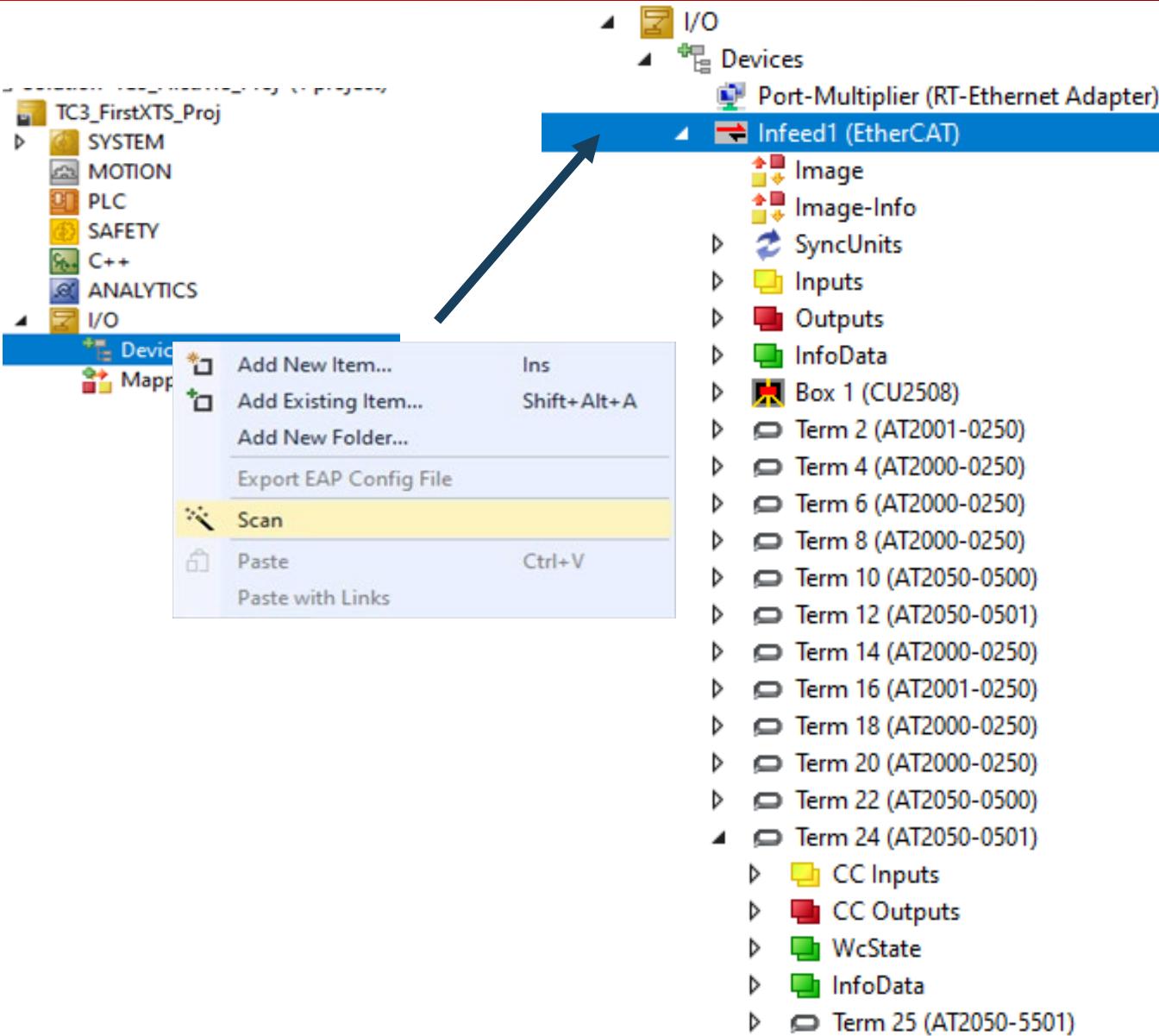
- 1. XPU Introduction
- 2. XTS Configuration Process
- 3. XPU – Deep Dive
- 4. XTS Viewer
- 5. Mover 1
- 6. Simulation Mode



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

- **TIP**

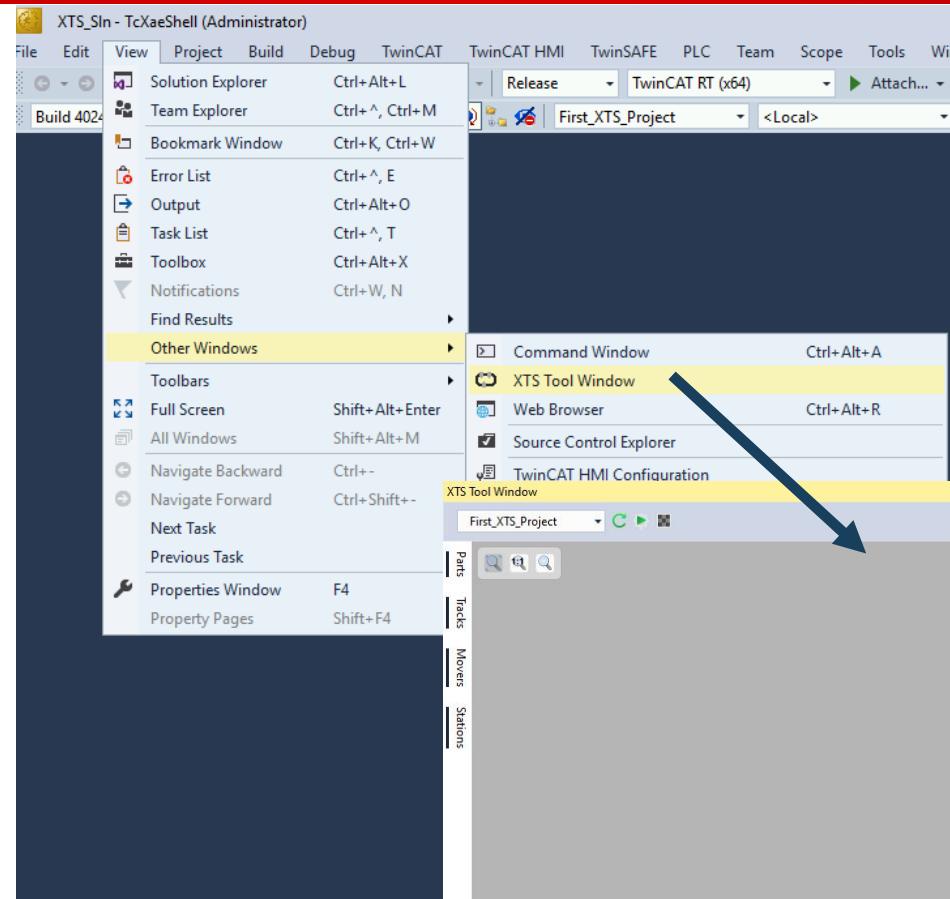
After scan, change to  
Free-Run mode and have a look at the  
signals,  
the values should be changing  
continuously.



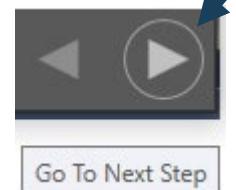
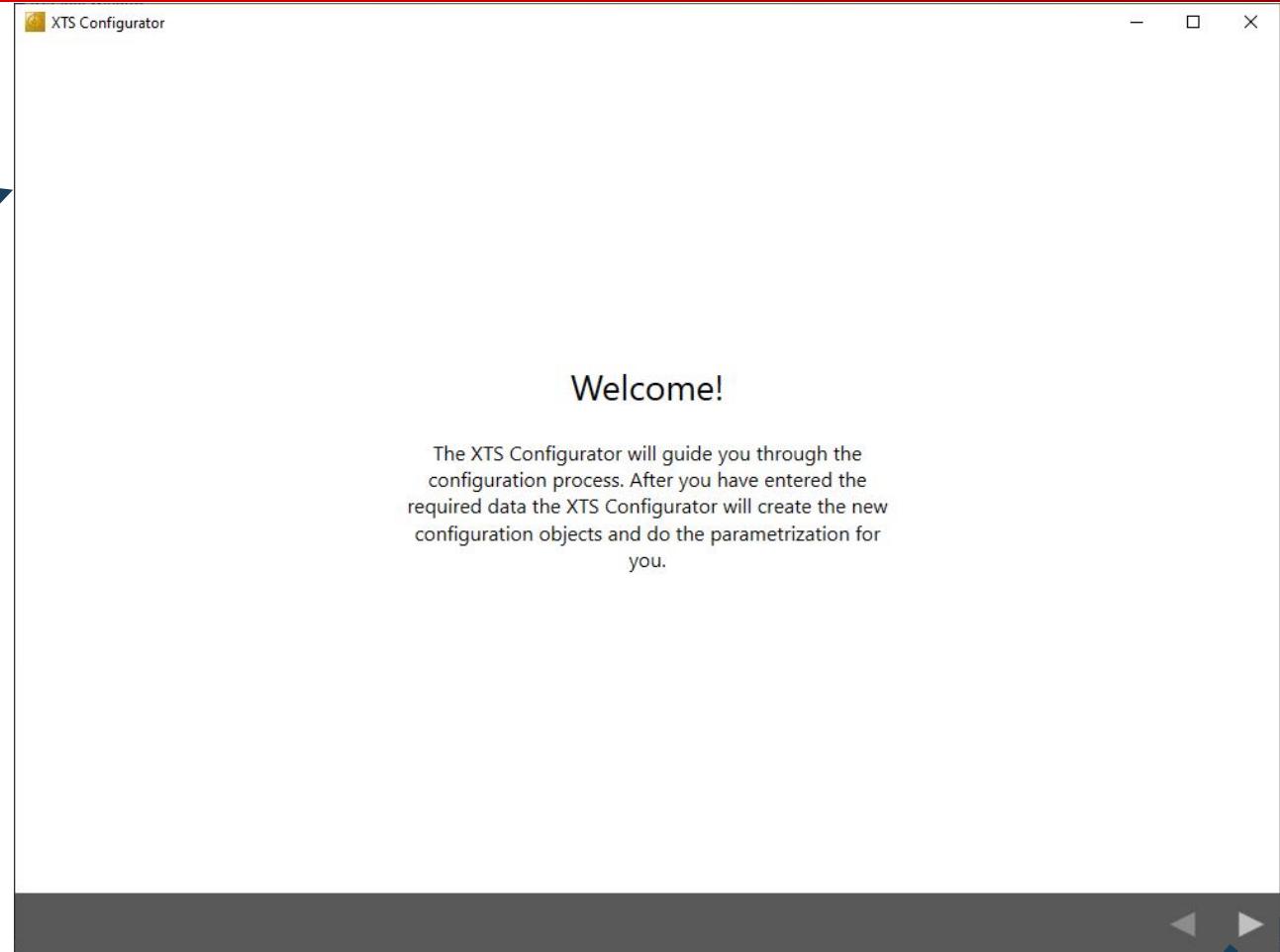
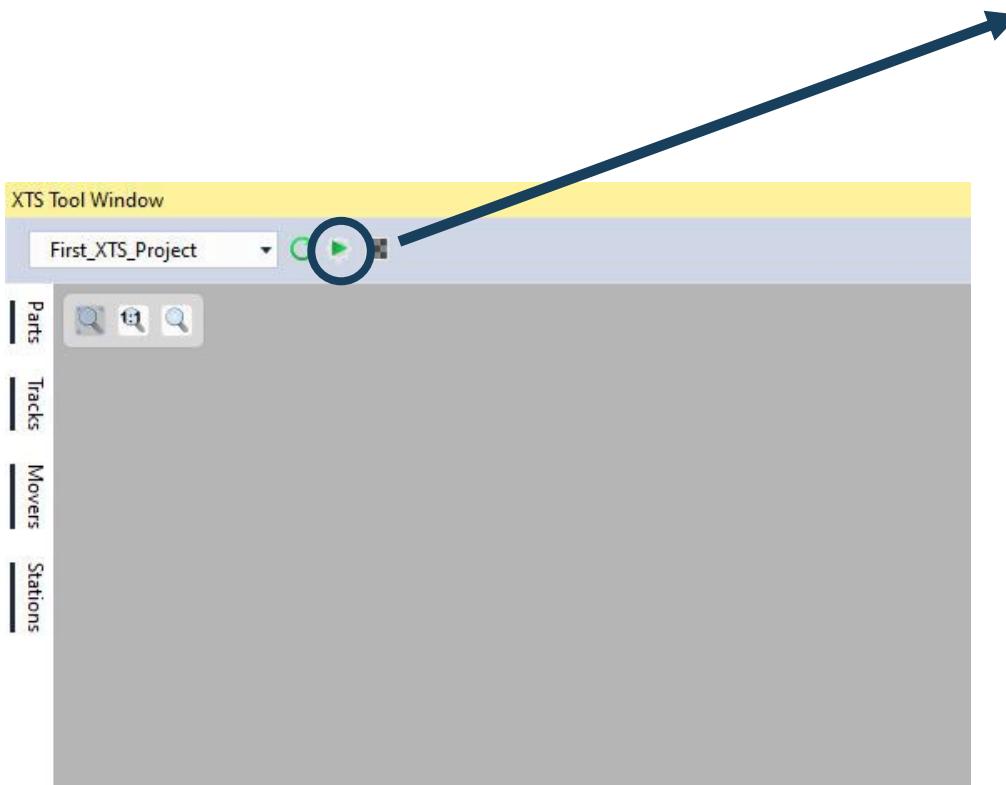
# XTS Configuration Process...

BECKHOFF

- Open XTS Tool Window



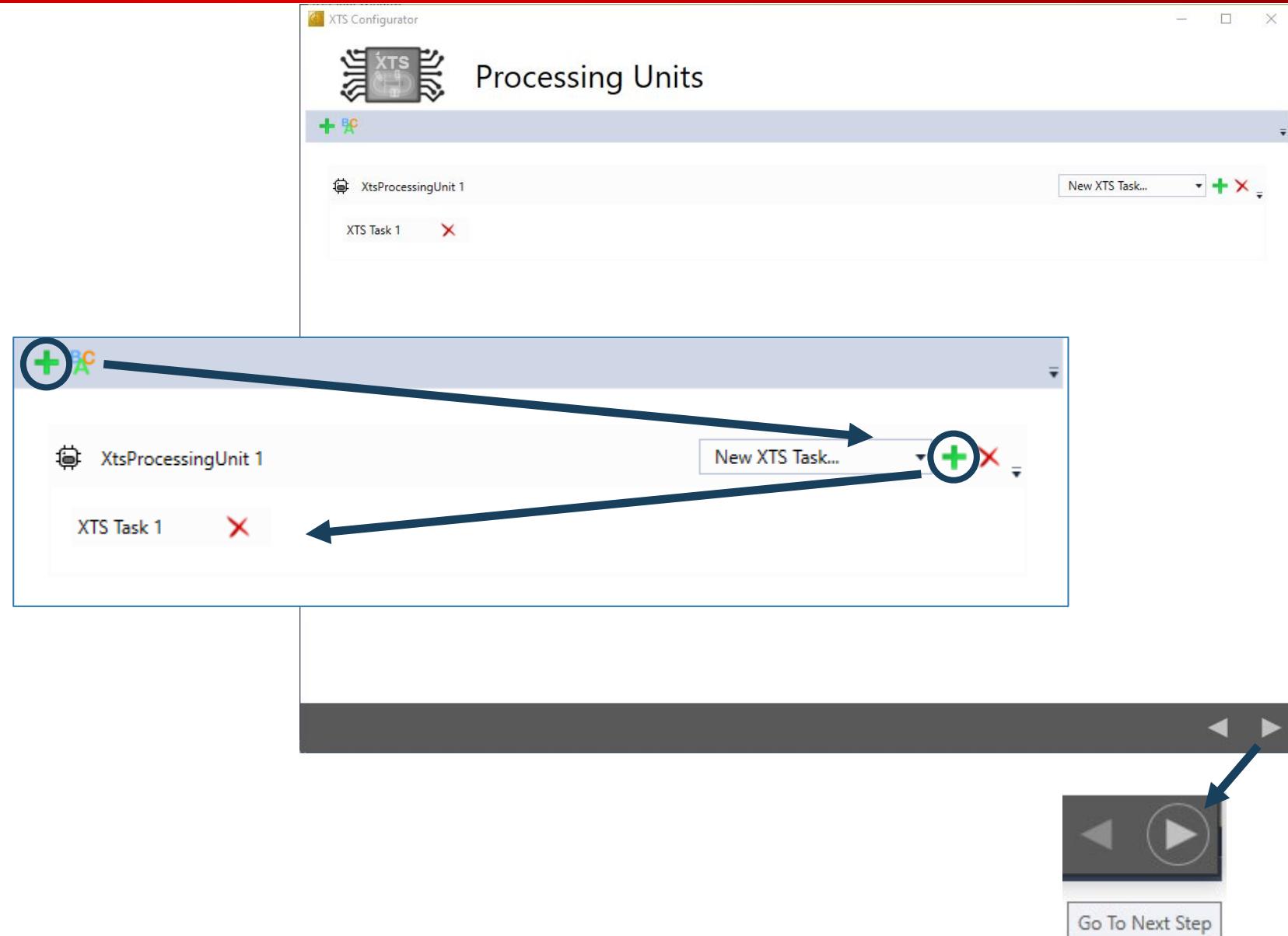
- Start the configuration process



# XTS Configuration Process...

BECKHOFF

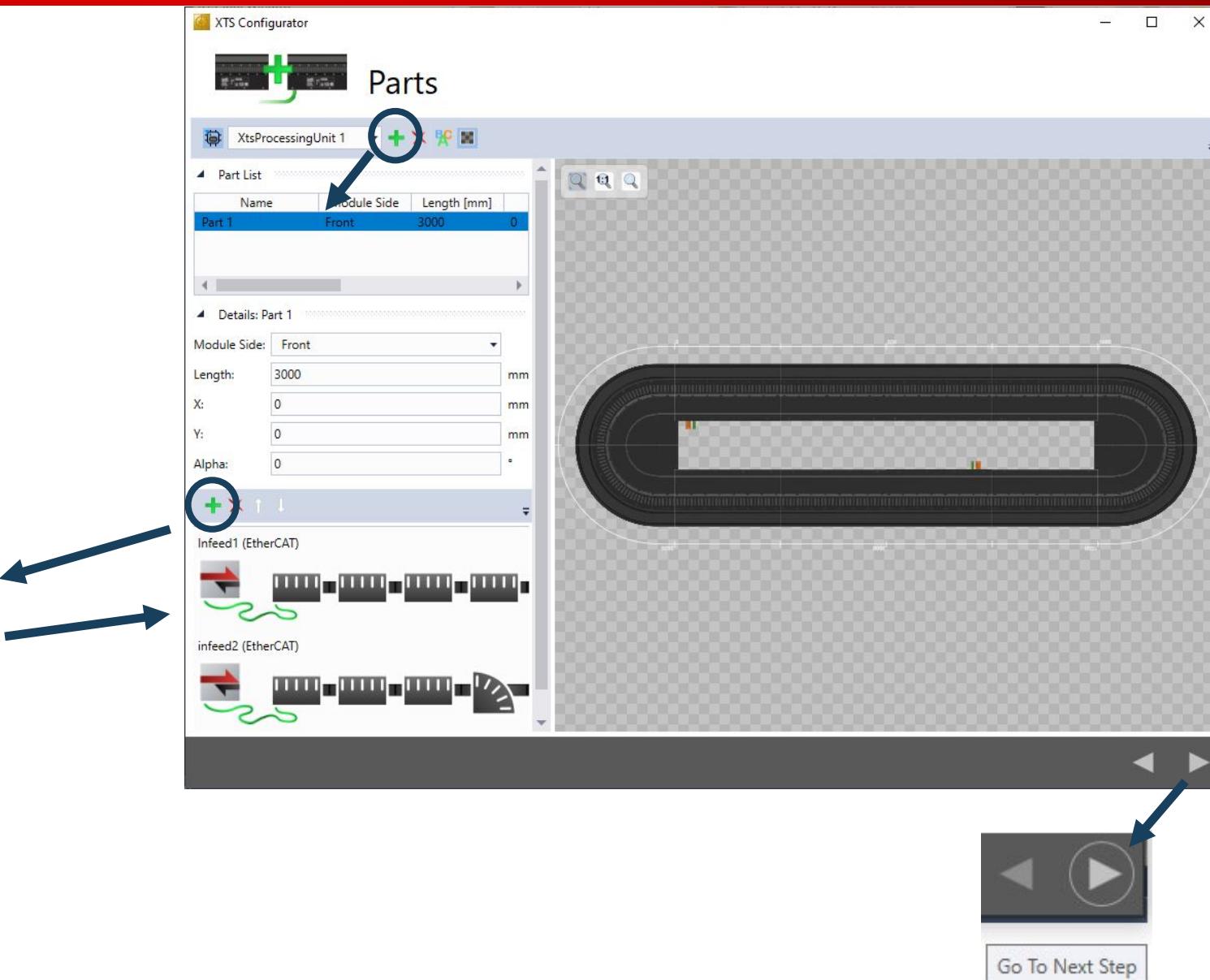
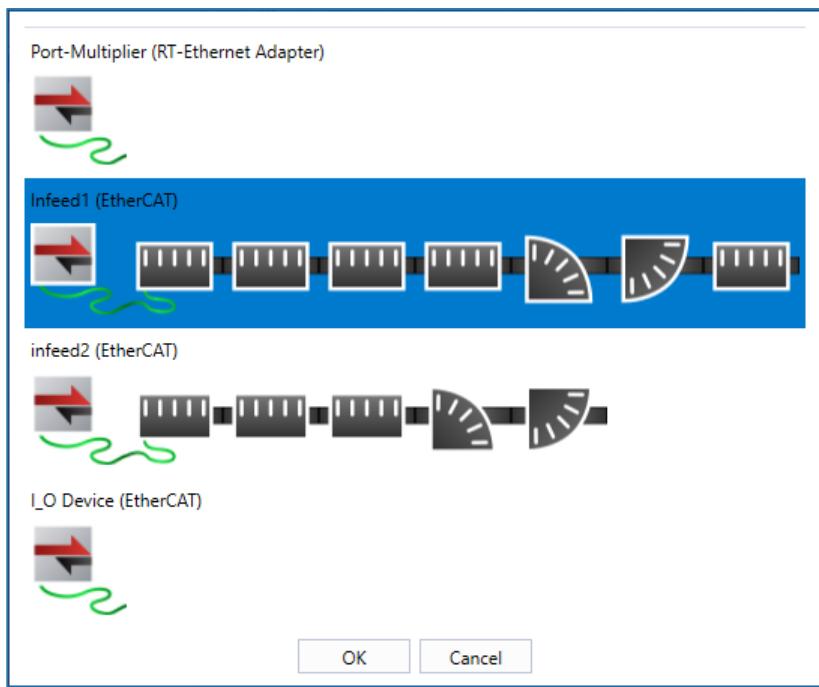
## ▪ Add XTS Task 1



# XTS Configuration Process...

BECKHOFF

## ■ Add XTS Parts

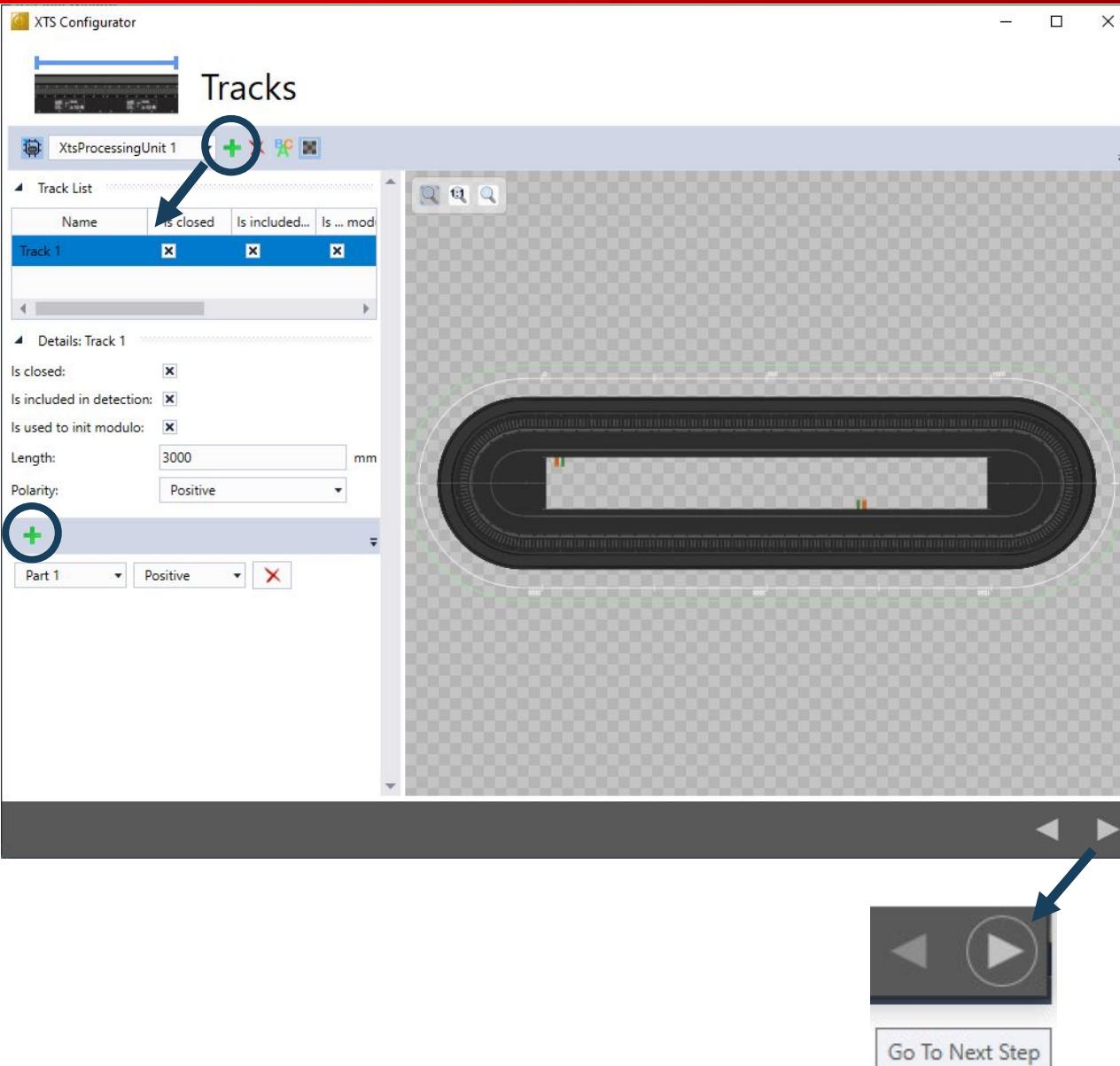


# XTS Configuration Process...

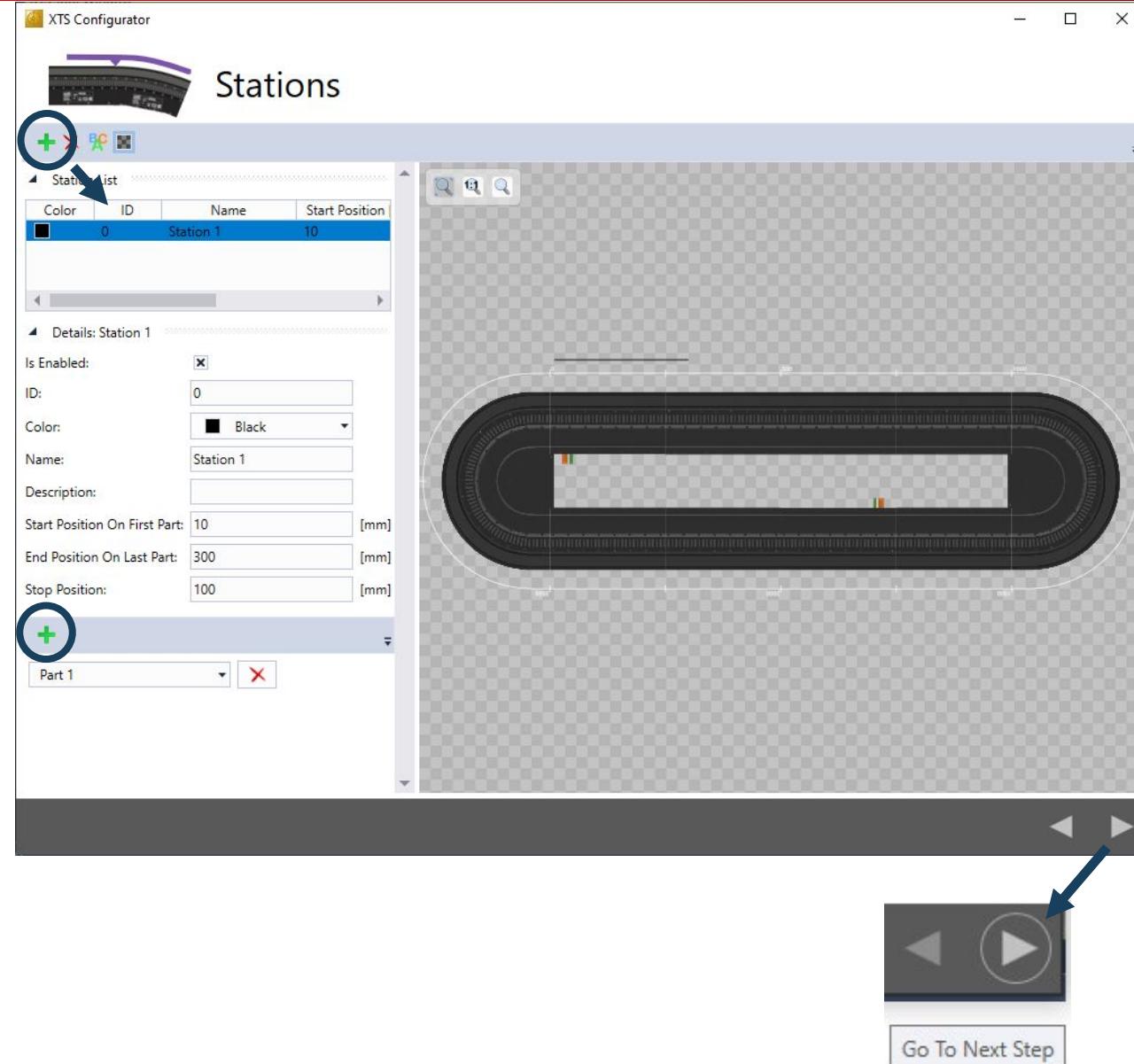
BECKHOFF

- Add XTS Tracks  
(one track minimum)

- Add Parts to the track



- Add XTS Station  
(only display at the moment)



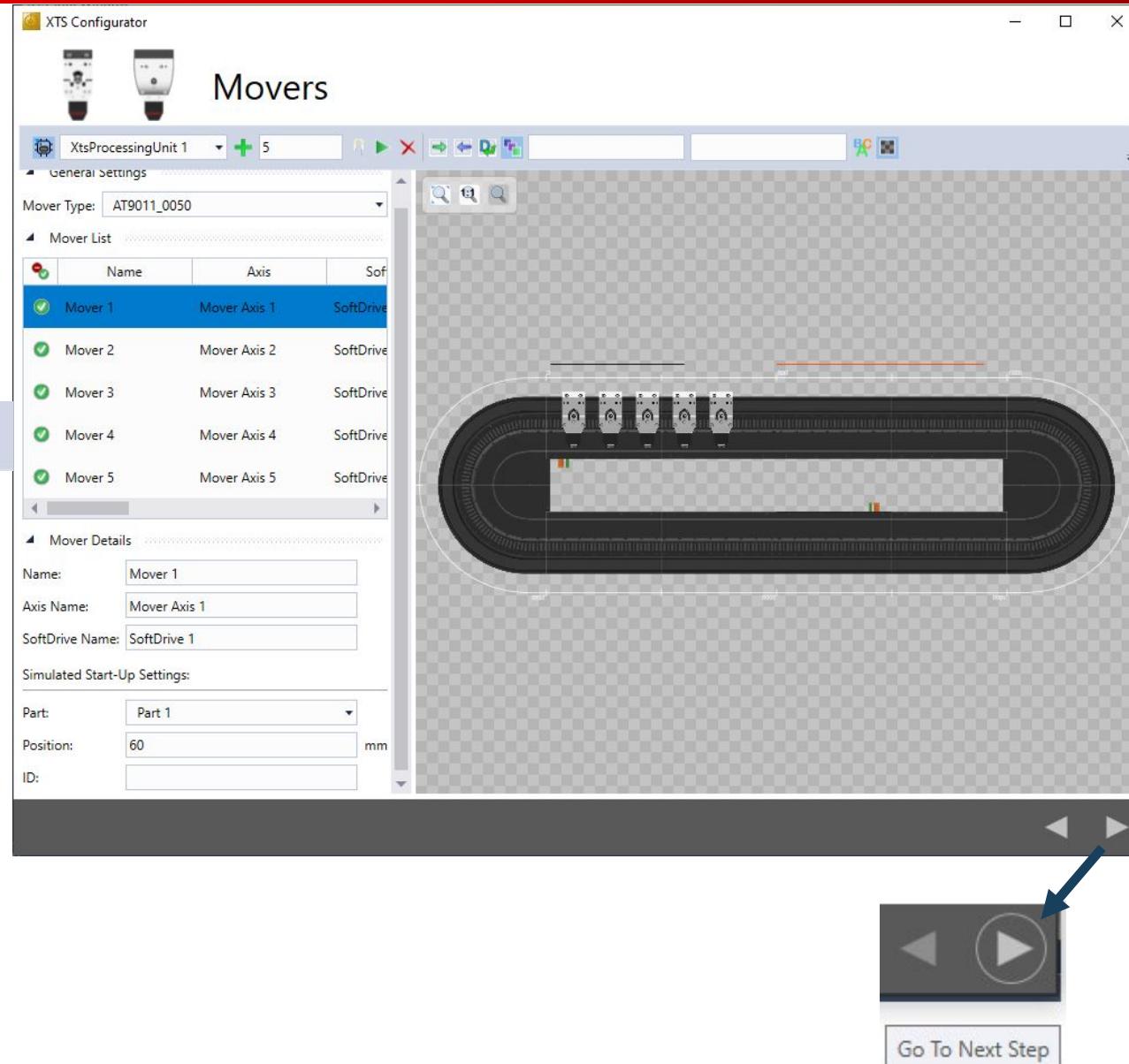
# XTS Configuration Process...

BECKHOFF

## ■ Add XTS Mover

The screenshot shows the XTS Configurator software interface. At the top, there is a toolbar with various icons. A blue circle highlights the first icon (a green plus sign) and a blue arrow points down to the 'Mover List' table below. The 'Mover List' table contains five entries, each with a green checkmark, indicating successful configuration. The columns are labeled 'Name', 'Axis', and 'SoftDrive'. The entries are: Mover 1 (Axis 1, SoftDrive 1), Mover 2 (Axis 2, SoftDrive 2), Mover 3 (Axis 3, SoftDrive 3), Mover 4 (Axis 4, SoftDrive 4), and Mover 5 (Axis 5, SoftDrive 5).

	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	Sim
<input checked="" type="checkbox"/>	Mover 1	Mover Axis 1	SoftDrive 1		@D	Part 1
<input checked="" type="checkbox"/>	Mover 2	Mover Axis 2	SoftDrive 2		@D	Part 1
<input checked="" type="checkbox"/>	Mover 3	Mover Axis 3	SoftDrive 3		@D	Part 1
<input checked="" type="checkbox"/>	Mover 4	Mover Axis 4	SoftDrive 4		@D	Part 1
<input checked="" type="checkbox"/>	Mover 5	Mover Axis 5	SoftDrive 5		@D	Part 1

◀ Mover Details

Name:

Axis Name:

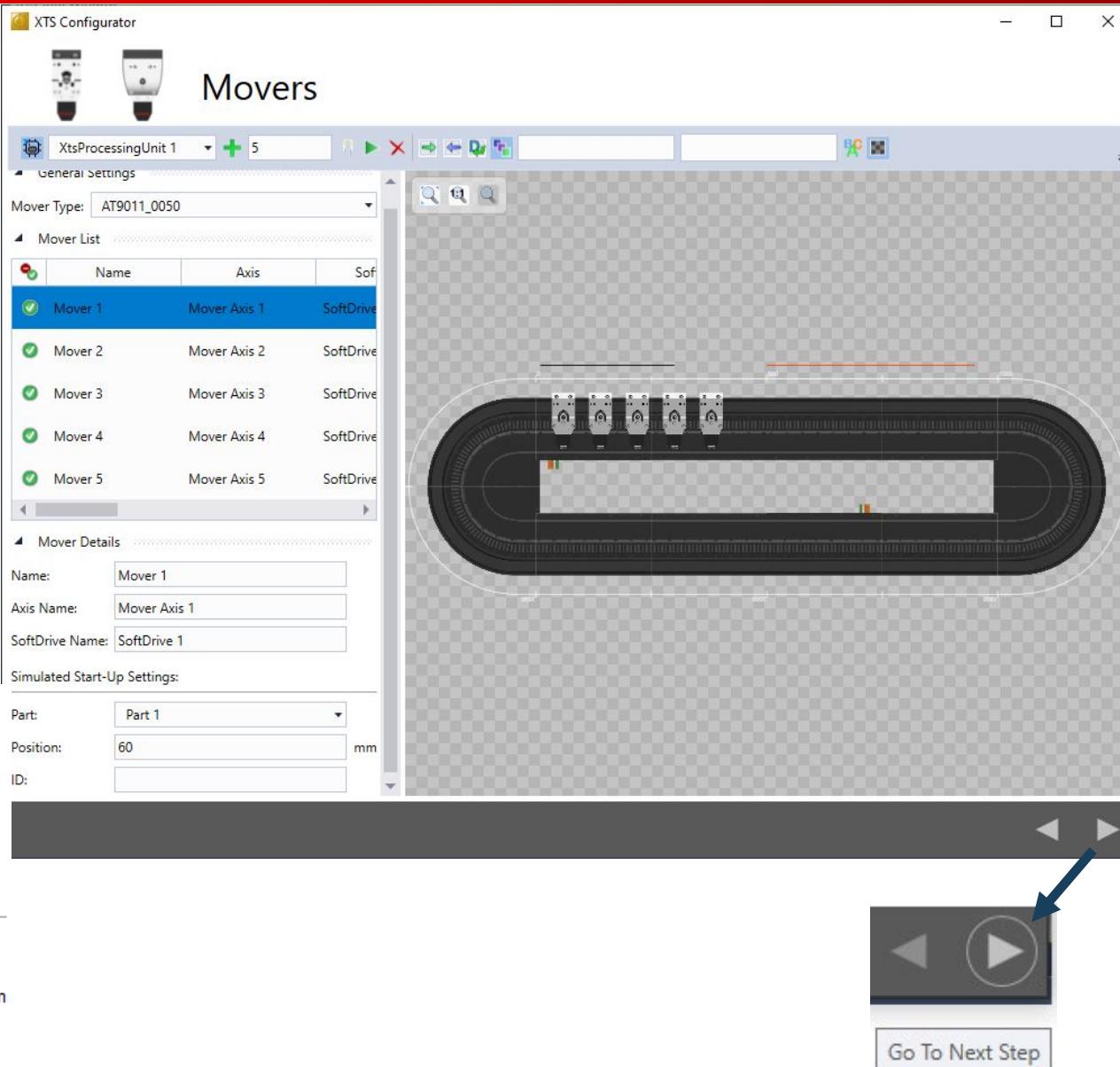
SoftDrive Name:

Simulated Start-Up Settings:

Part:

Position:  mm

ID:

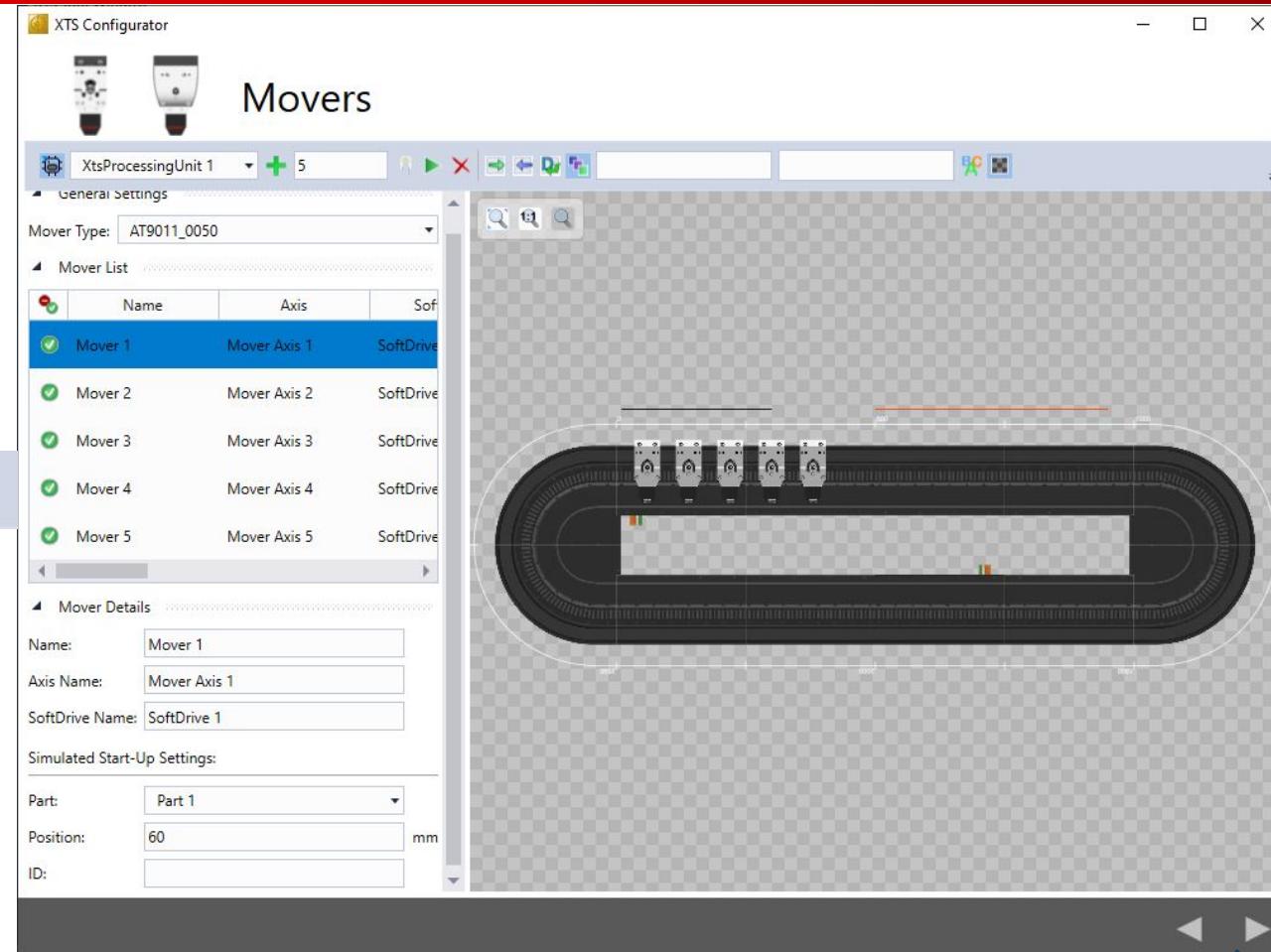
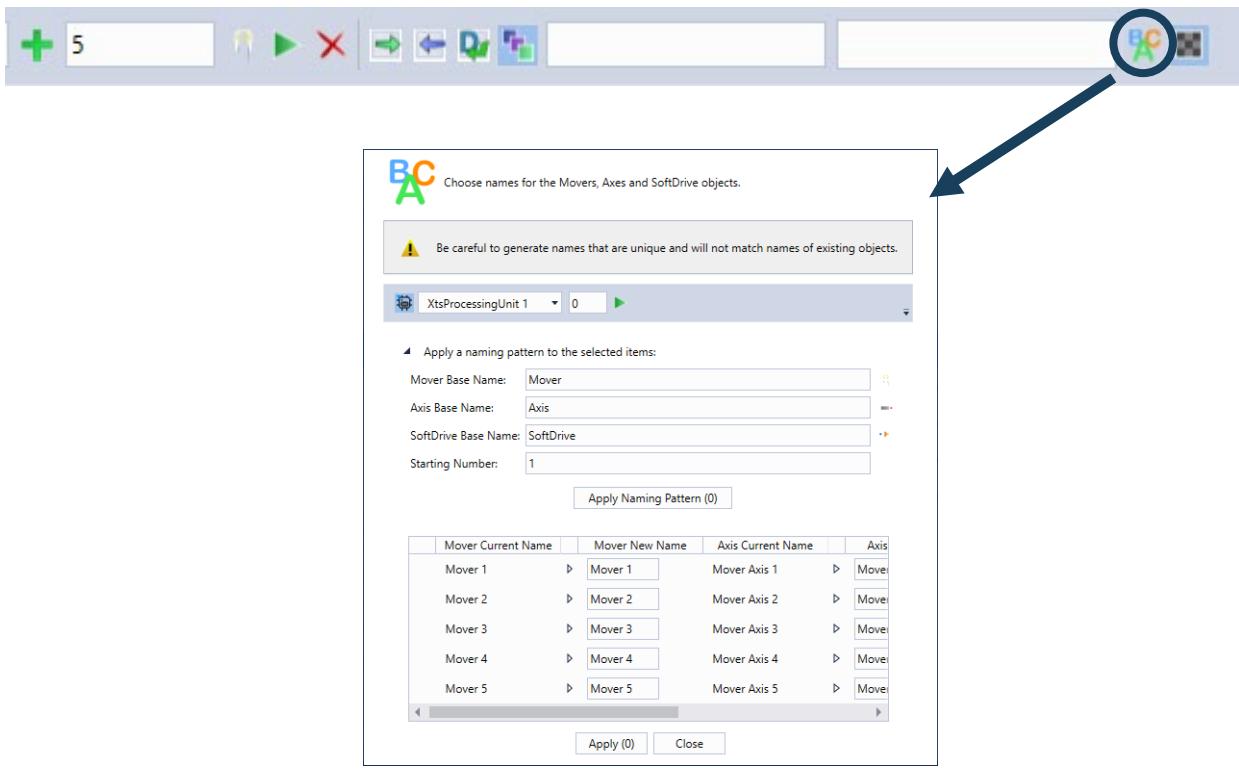


# XTS Configuration Process...

BECKHOFF

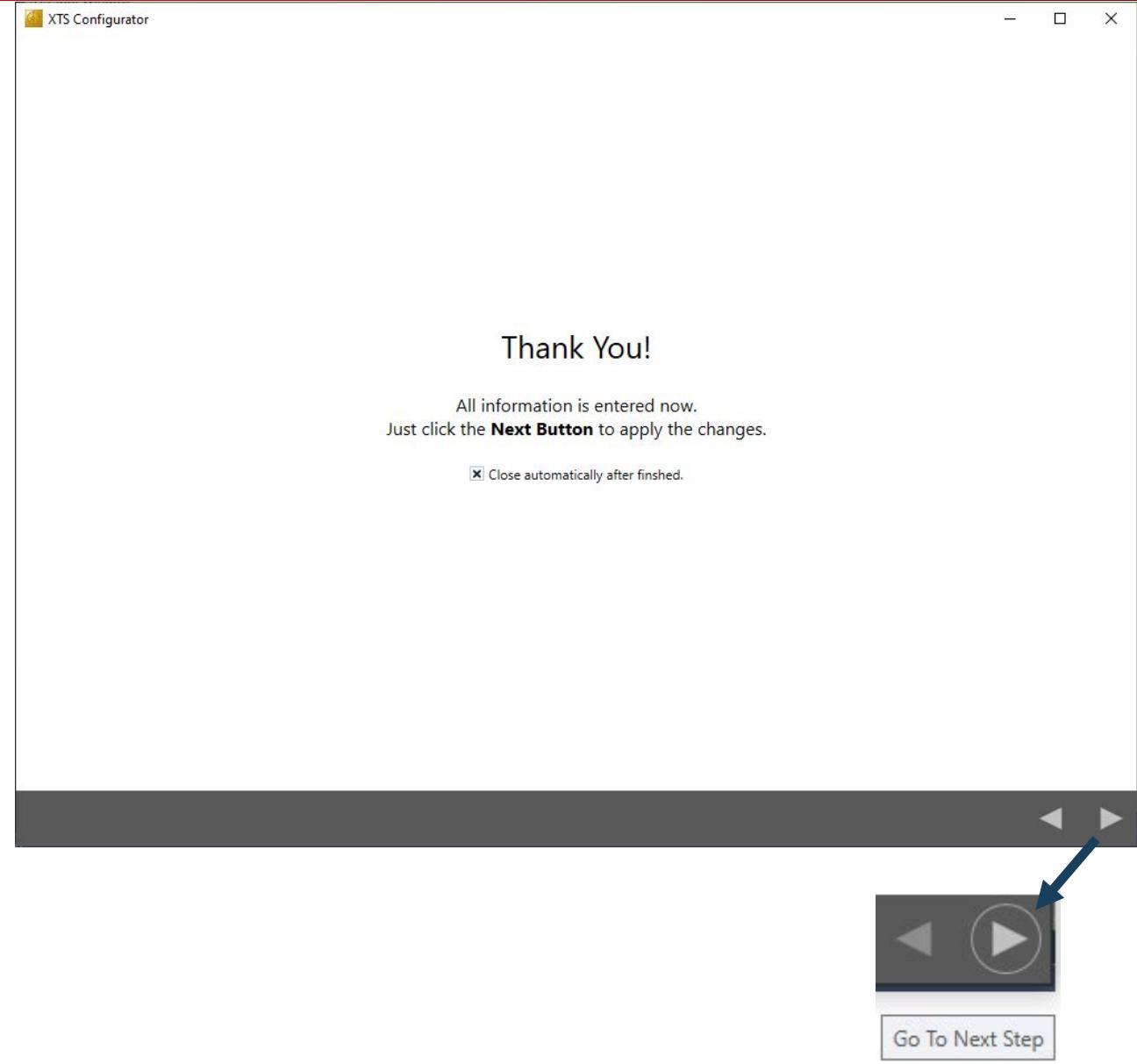
## ■ Add XTS Mover

- choose names for Mover, Axis and Softdrive



Go To Next Step

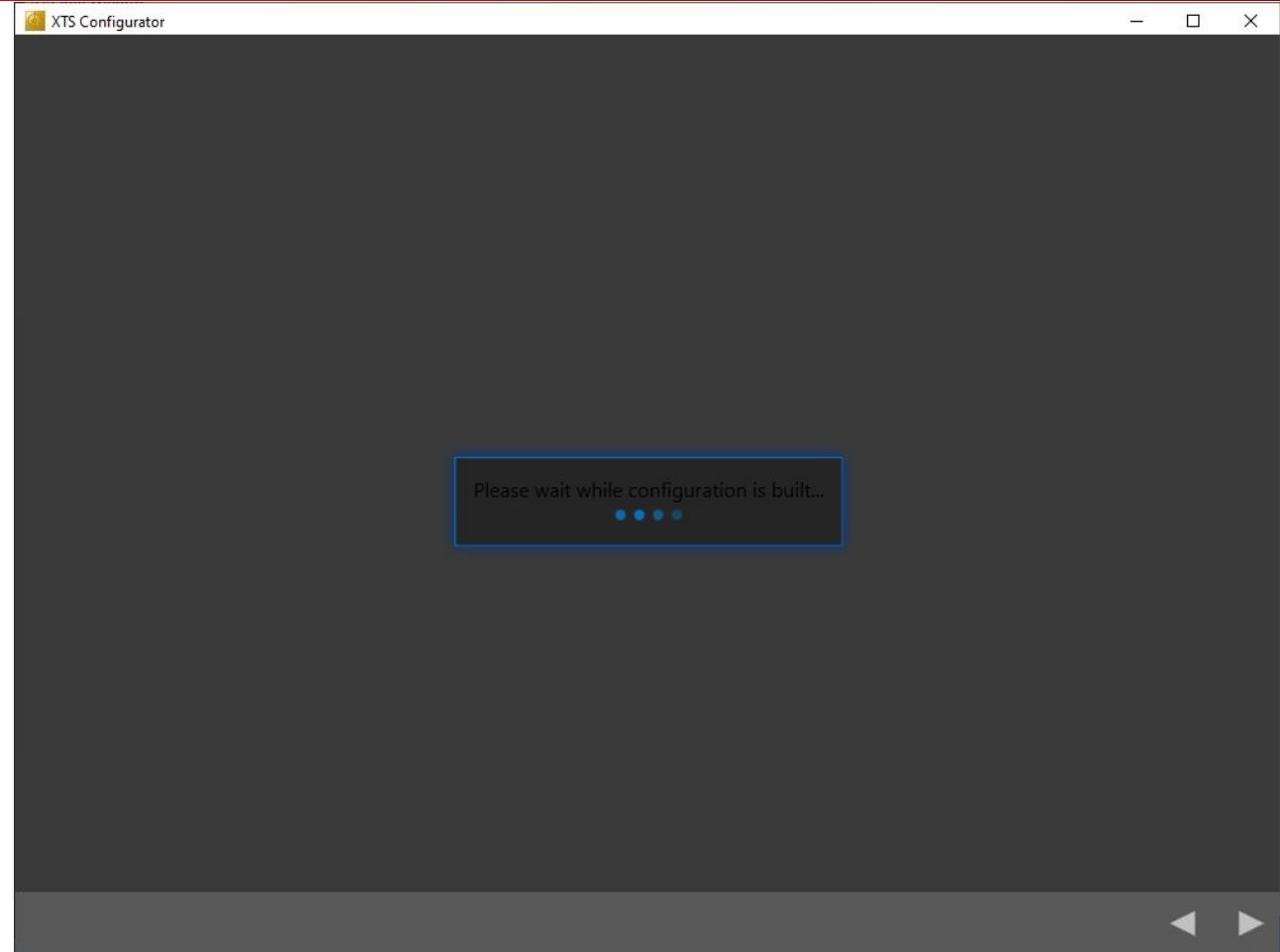
- Finished Configuration process



- Finished Configuration process

The manager creates the configuration of the system:

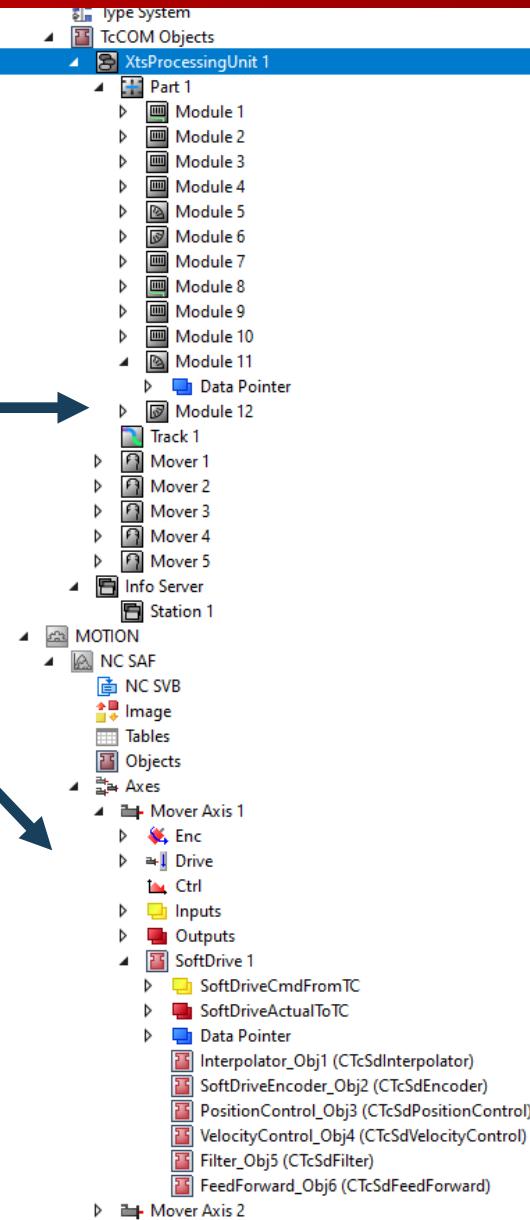
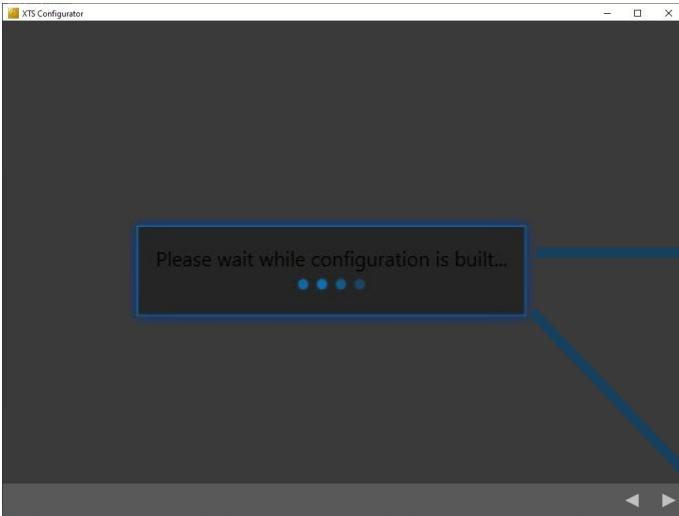
- Creates the XTS task.
- Creates the child objects of the TcloXtsProcessingUnit (modules & movers)
- Adds the Movers to the NC configuration (with a SoftDrive object for each mover)
- Context (task) of all XPU objects and SoftDrive objects are set.



# XTS Configuration Process...

# BECKHOFF

- Complete the configuration

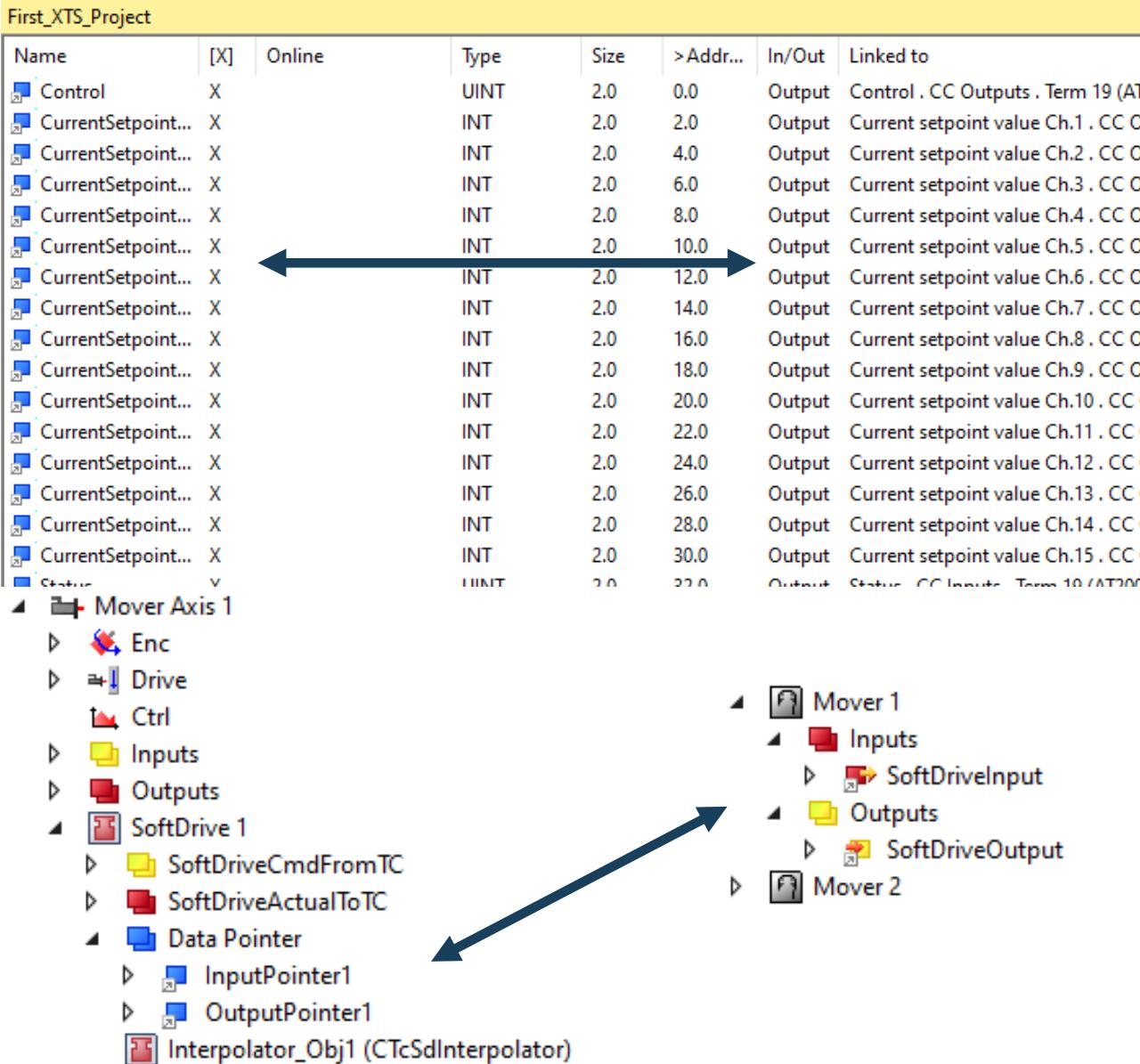


# XTS Configuration Process...

BECKHOFF

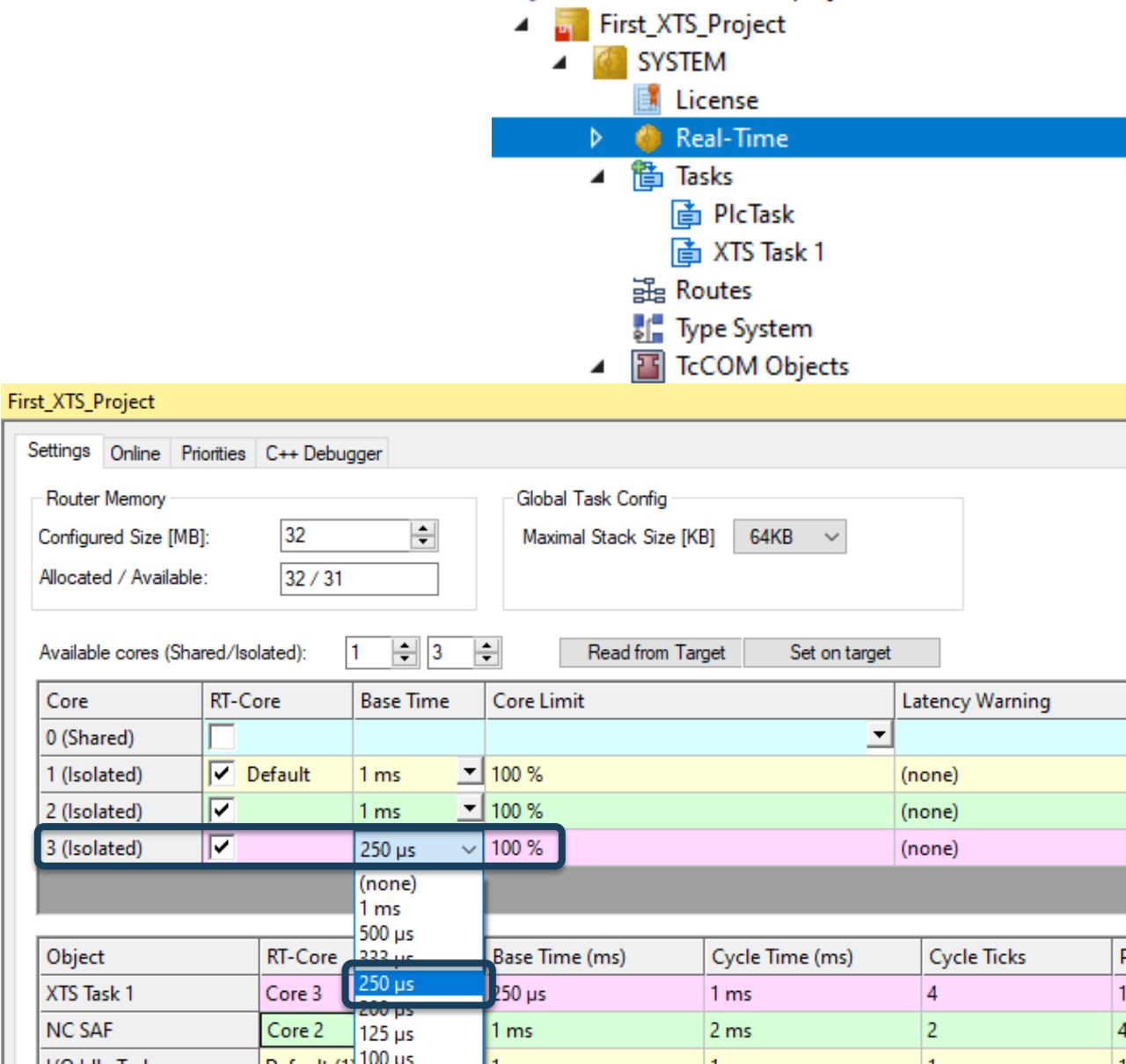
- Communication between the Modules:
  - via Data Pointers
  - No mapping object
  - No copy process

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



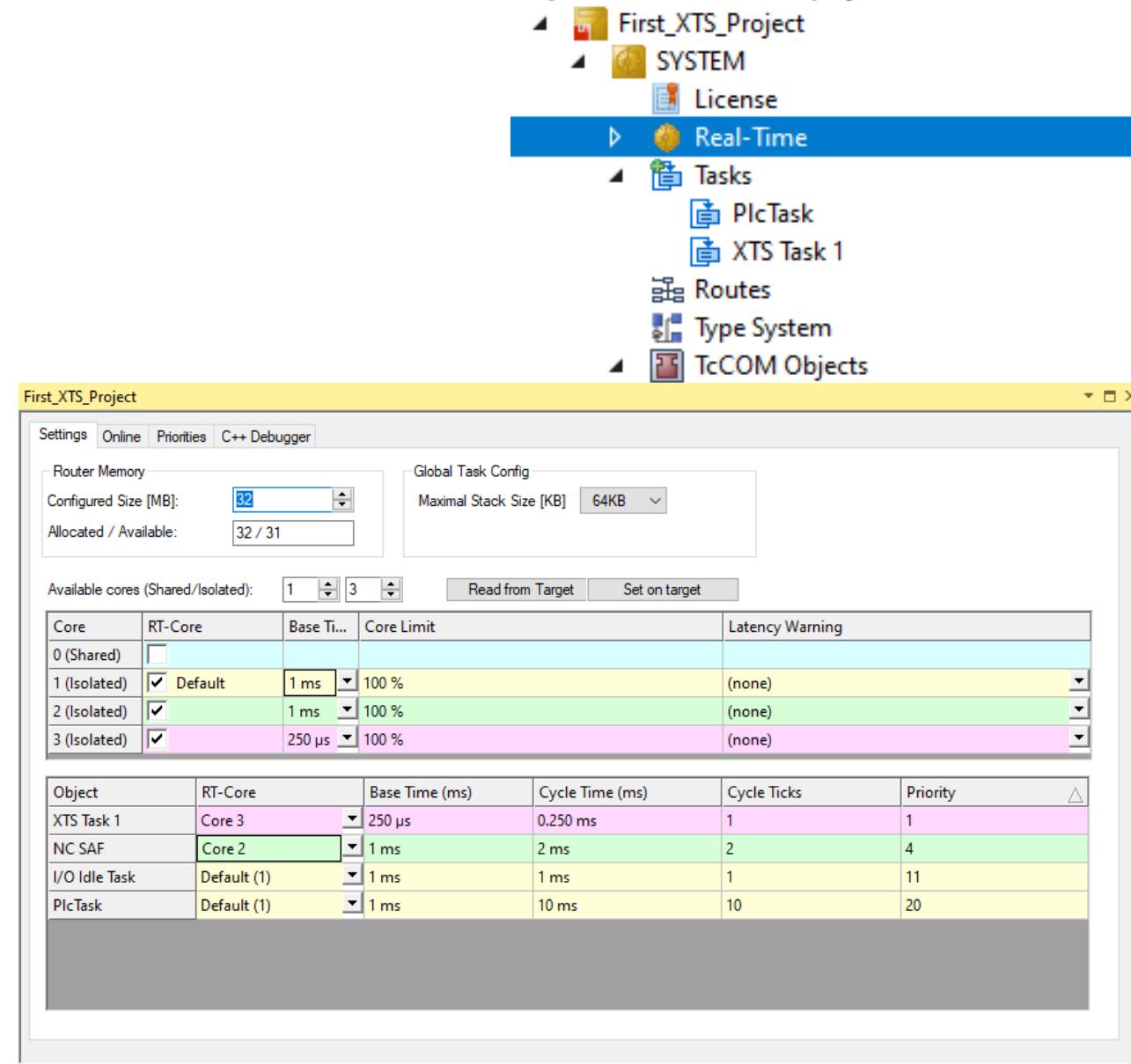
- Manual settings Real-Time

- Change base time to 250 µs.
- Change XTS task settings.



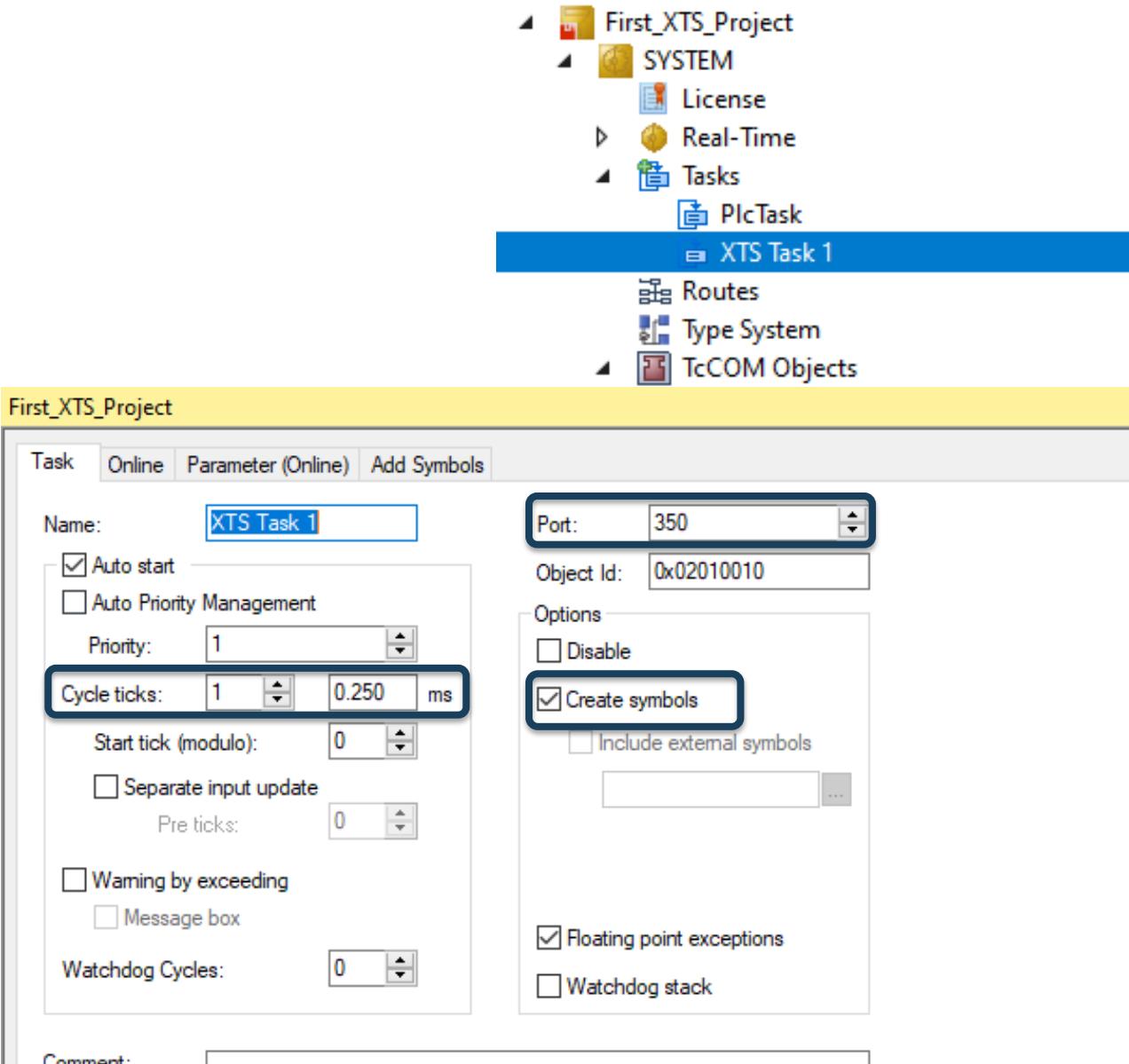
- Suggested settings Real-Time  
(small XTS-Systems)

- It is suggested to use one core just for the fast 250 µs XTS task (100% isolated).
- use 1 core just for windows and three cores as isolated real time cores



- Manual settings XTS Task

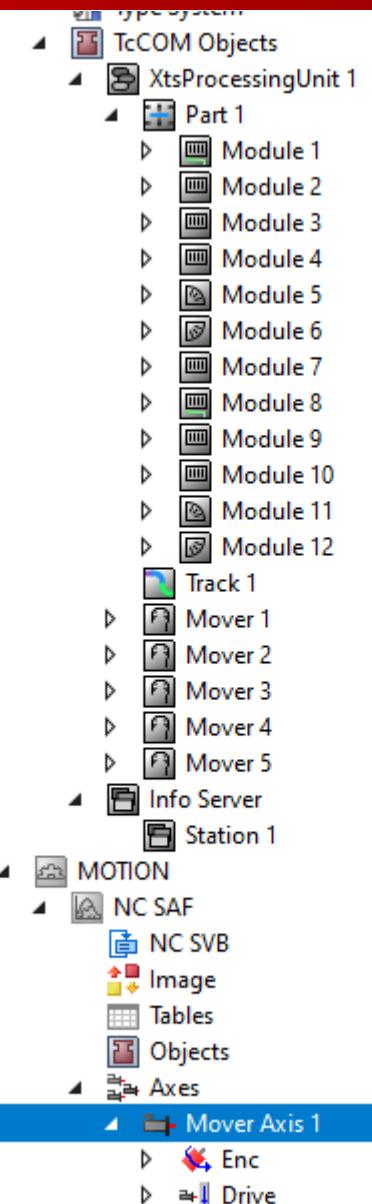
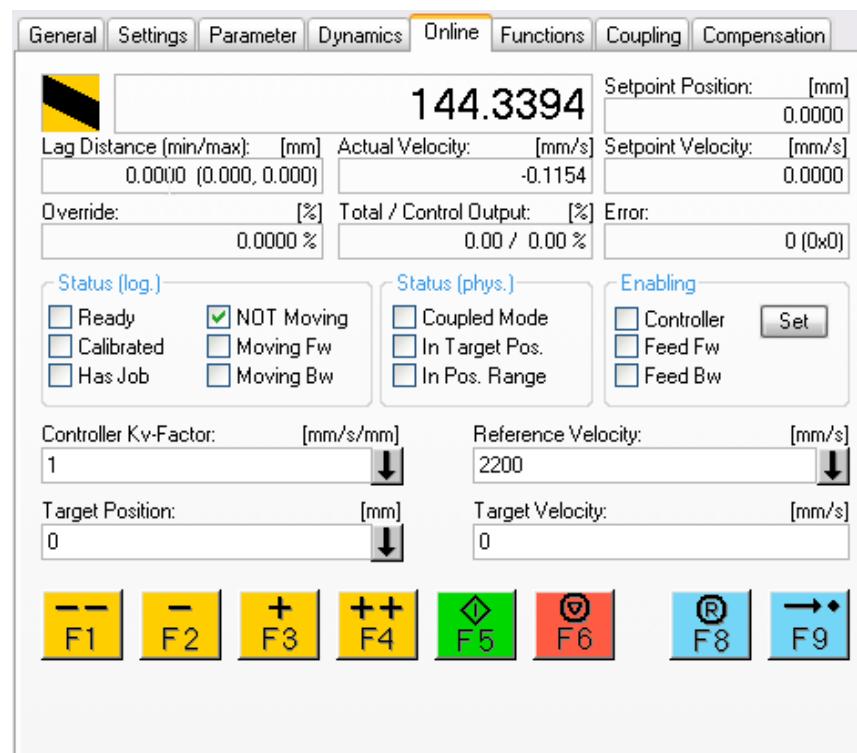
- Change Cycle time to 250 µs
- Port must be greater or equal to 350
- ‘Create symbols’ is useful to simplify measurements with TC3 Scope



# XTS Configuration Process...

BECKHOFF

- First activation...



- First activation...

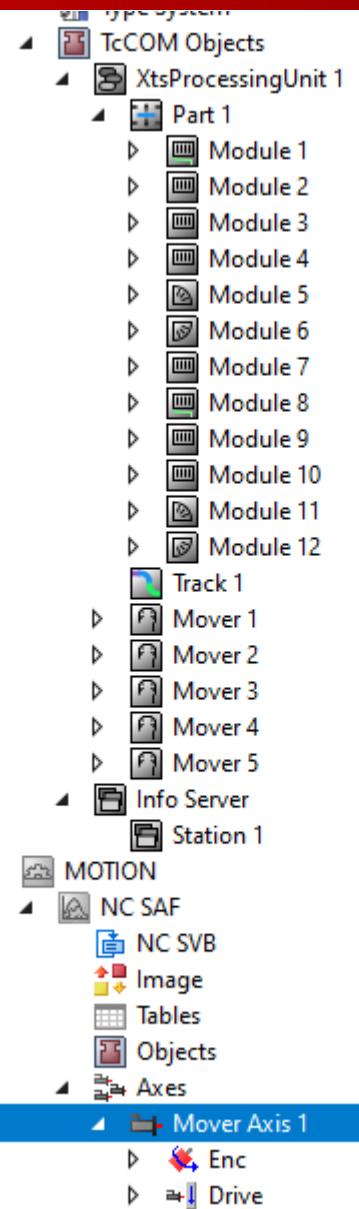
- Output Window

Output

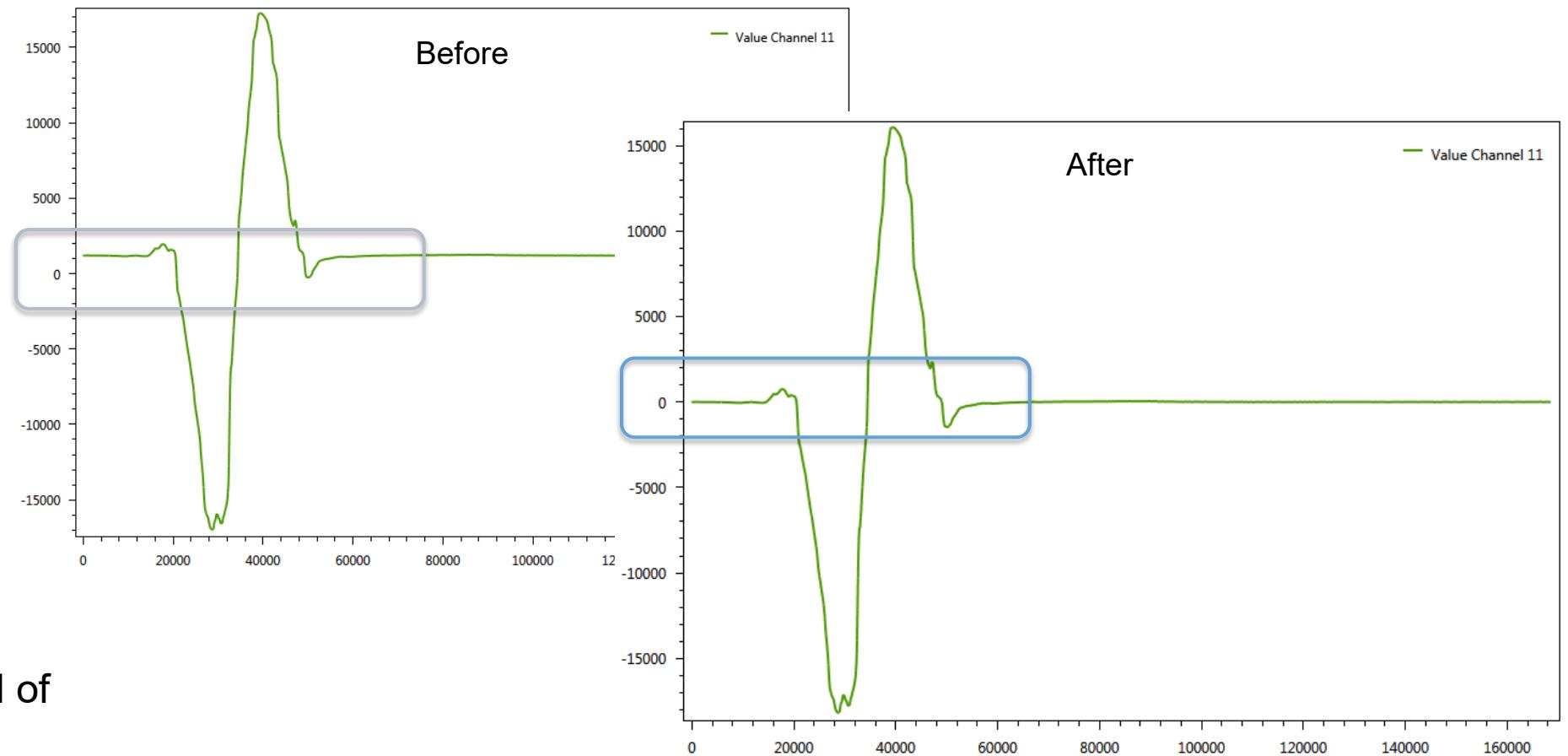
Show output from: TwinCAT

```
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.
```

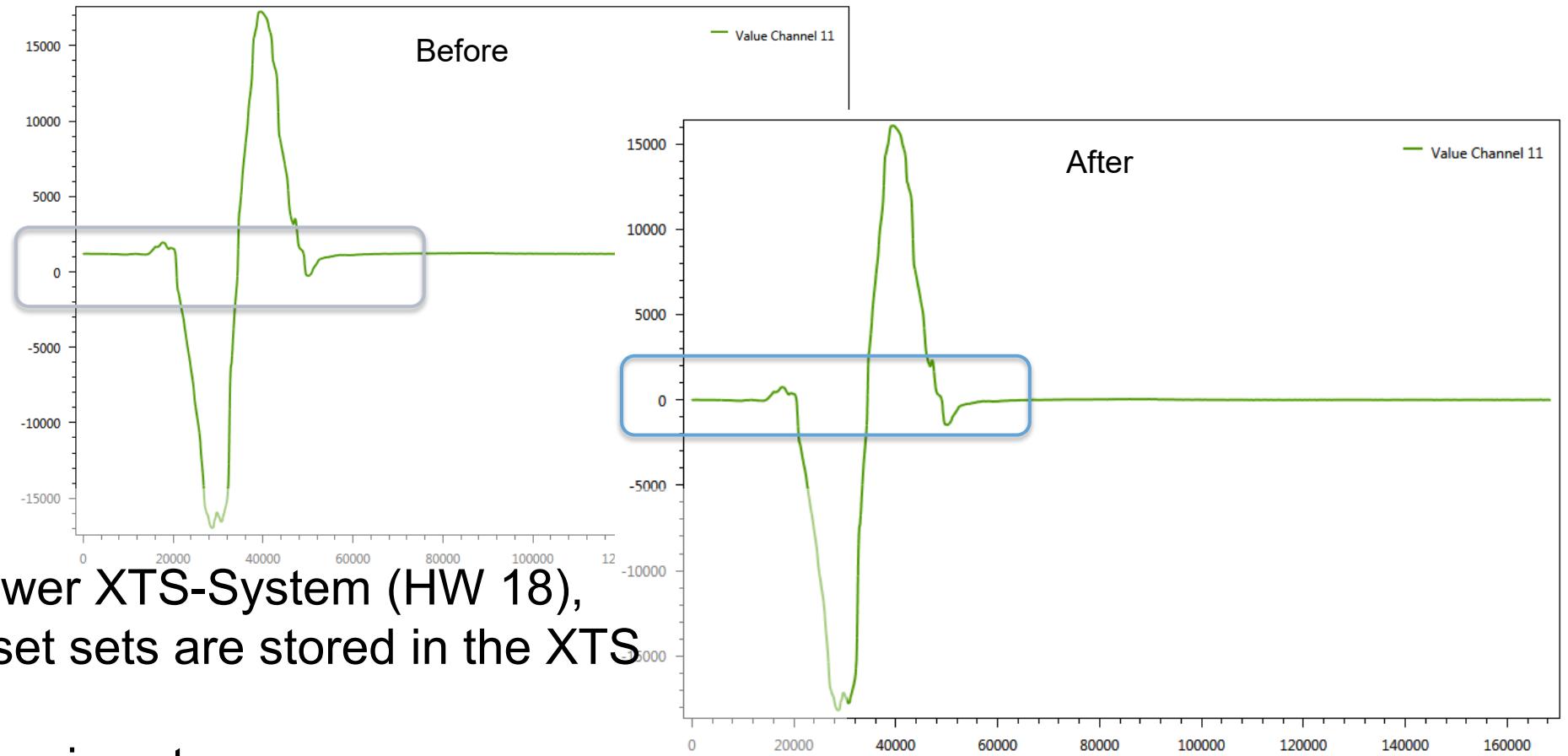
Error List Output



- Teaching Process



- 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

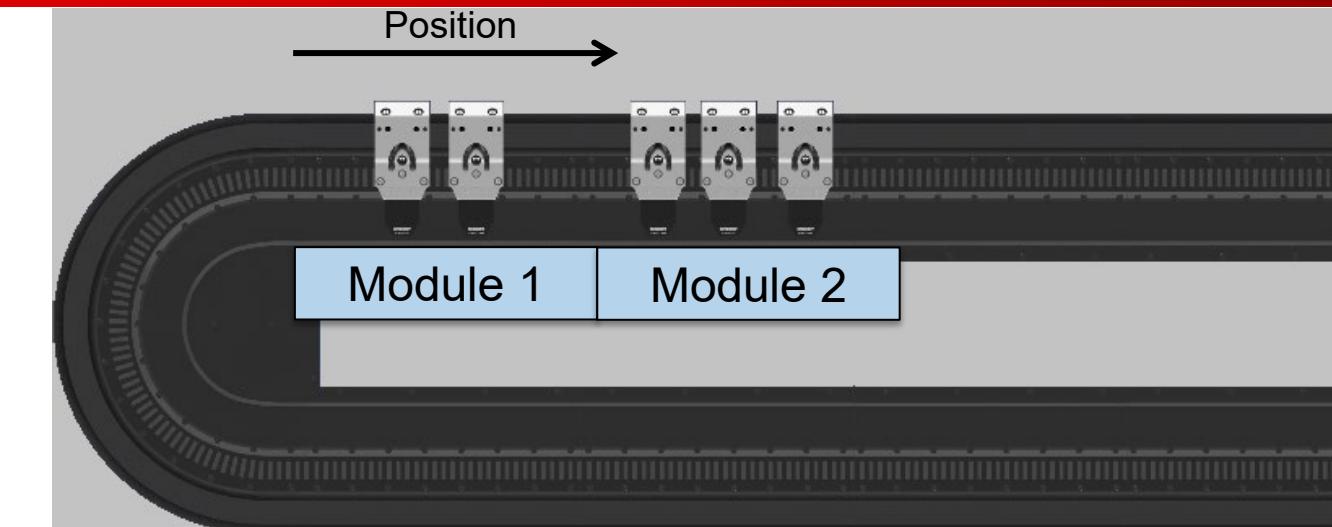
Changes to the ‘TeachingFileName’ are not recognized until after an ‘Activate Configuration’ is performed.

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

The screenshot shows the Beckhoff XTS configuration software interface. At the top, there is a navigation bar with tabs: Object, Context, Parameter (Init), Parameter (Online), Interfaces, Event Classes, and XPU. The 'Parameter (Init)' tab is selected. Below the navigation bar is a tree view of the project structure under 'First\_XTS\_Project'. The tree includes 'Type System', 'TcCOM Objects', 'XtsProcessingUnit 1' (selected), 'Part 1', 'Track 1', 'Mover 1', and 'Mover 2'. The main area is a table titled 'First\_XTS\_Project' with columns: Name, Value, CS, Unit, Type, and PT... . The table contains several parameters under the 'Teaching' category, including 'TeachingFileName' (set to '202102001'), 'StartStandStillTeaching', 'StartMovementTeaching', 'StopMovementTeaching', 'IsAbortOnTeachingWarningsEnabled' (set to 'TRUE'), 'IsTeachingCheckSumCheckEnabled' (set to 'FALSE'), 'TeachingCheckSum' (containing binary data [0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00]), and 'TeachingWarningLevel' (set to 'Level\_3'). At the bottom of the table are buttons for 'Show Online Values', 'Show Hidden Parameter', 'Expand All', and 'Collapse All'.

- Teaching Process | next Step

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



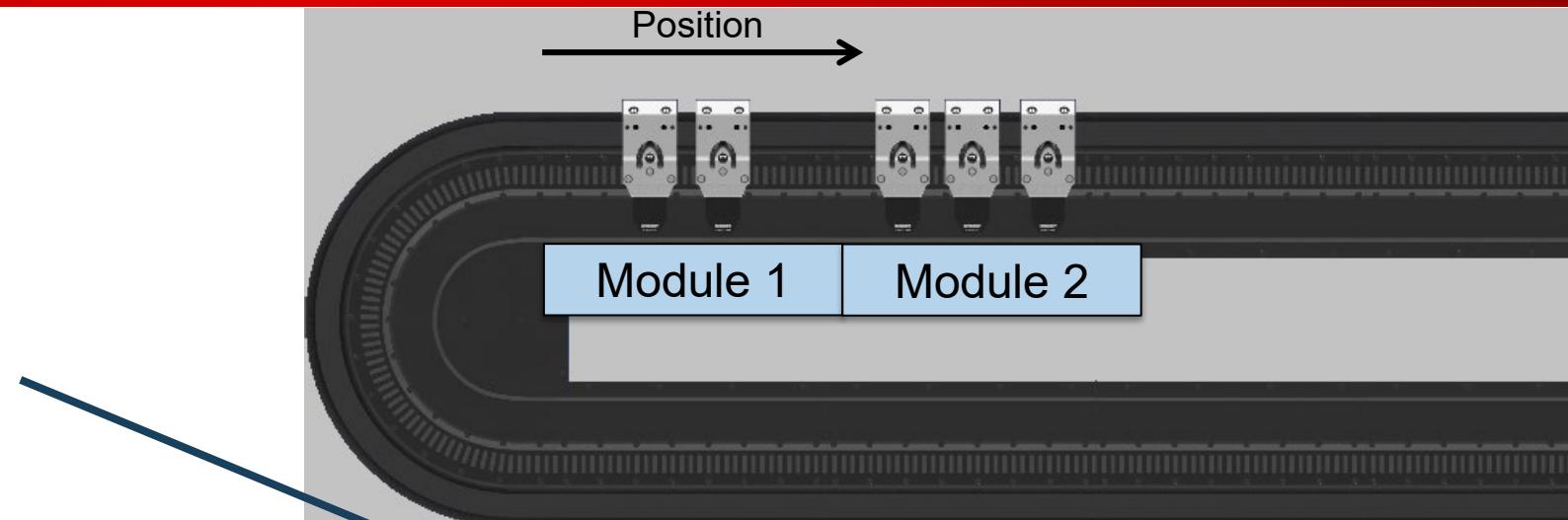
- Info

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

Teaching	
TeachingFileName	202102001
- StartStandStillTeaching	...
.teachingSelection	ExcludeSpecifiedItems
.selectionString	1-2
+ StartMovementTeaching	...
StopMovementTeaching	
IsAbortOnTeachingWarningsEnabled	TRUE
IsTeachingCheckSumCheckEnabled	FALSE
+ TeachingCheckSum	[0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00]
TeachingWarningLevel	Level_3

- Teaching Process | next Step

## 3. StartStandStillTeaching

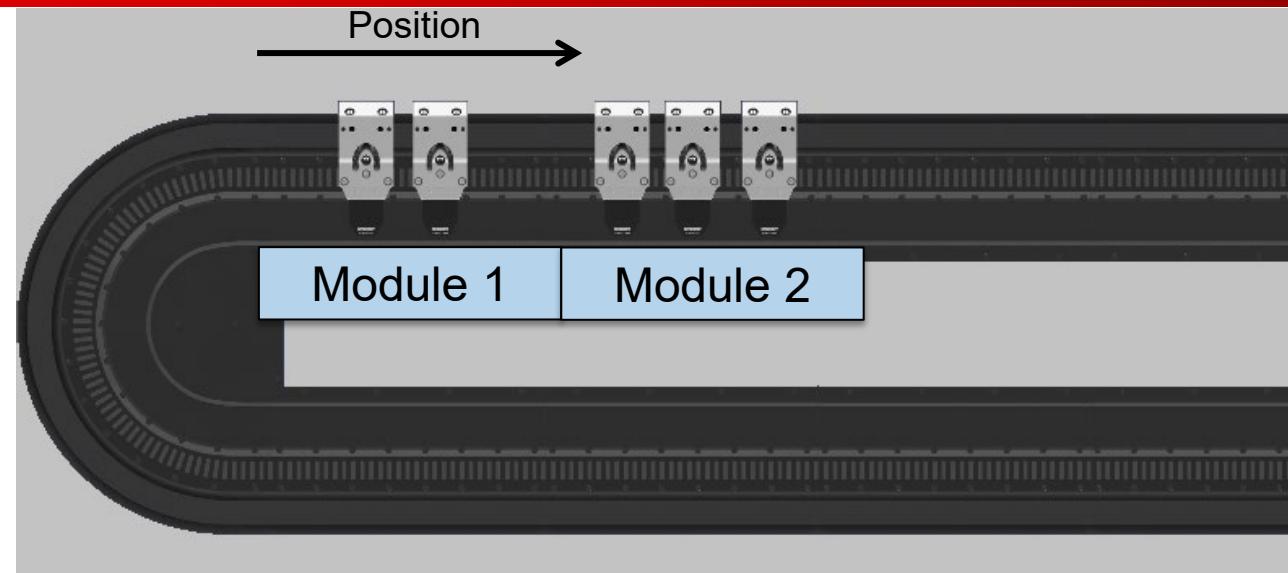


Teaching		
	TeachingFileNameNumber	202102001
-	StartStandStillTeaching	<span style="color: blue;">...</span>
	.teachingSelection	Exclud
	.selectionString	1-2
+	StartMovementTeaching	<span style="color: blue;">...</span>
	StopMovementTeaching	
	IsAbortOnTeachingWarningsEnabled	TRUE
	IsTeachingCheckSumCheckEnabled	FALSE
+.	TeachingCheckSum	[0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00]
	TeachingWarningLevel	Level_3

Download  
Upload  
Copy To...

- Teaching Process

- Teaching Stops automatically



## Output

```
Show output from: TwinCAT |  |  |  |  | 
```

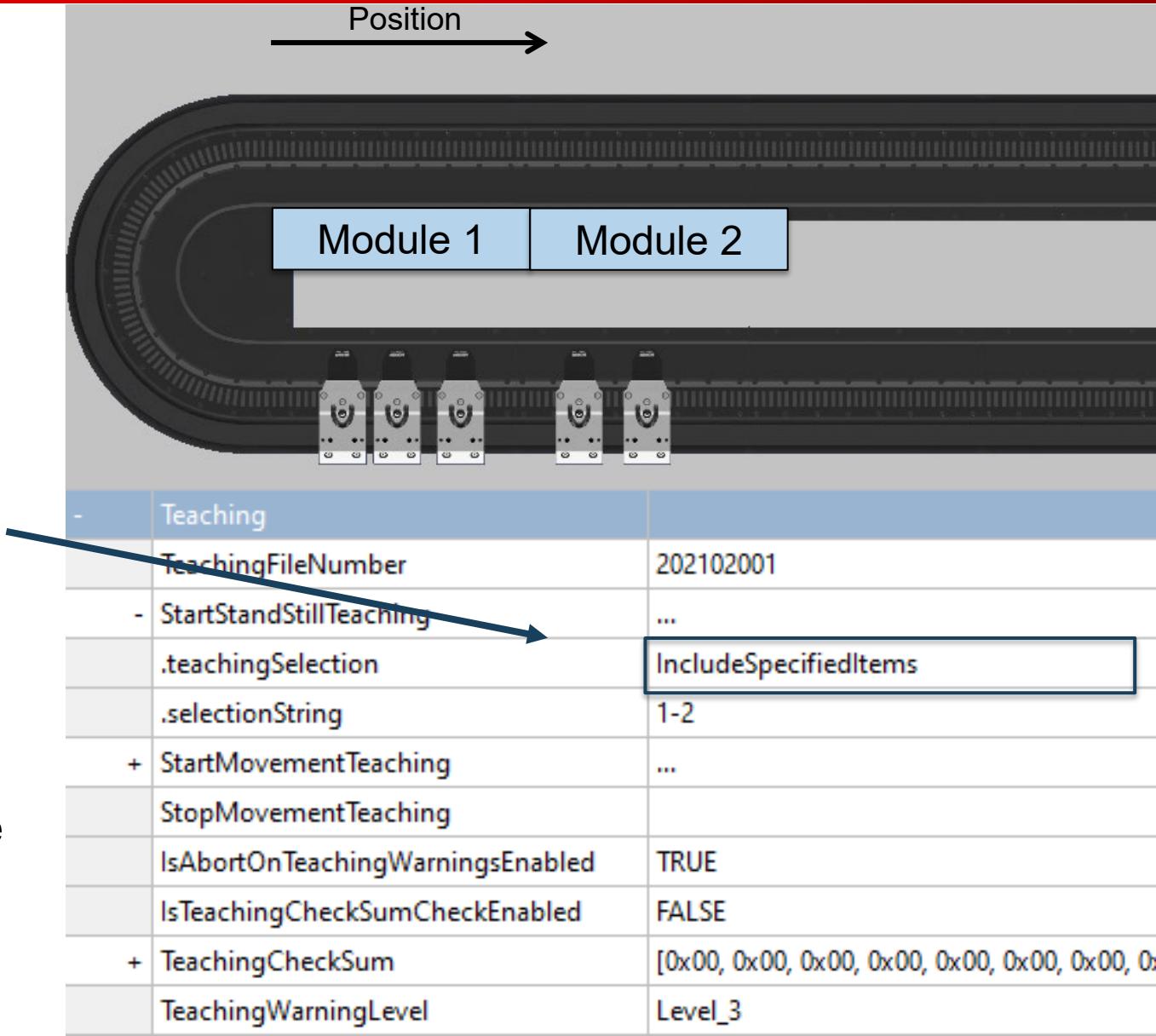
| XtsProcessingUnit 1 (0x01010010): Teaching is started on 10 modules.  
| XtsProcessingUnit 1 (0x01010010): Teaching is stopped on 10 modules.  
| XtsProcessingUnit 1 (0x01010010): Teaching data plausibility check is passed successfully.

- Teaching Process | next Step

5. Move the Mover to a different defined Position
6. Change “.teachingSelection”

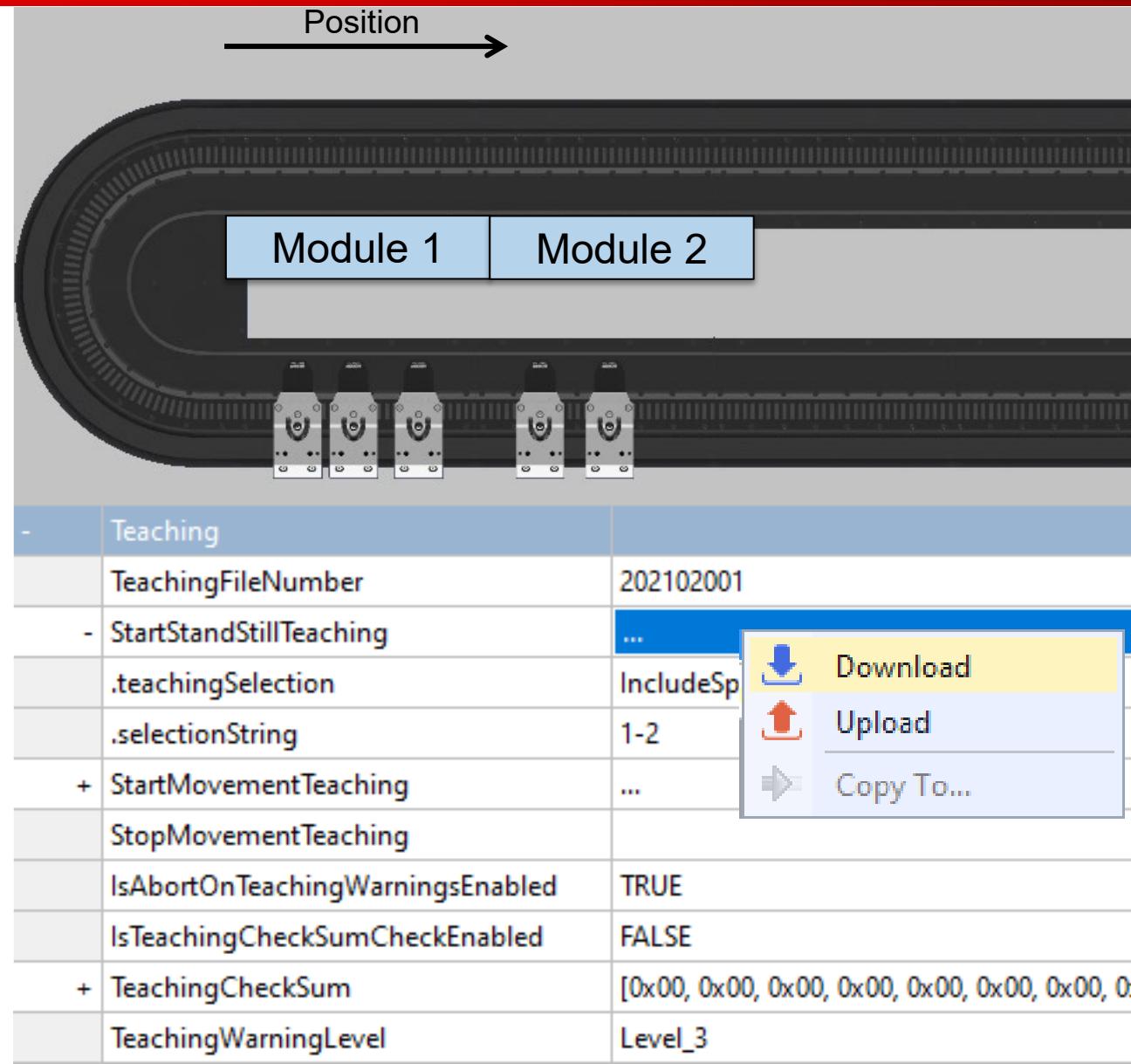
- **Warning**

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



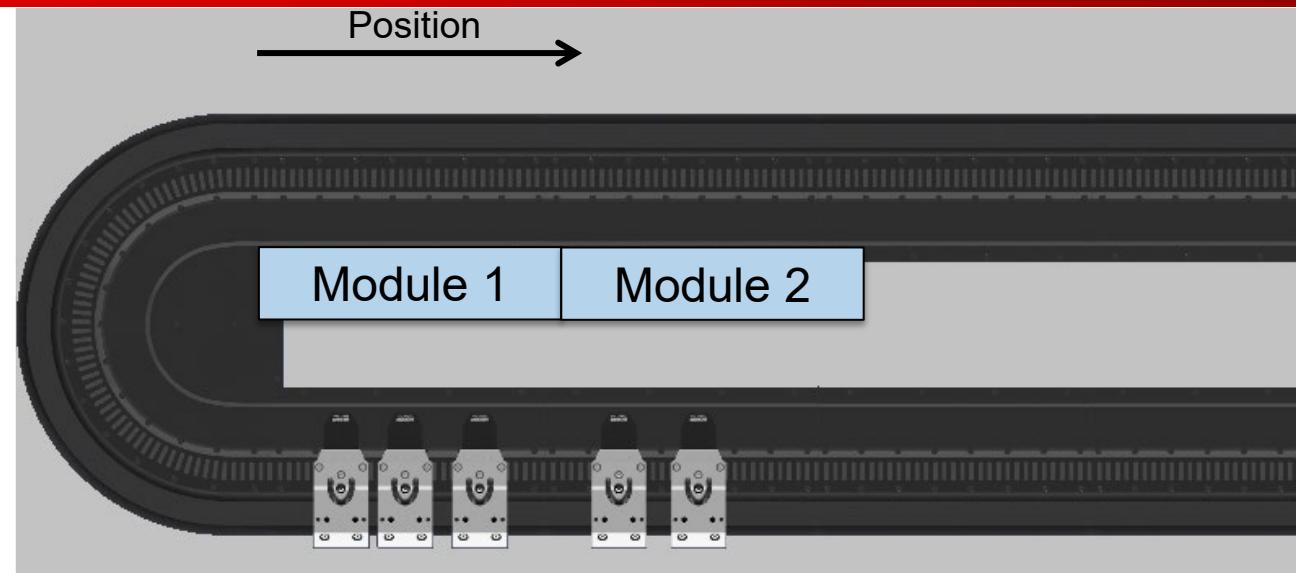
- Teaching Process | next Step

## 7. StartStandStillTeaching



- 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.
```

Output List

- Teaching Process



- Set TwinCAT in Config Mode

Name	Date modified	Type	Size
TcloXts.A3CD1B10DC0A.bootdata	9/12/2019 11:59 AM	BOOTDATA File	135 KB
TcloXts.AFAE087DBF89.bootdata	9/12/2019 11:59 AM	BOOTDATA File	164 KB
TcloXts.C651730AF406.bootdata	9/12/2019 11:59 AM	BOOTDATA File	164 KB
TcloXts.2V4K9I7S3FL2.bootdata	12/17/2020 2:20 PM	BOOTDATA File	99 KB
TcloXts.2X3Y3P08Q6E4.bootdata	12/17/2020 2:20 PM	BOOTDATA File	97 KB
TcloXts.3F7E6515353E.bootdata	12/17/2020 2:20 PM	BOOTDATA File	110 KB
TcloXts.6B7B5CB523B6.bootdata	12/17/2020 2:20 PM	BOOTDATA File	93 KB
TcloXts.7B1EB9C21232.bootdata	12/17/2020 2:20 PM	BOOTDATA File	99 KB
TcloXts.49F4D228F523.bootdata	12/17/2020 2:20 PM	BOOTDATA File	136 KB
TcloXts.395324E19C62.bootdata	12/17/2020 2:20 PM	BOOTDATA File	143 KB
TcloXts.99158292150F.bootdata	12/17/2020 2:20 PM	BOOTDATA File	108 KB
TcloXts.A66B5237F36C.bootdata	12/17/2020 2:20 PM	BOOTDATA File	105 KB
TcloXts.B0D0D28B259A.bootdata	12/17/2020 2:20 PM	BOOTDATA File	130 KB
TcloXts.B098B31198B5.bootdata	12/17/2020 2:20 PM	BOOTDATA File	103 KB
TcloXts.D162E74EC647.bootdata	12/17/2020 2:20 PM	BOOTDATA File	97 KB
TcloXts.DD5A57E33B16.bootdata	12/17/2020 2:20 PM	BOOTDATA File	126 KB
TcloXts.H411R3FBD475.bootdata	12/17/2020 2:20 PM	BOOTDATA File	119 KB
TcloXts.HYGH411R3F00.bootdata	12/17/2020 2:20 PM	BOOTDATA File	174 KB
TcloXts.HYGH411R3F01.bootdata	12/17/2020 2:20 PM	BOOTDATA File	168 KB
TcloXts.HYGH411R3F02.bootdata	12/17/2020 2:20 PM	BOOTDATA File	106 KB
TcloXts.TeachingData.202102001.bootdata	3/1/2021 1:27 PM	BOOTDATA File	2 KB

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

## ■ Teaching Process



- Set TwinCAT in Run-Mode

Output

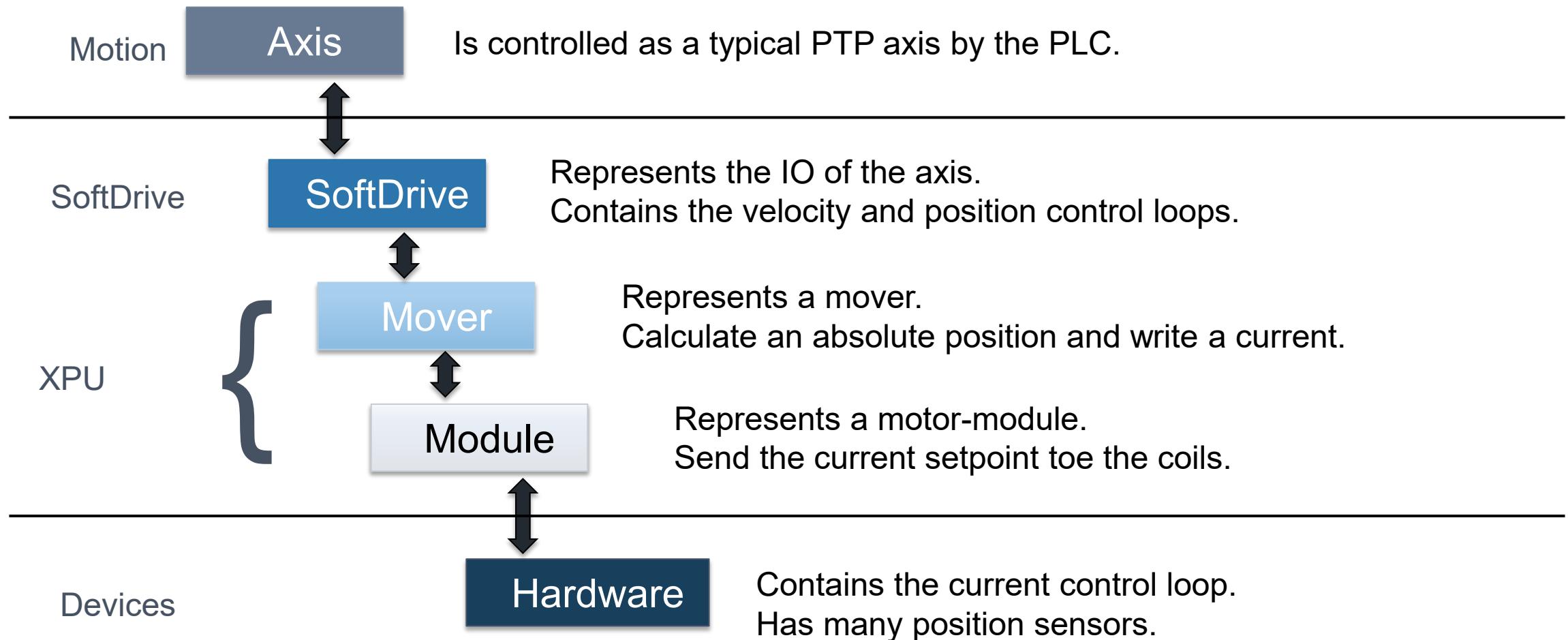
Show output from: TwinCAT | | | |

```
| 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. 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.
```

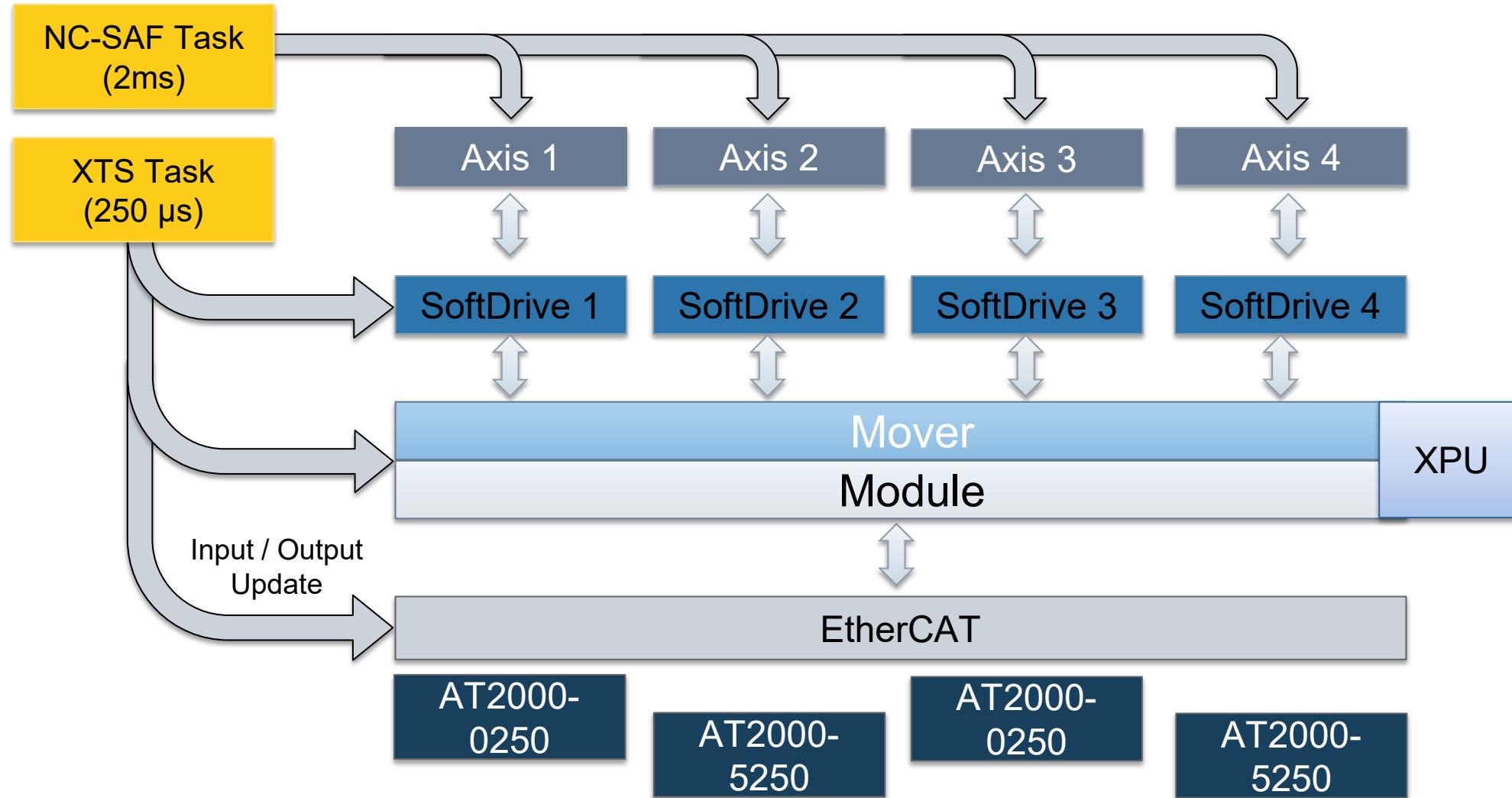
- 1. XPU Introduction
- 2. XTS Configuration Process
- 3. XPU – Deep Dive**
- 4. XTS Viewer
- 5. Mover 1
- 6. Simulation Mode



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

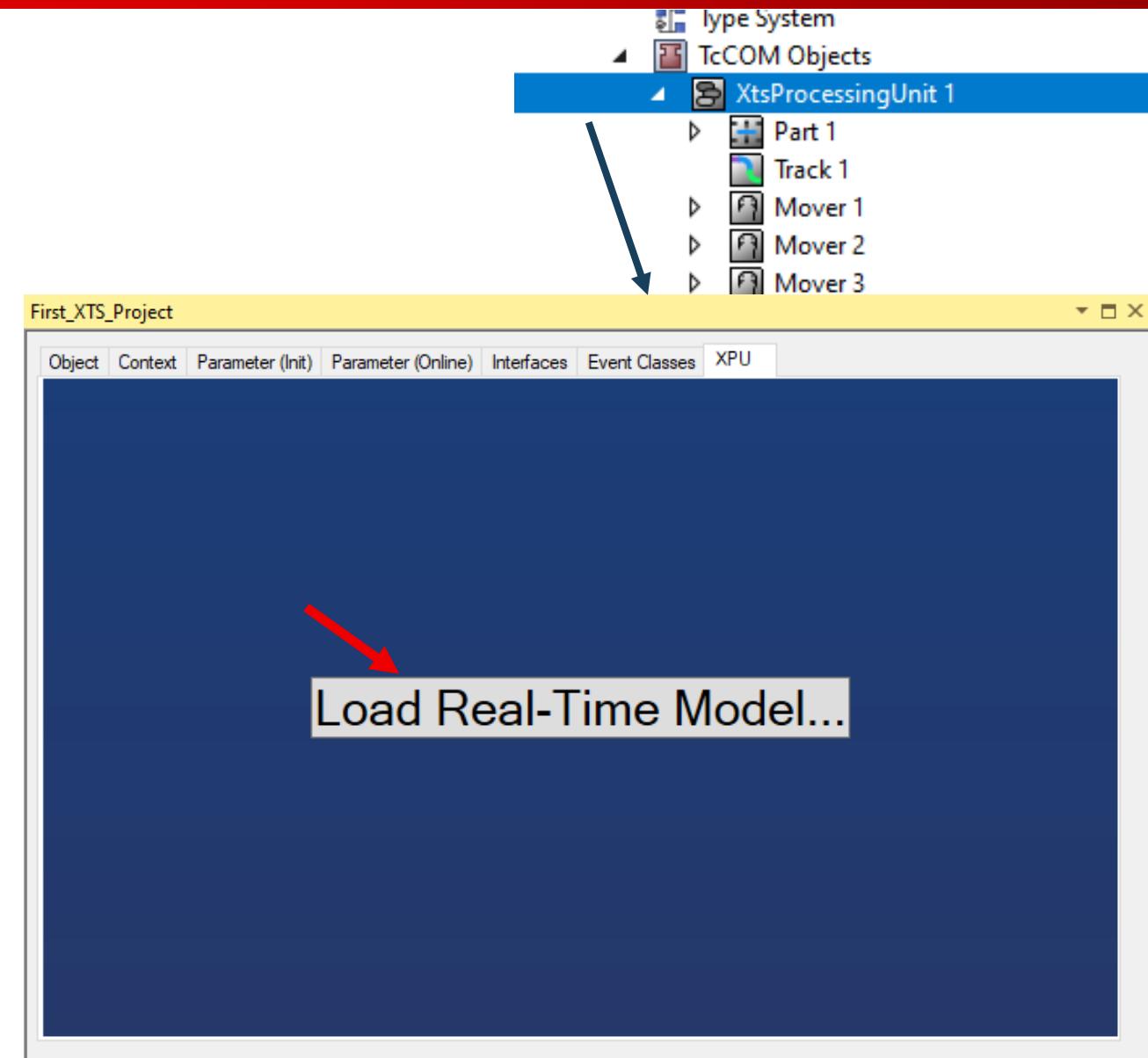


- Cycle Update of SoftDrive & Axis



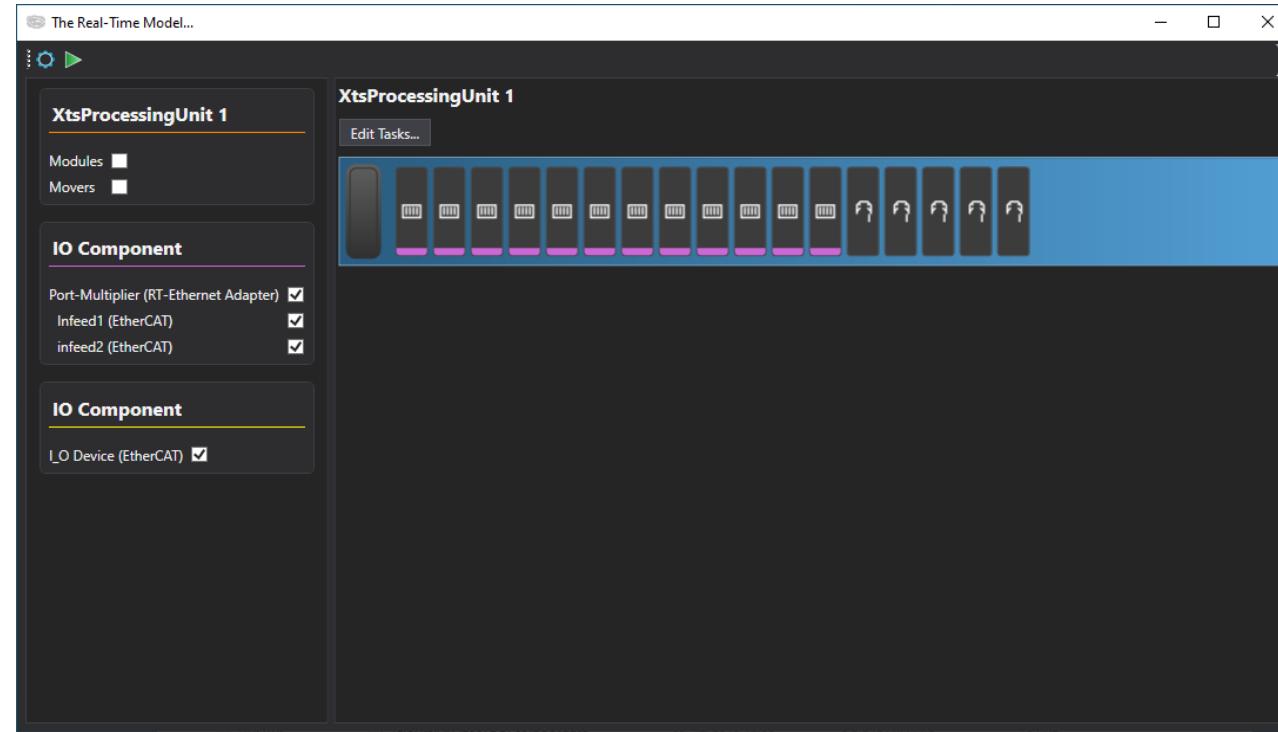
- Real-Time Model

- click on Load Real-Time Model...



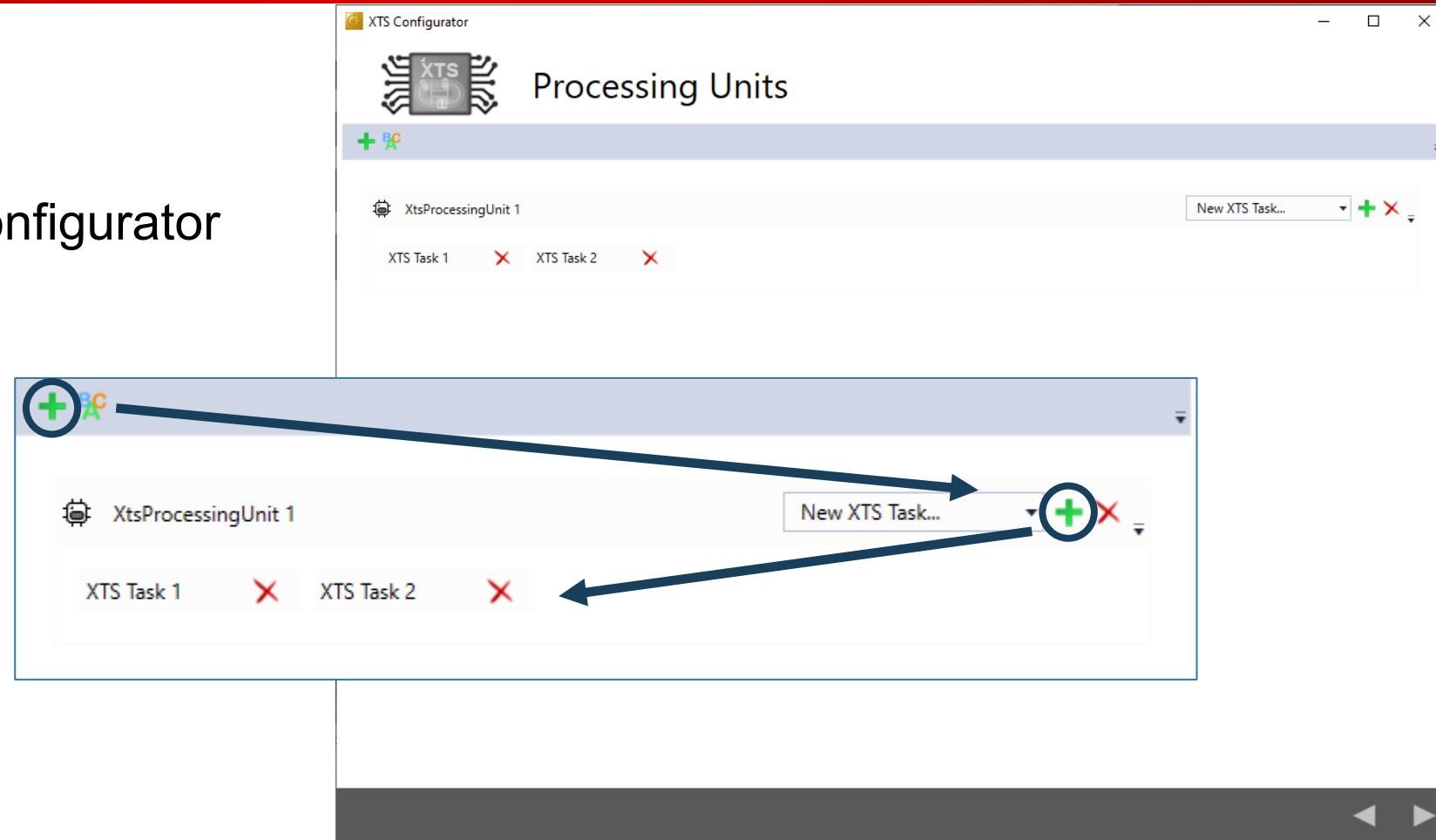
- Real-Time Model

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



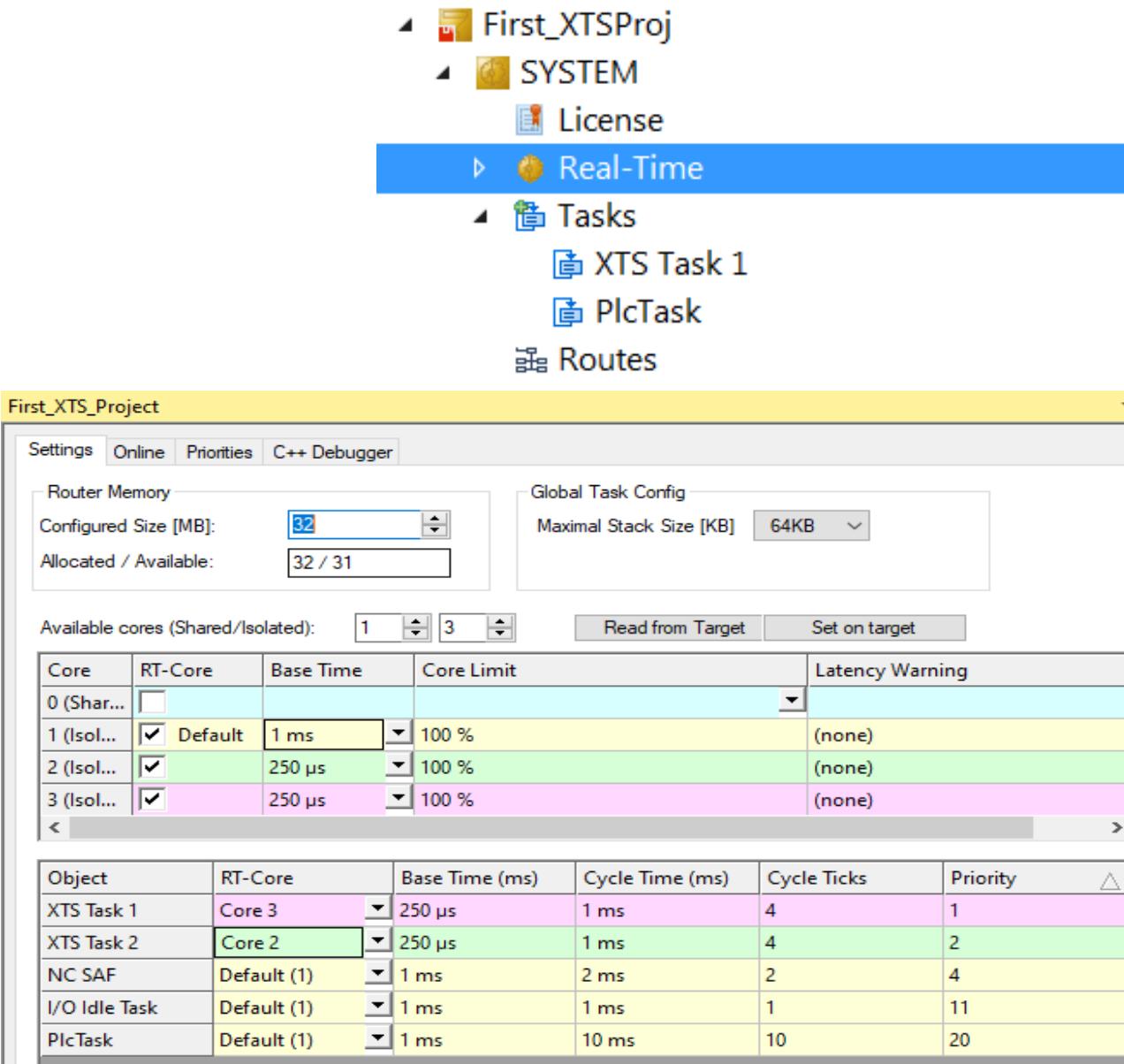
- Real-Time Model

- Create XTS Task 2 via Configurator



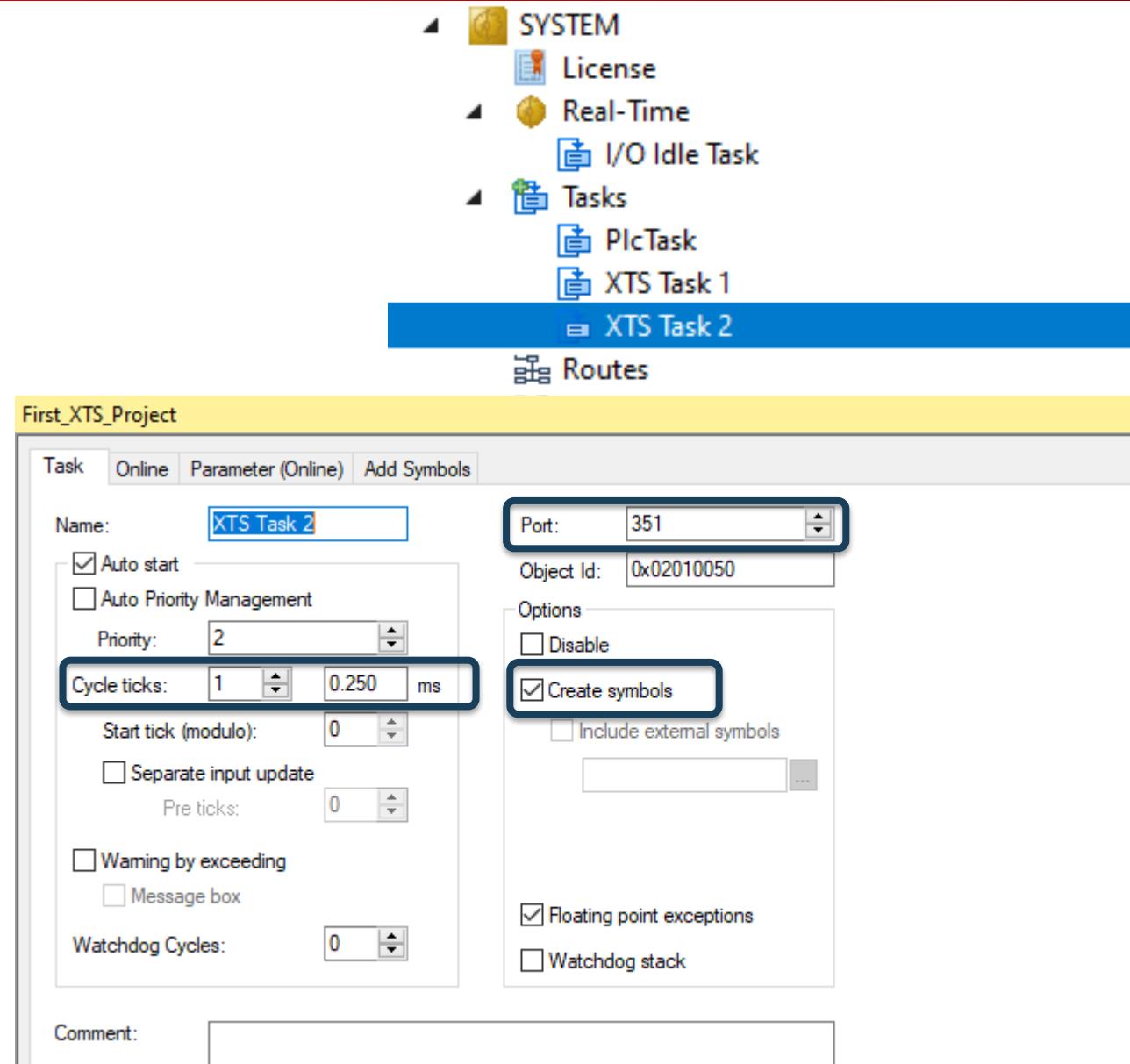
- Real-Time Model

- Setup Real-Time



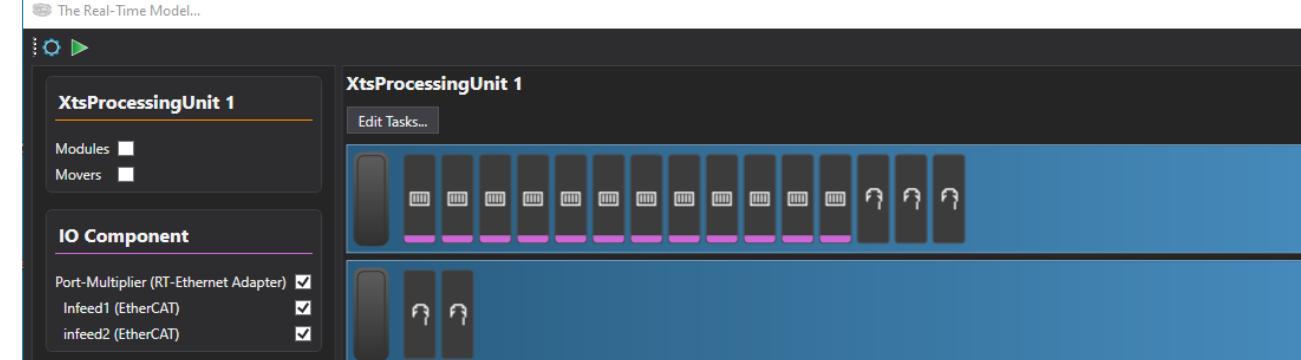
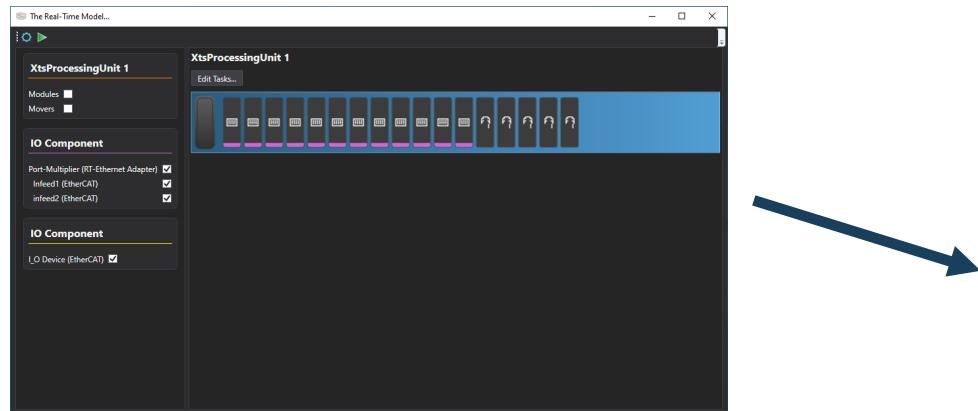
- Real-Time Model

- Setup XTS Task 2



- Real-Time Model

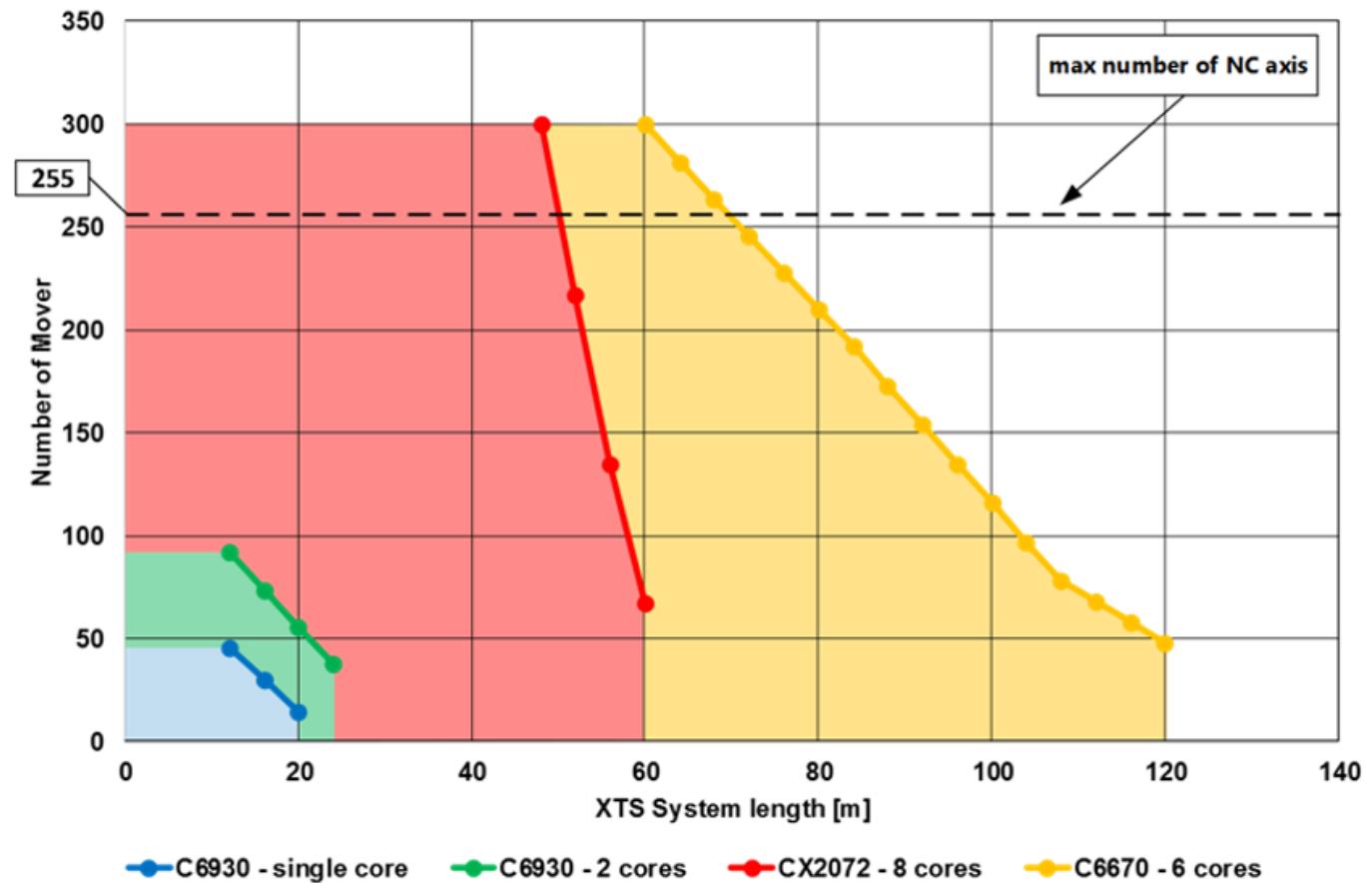
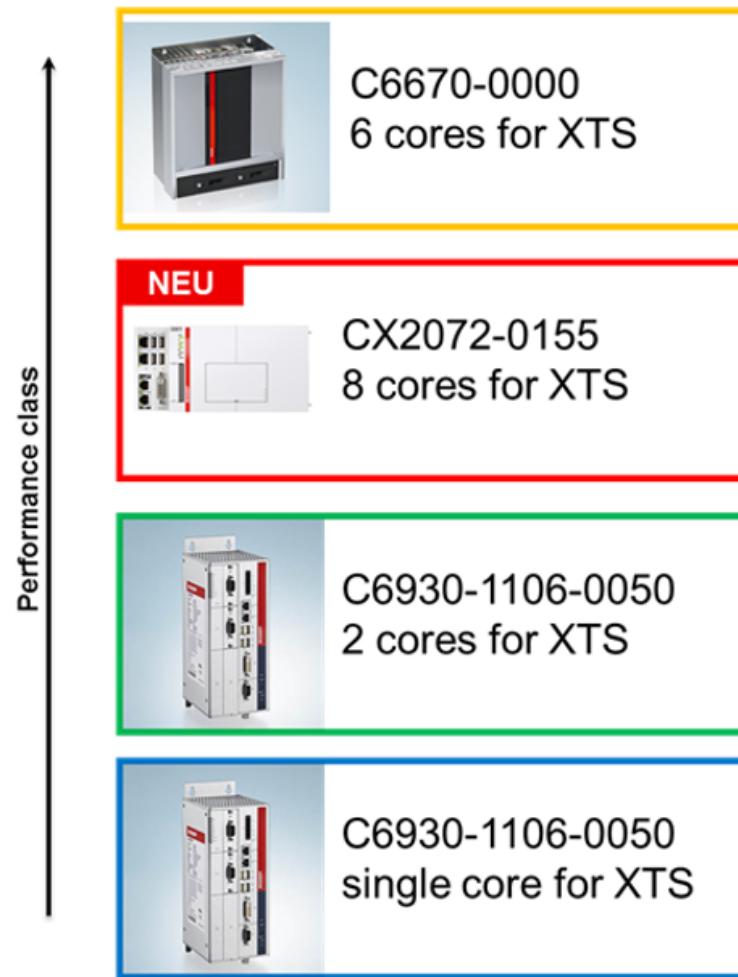
- new setup



- Info

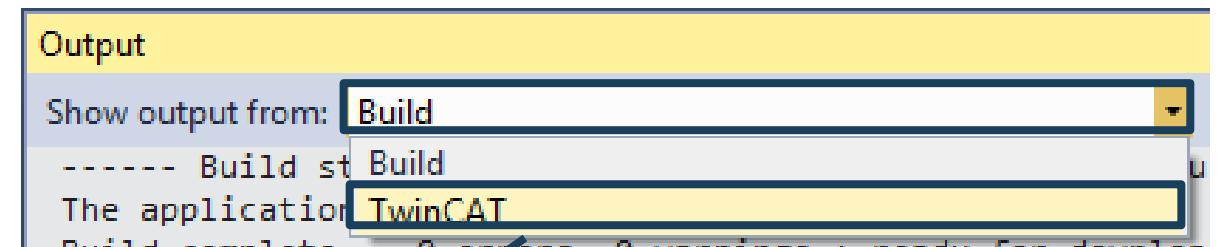
This setup should not be used in a real machine. It is only an example.

- Real-Time Model



## ■ Diagnosis

- output Window from Visual Studio



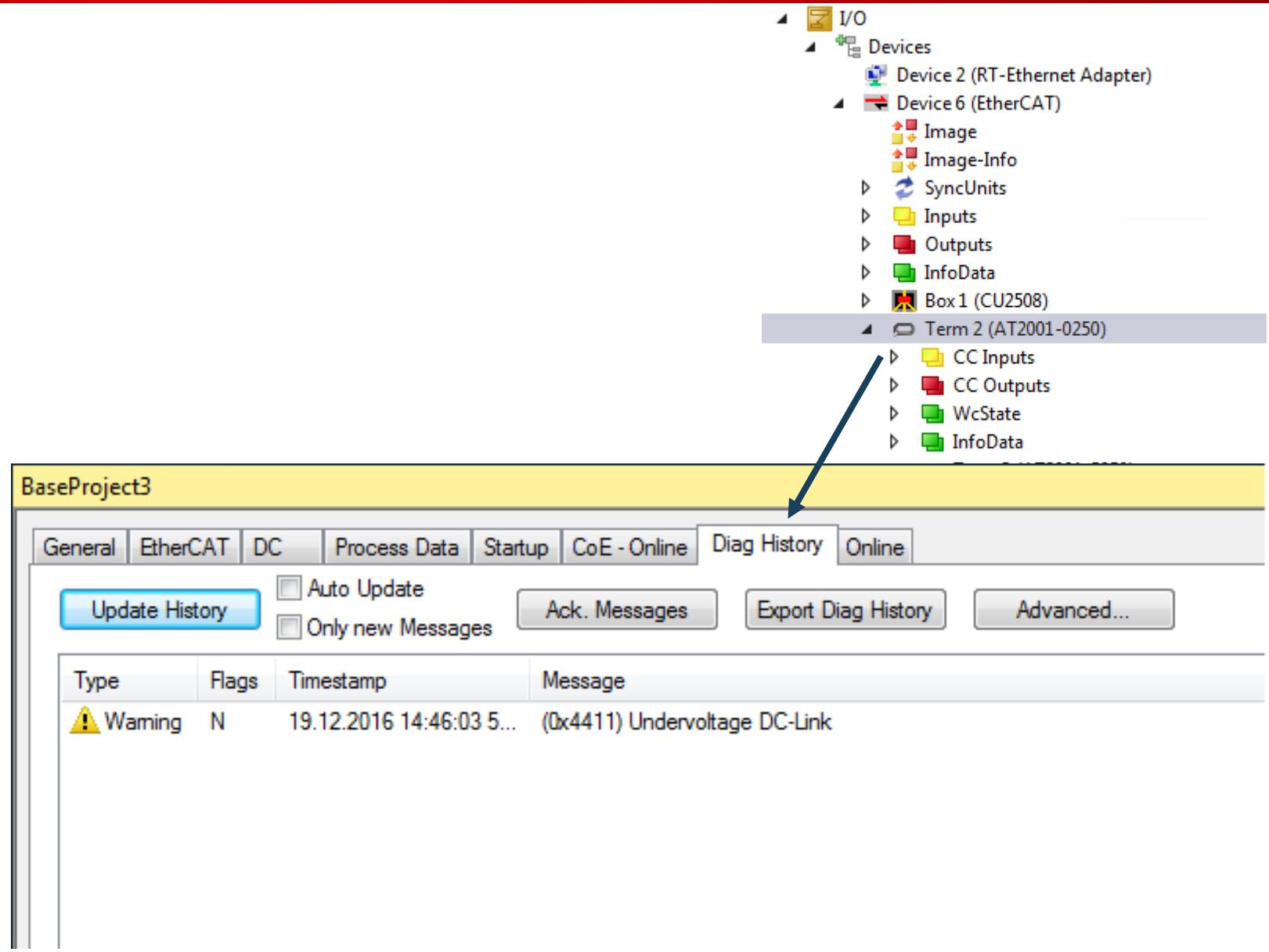
A screenshot of the Visual Studio Output window with the title 'Output'. The 'Show output from:' dropdown is set to 'TwinCAT'. The window displays the following log messages:

```
MSG | 02/23/2021 13:56:43 160 ms | XtsProcessingUnit 1 (0x01010010): Version 3.20.711.0 Build date: Dec 17 2020 Build time: 14:22:27
MSG | 02/23/2021 13:56:43 160 ms | XtsProcessingUnit 1 (0x01010010): 12 XTS module(s) are loaded.
MSG | 02/23/2021 13:56:43 160 ms | XtsProcessingUnit 1 (0x01010010): 5 XTS mover(s) are loaded.
MSG | 02/23/2021 13:56:43 160 ms | XtsProcessingUnit 1 (0x01010010): Path length is 3000.000000 mm.
WRN | 02/23/2021 13:56:43 502 ms | XtsProcessingUnit 1 (0x01010010): Teaching data TcIoXts.TeachingData.0 is missing.
MSG | 02/23/2021 13:56:43 668 ms | XtsProcessingUnit 1 (0x01010010): Is registered by all tasks as IO driver.
MSG | 02/23/2021 13:56:43 668 ms | XtsProcessingUnit 1 (0x01010010): Enable time is set.
MSG | 02/23/2021 13:56:43 673 ms | XtsProcessingUnit 1 (0x01010010): All XTS mover(s) are detected.
MSG | 02/23/2021 13:56:43 717 ms | 'TwinCAT System' (10000): COM Server TcpIpServer wird gestartet!
MSG | 02/23/2021 13:56:43 729 ms | 'TwinCAT System' (10000): COM Server TcEventLogger wird gestartet!
```

The bottom of the window shows tabs for 'Error List' and 'Output', with 'Output' currently selected.

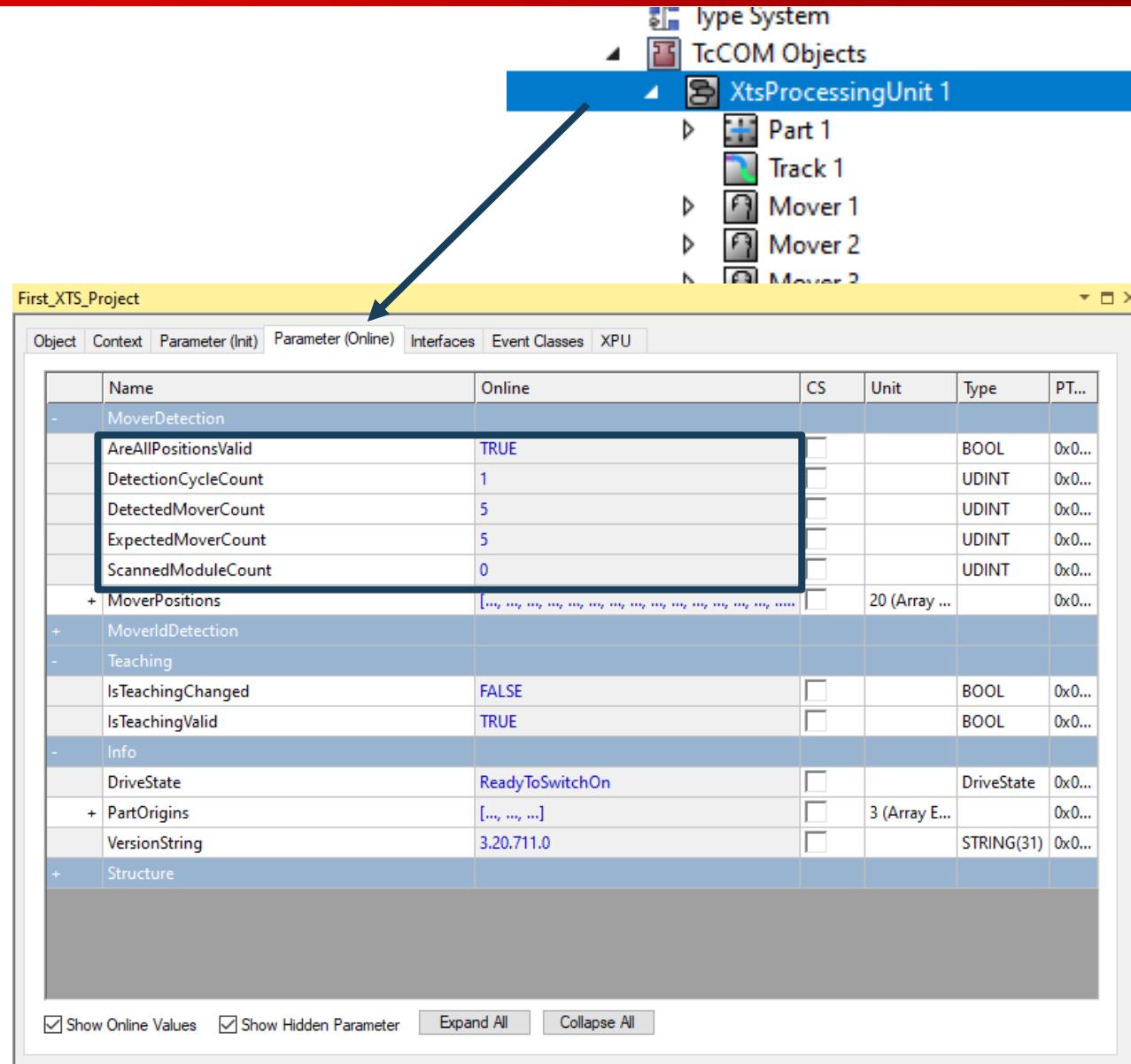
## ■ Diagnosis

### – Module Diagnostic History



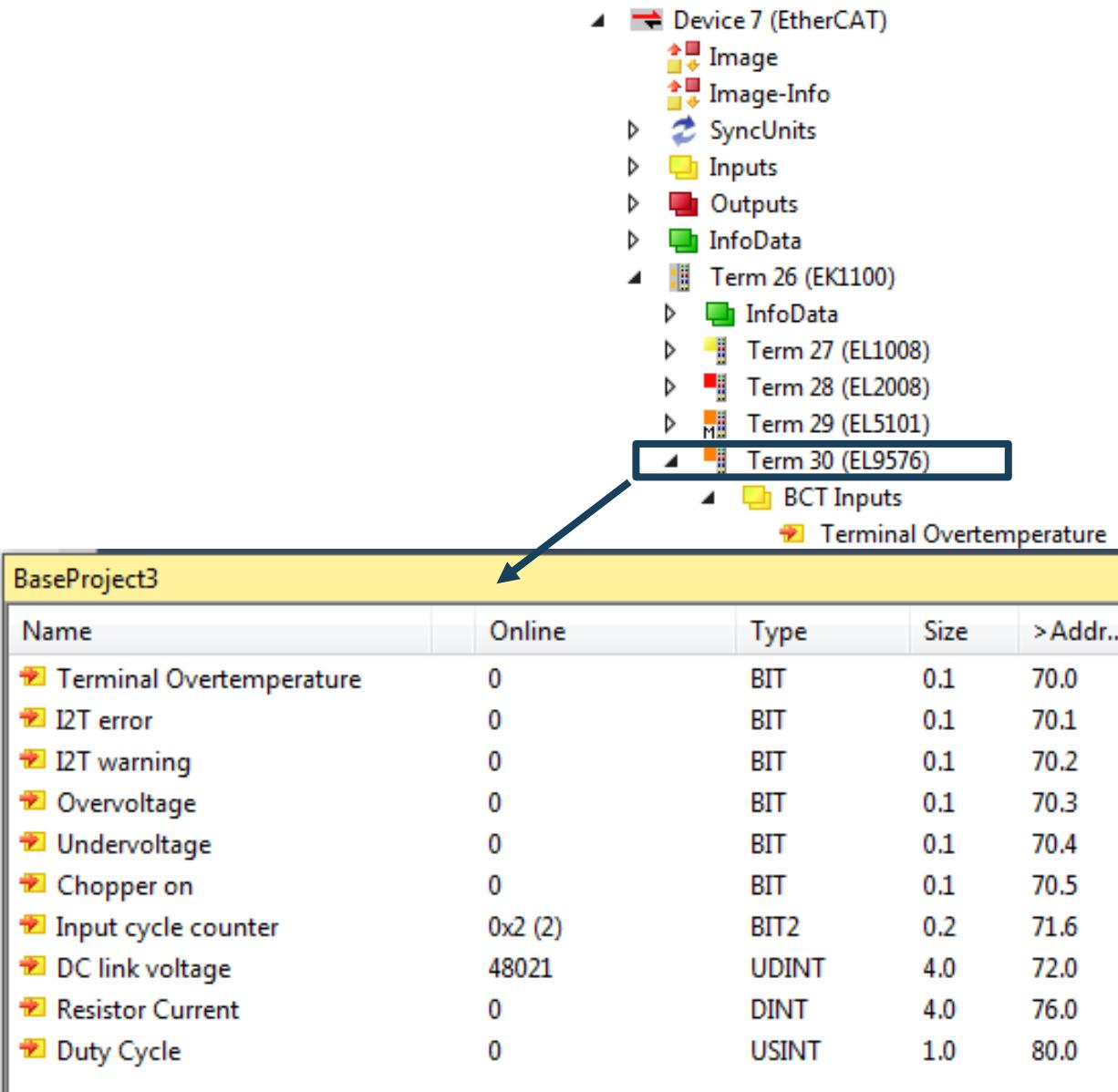
## ■ Diagnosis

### – Parameter (Online)



- Diagnosis

- Info's from EL9576  
(Break Chopper Terminal)



- 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

The screenshot shows the 'First\_XTS\_Project' window in the Beckhoff XTS software. At the top, there's a table titled 'Online' with columns for Name, Actual Pos., Setp. Pos., Lag Dist., Setp. Velo, and Error. The rows list 'Mover Axis 1' through 'Mover Axis 5', all with '0.0000' in the 'Actual Pos.' column. A red box highlights the 'Actual Pos.' column header, and a red arrow points from the 'Too many movers detected' bullet point to this highlighted area. Below the table are four buttons (F1, F2, F3, F4) and a 'Select Columns' button. The bottom part of the window contains another table with columns for Number, Axes, Link to I/O, and Link to PLC. It lists five entries: '1 (Id 1)' linked to 'Mover Axis 1' via 'SoftDrive 1'; '2 (Id 2)' linked to 'Mover Axis 2' via 'SoftDrive 2'; '3 (Id 3)' linked to 'Mover Axis 3' via 'SoftDrive 3'; '4 (Id 4)' linked to 'Mover Axis 4' via 'SoftDrive 4'; and '5 (Id 5)' linked to 'Mover Axis 5' via 'SoftDrive 5'. There are navigation arrows at the bottom of this table.

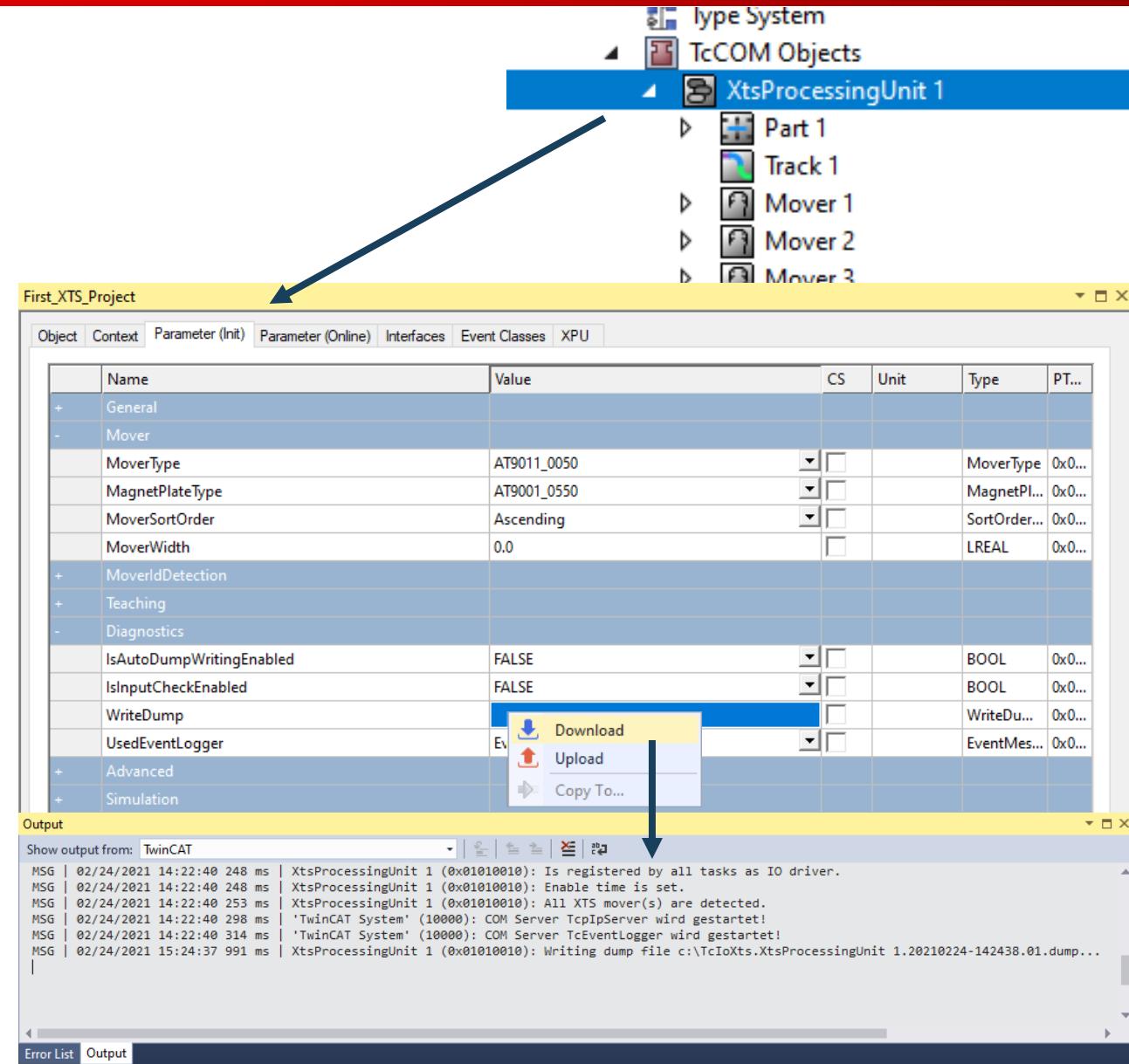
Name	Actual Pos.	Setp. Pos.	Lag Dist.	Setp. Velo	Error
Mover Axis 1	0.0000	0.0000	0.0000	0.0000	0x0
Mover Axis 2	0.0000	0.0000	0.0000	0.0000	0x0
Mover Axis 3	0.0000	0.0000	0.0000	0.0000	0x0
Mover Axis 4	0.0000	0.0000	0.0000	0.0000	0x0
Mover Axis 5	0.0000	0.0000	0.0000	0.0000	0x0

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	

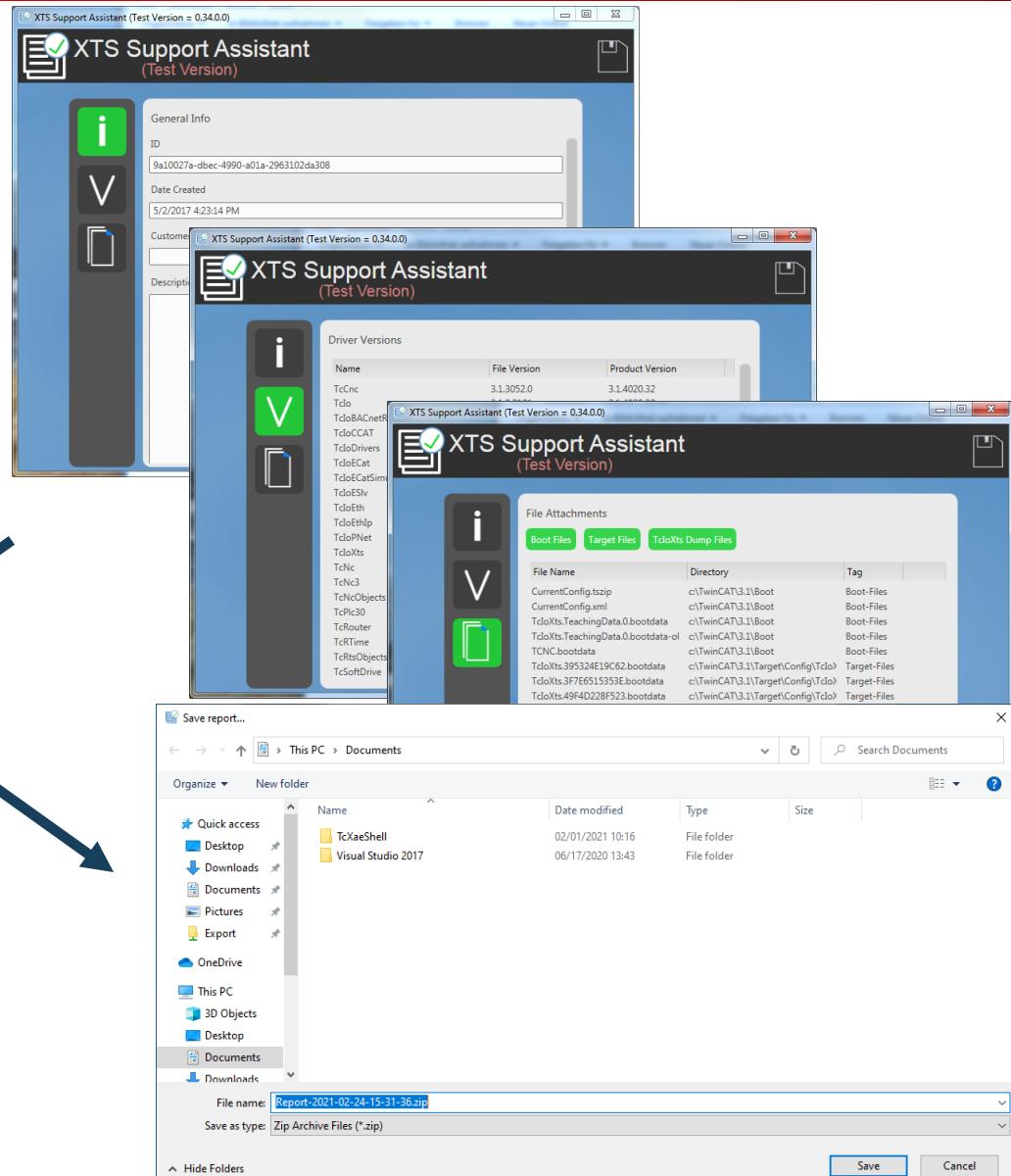
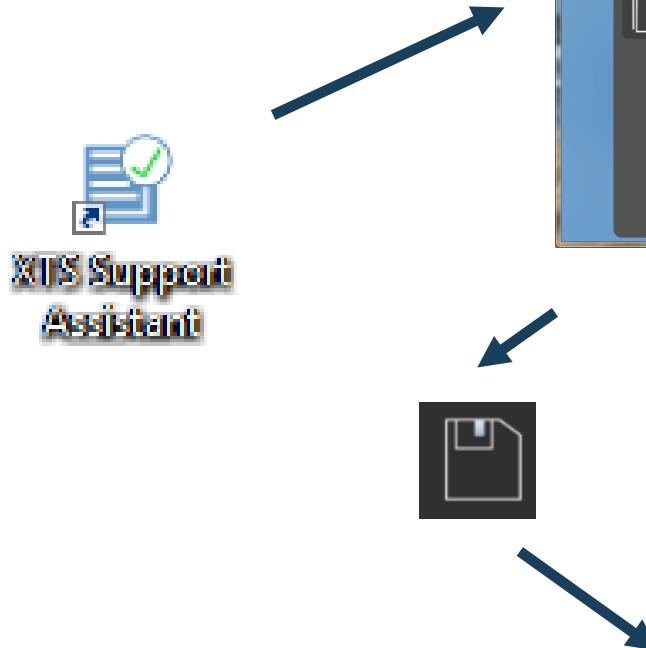
- Collecting data...

- XTS-DUMP



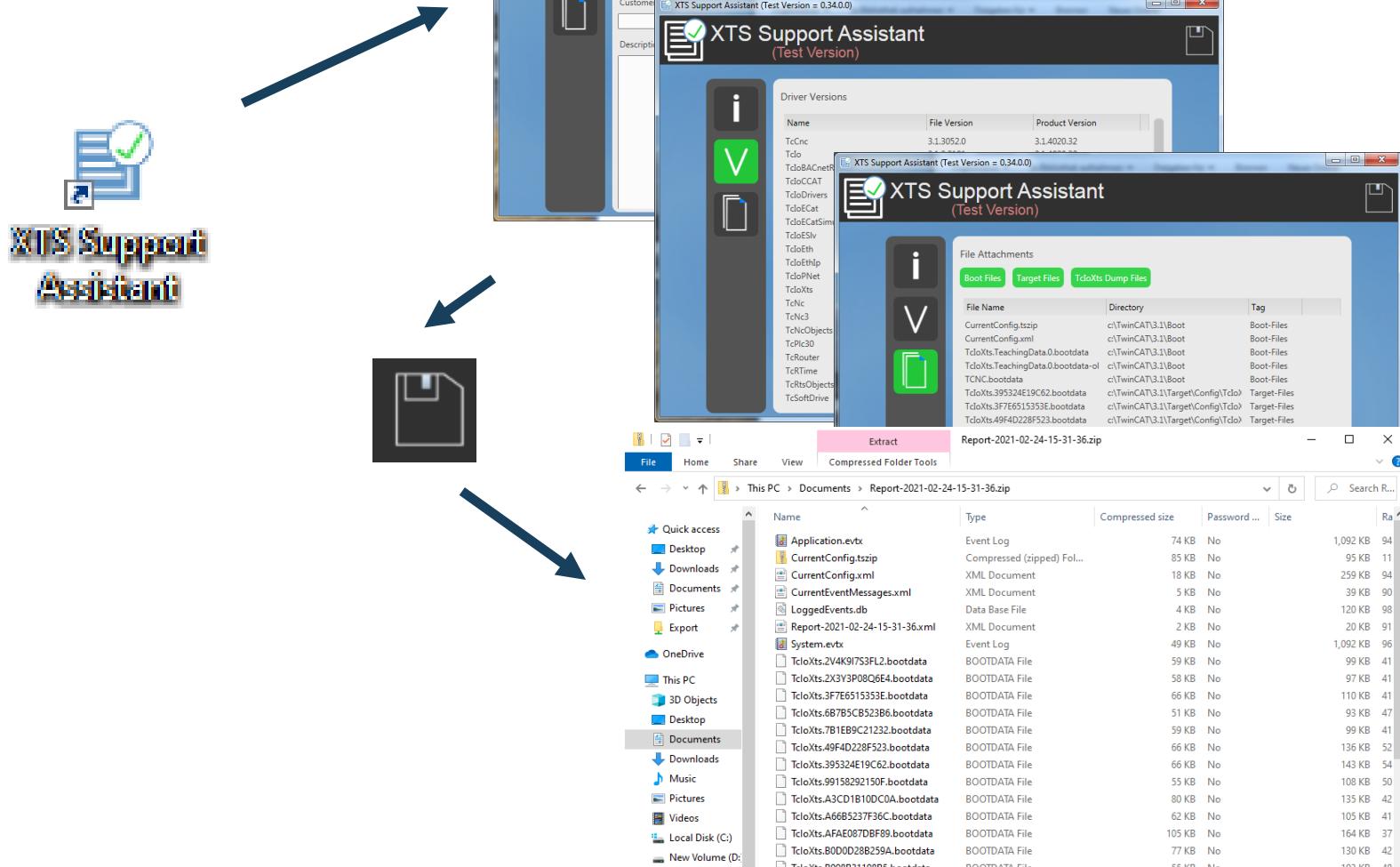
- Collecting data...

- 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

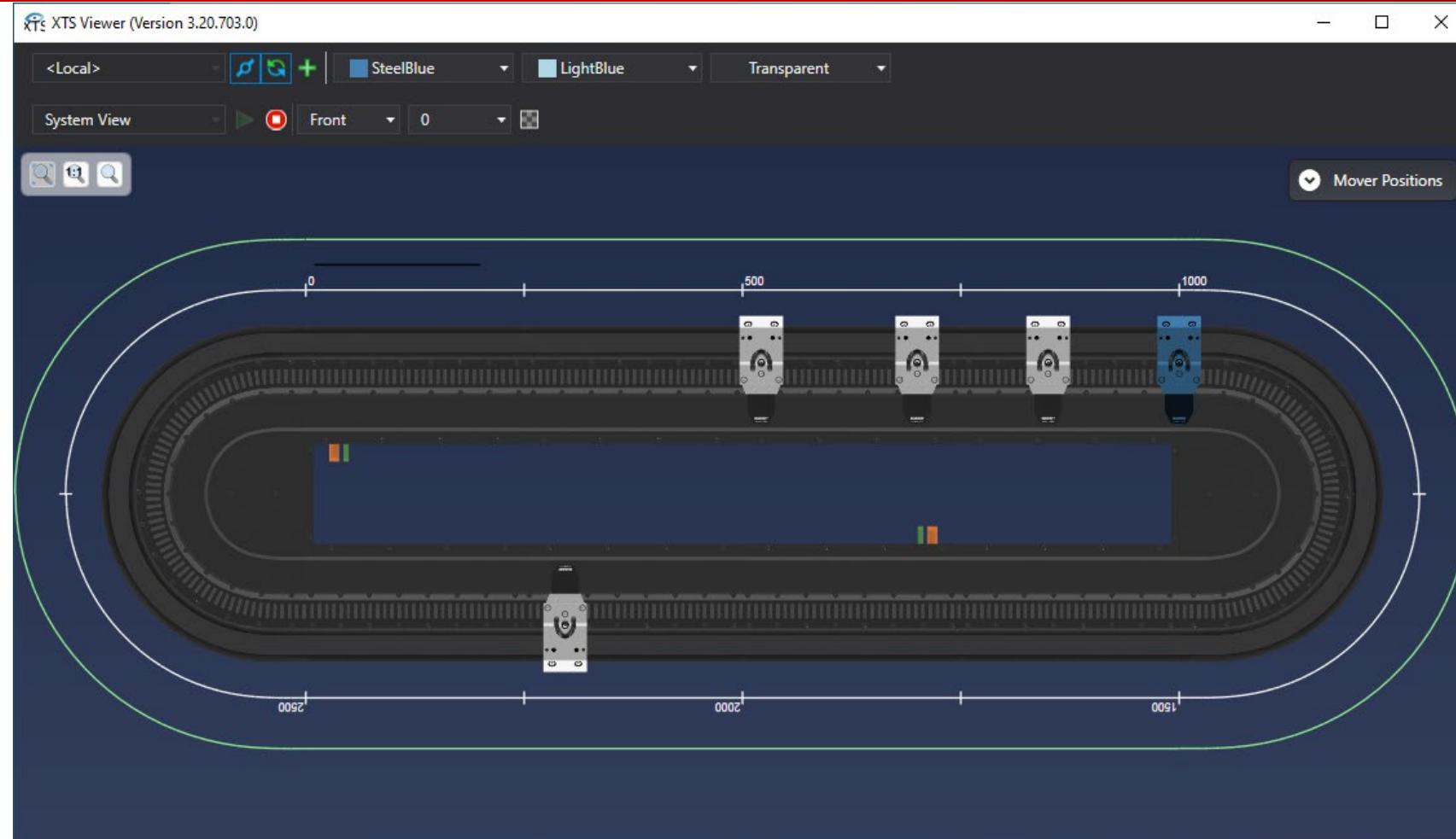


- XTS Viewer

- Start

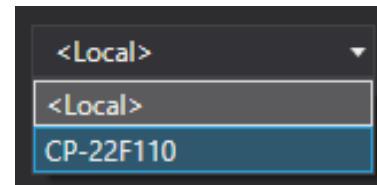
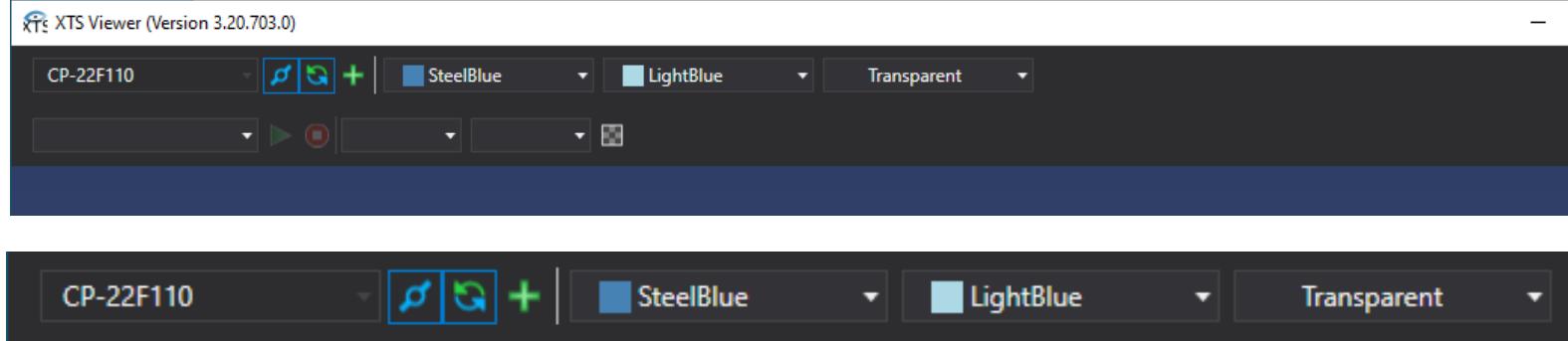


XTS Viewer



- XTS Viewer

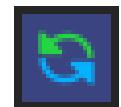
- Toolbar 1



choose Target



connect to selected target



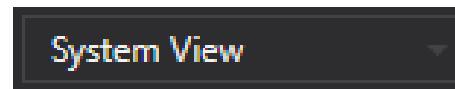
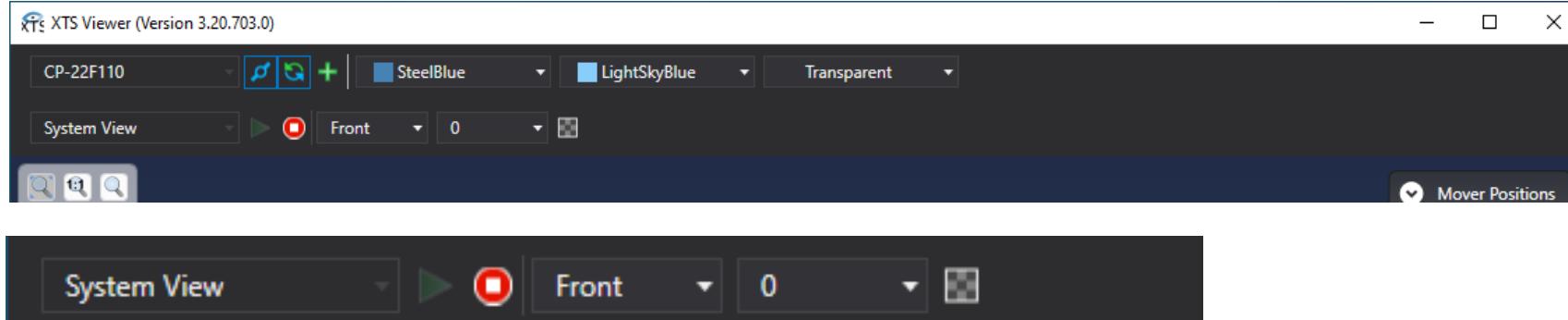
continuous update



open sup window

## ■ XTS Viewer

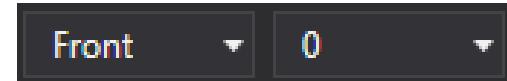
### – Toolbar 2



choose a view description



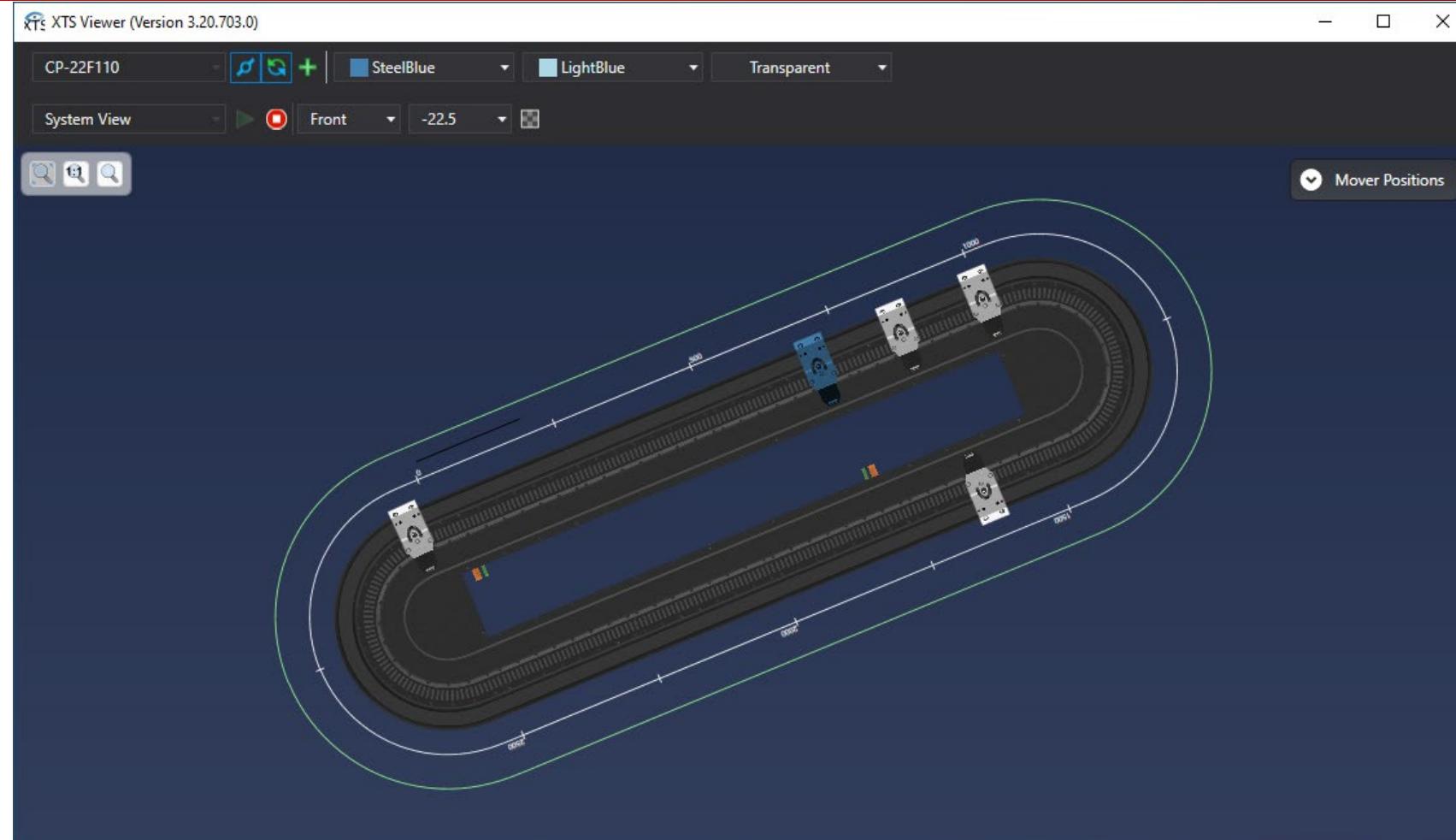
Start / Stop view



select module side and rotation degree

- XTS Viewer

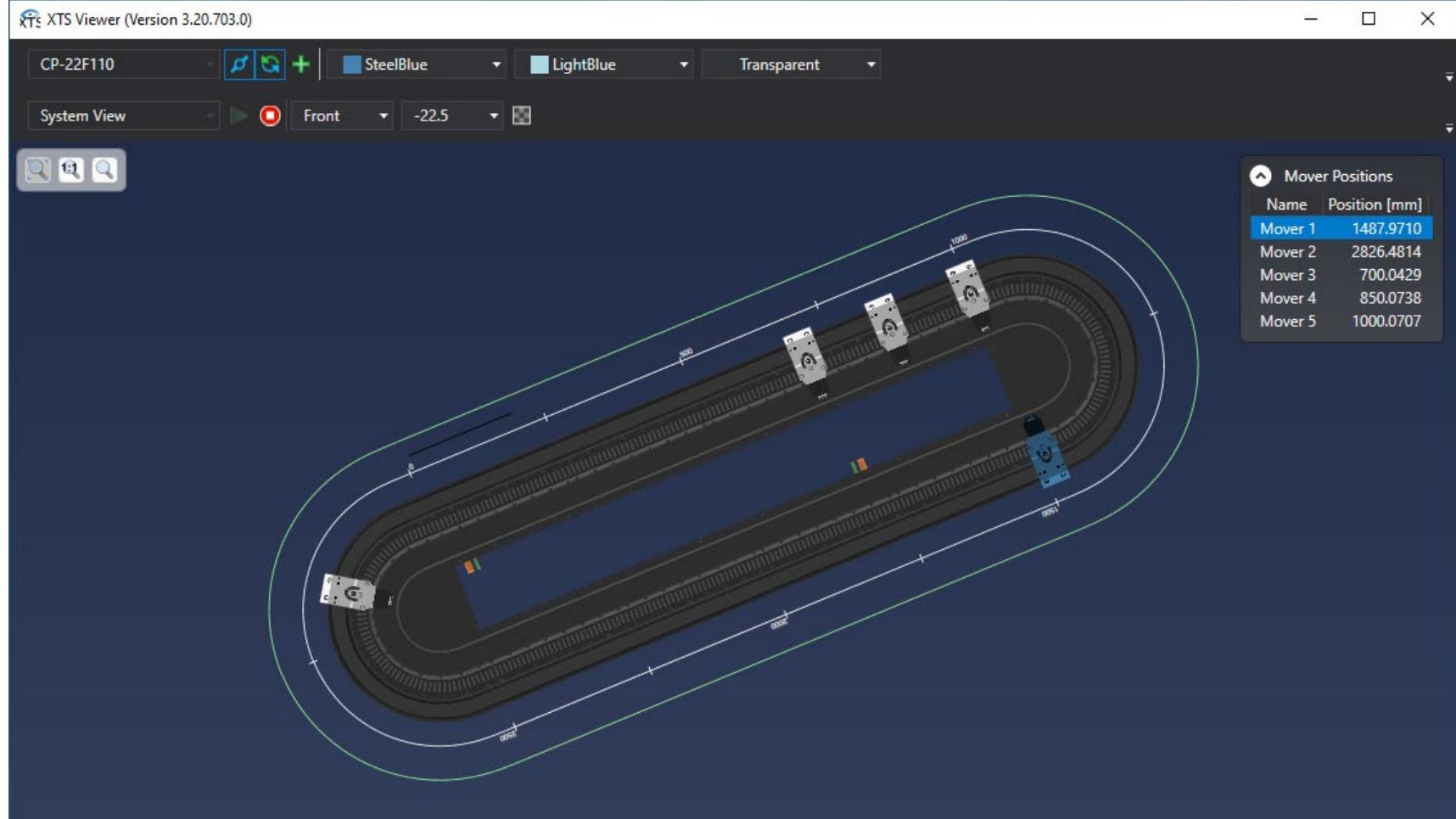
- Complete view



## ■ XTS Viewer

- Show Mover Positions  
(Modulo Value)

Mover Positions



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

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

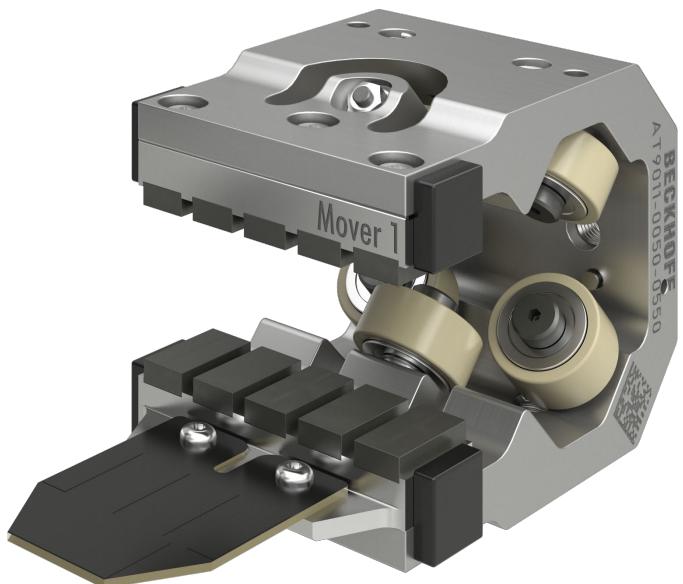
- 1. XPU Introduction
- 2. XTS Configuration Process
- 3. XPU – Deep Dive
- 4. XTS Viewer
- 5. Mover 1**
- 6. Simulation Mode



- Mover 1 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.

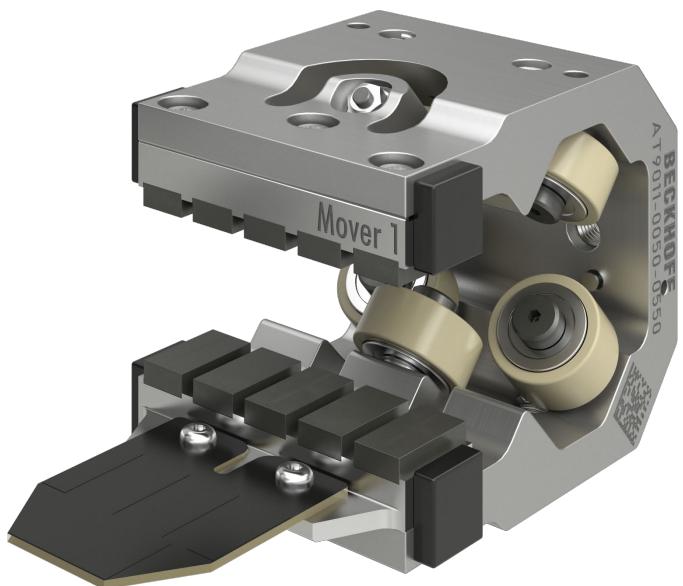


- Mover 1 functionality

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

These magnets creates an inverted magnetic field.

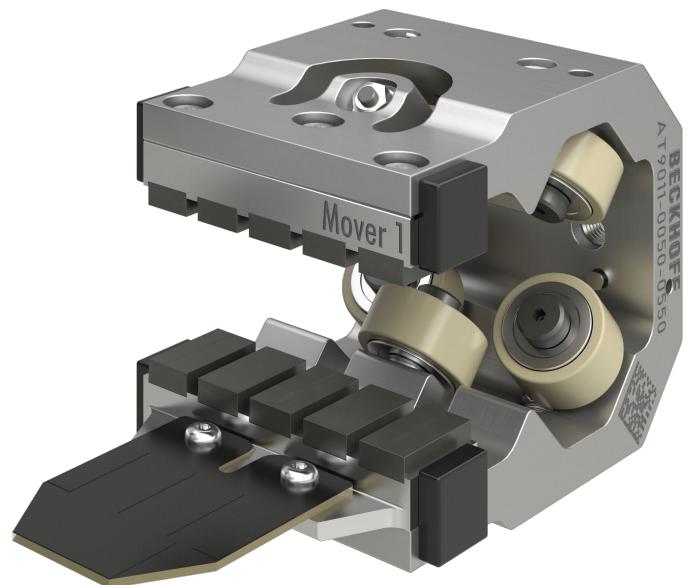
This magnetic plate set exhibits a different behavior when the Mover1 search is triggered (MoverIdDetection)



- MoverIdDetection

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

Therefore 48V power supply is required.



- 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.



First\_XTS\_Project

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				Trigger...	0x...
+ Teaching					
+ Diagnostics					
+ Advanced					
- Simulation					
IsPositionNoiseEnabled	TRUE			BOOL	0x...
IsRandomStartUpEnabled	TRUE			BOOL	0x...
...					

Show Online Values Show Hidden Parameter Expand All Collapse All

- 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**



First\_XTS\_Project

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				Trigger...	0x...
+ Teaching					
+ Diagnostics					
+ Advanced					
- Simulation					
IsPositionNoiseEnabled	TRUE			BOOL	0x...
IsRandomStartUpEnabled	TRUE			BOOL	0x...
...					

Show Online Values Show Hidden Parameter Expand All Collapse All

- 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.



First\_XTS\_Project

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	StartAtMover1			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 Expand All Collapse All

- MoverIdDetectionMode
- MoverPositionAssignment

Change of these parameters requires  
at TwinCAT

→  Activate Configuration



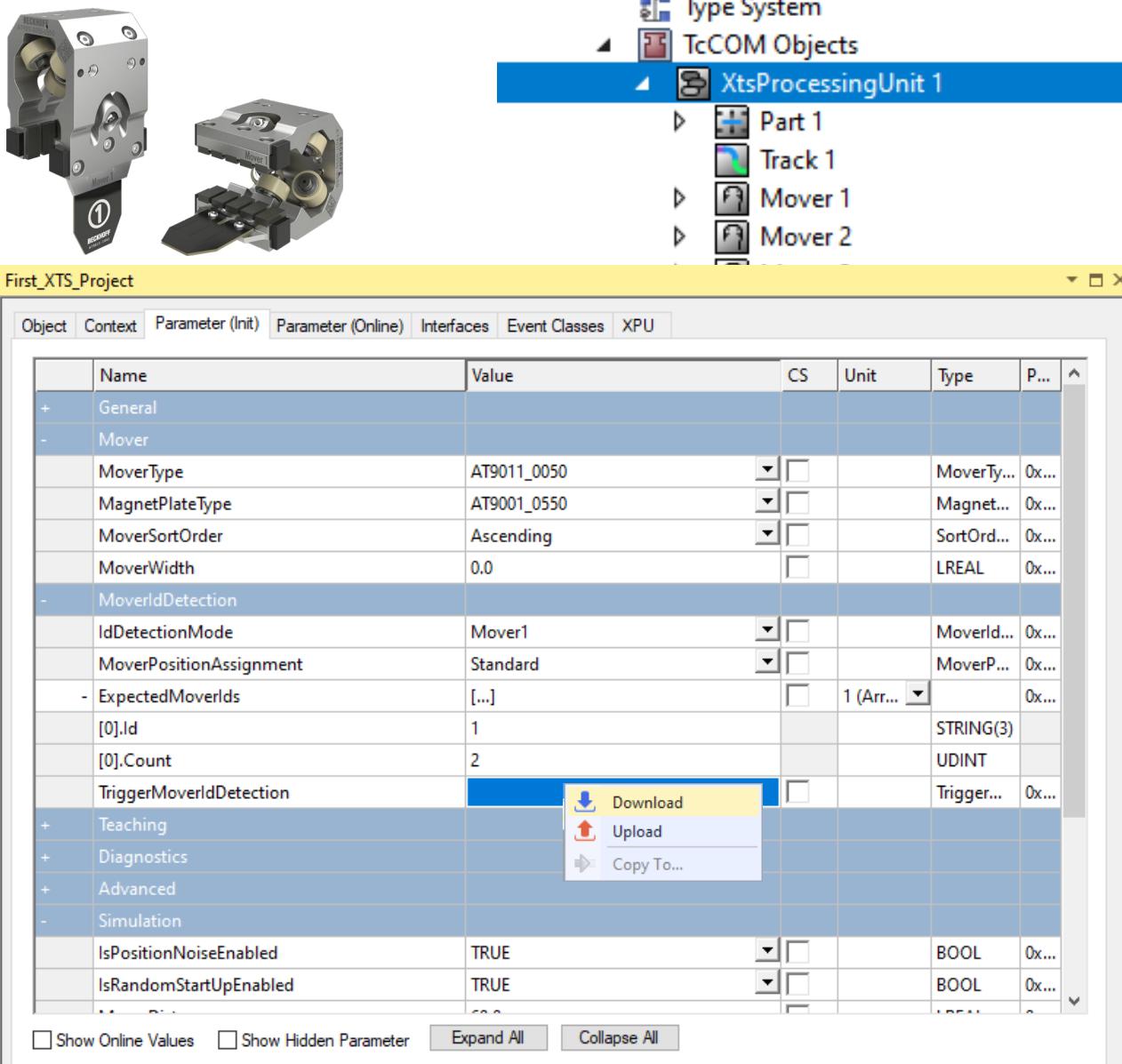
First\_XTS\_Project

Object	Context	Parameter (Init)	Parameter (Online)	Interfaces	Event Classes	XPU
Mover	Name		Value	CS	Unit	Type
	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				Trigger...	0x...
	+ Teaching					
+ Diagnostics						
+ Advanced						
- Simulation						
IsPositionNoiseEnabled	TRUE			BOOL	0x...	
IsRandomStartUpEnabled	TRUE			BOOL	0x...	
...	...			...	...	

Show Online Values Show Hidden Parameter Expand All Collapse All

- TriggerMoverIdDetection

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

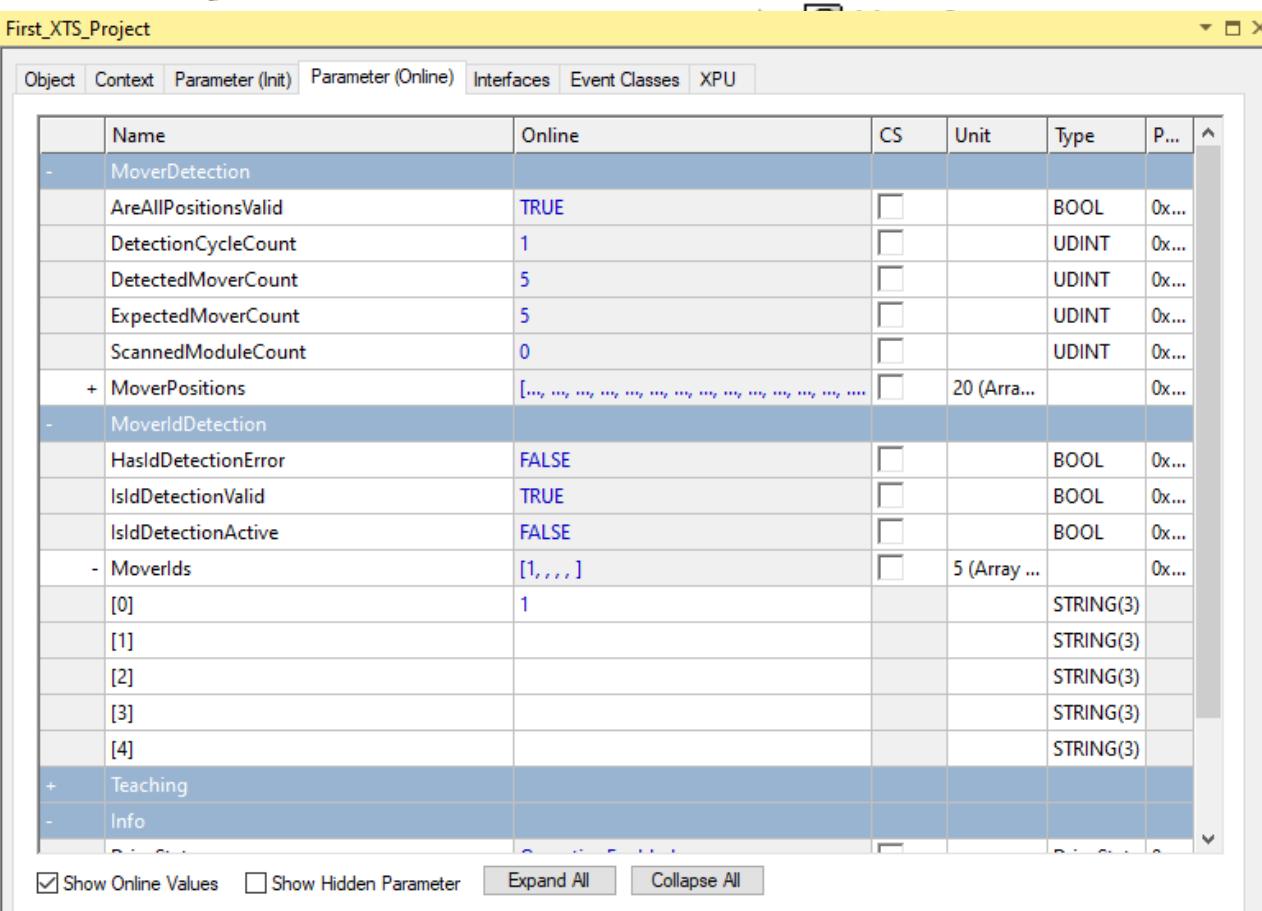


- Feedback Mover Id detection

Messages from the Mover Id detection  
→ shown in the Output Window

State of Mover Id detection  
→ as Parameter in "Parameter (Online)"

```
Output
Show output from: TwinCAT
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_McCollide'
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**



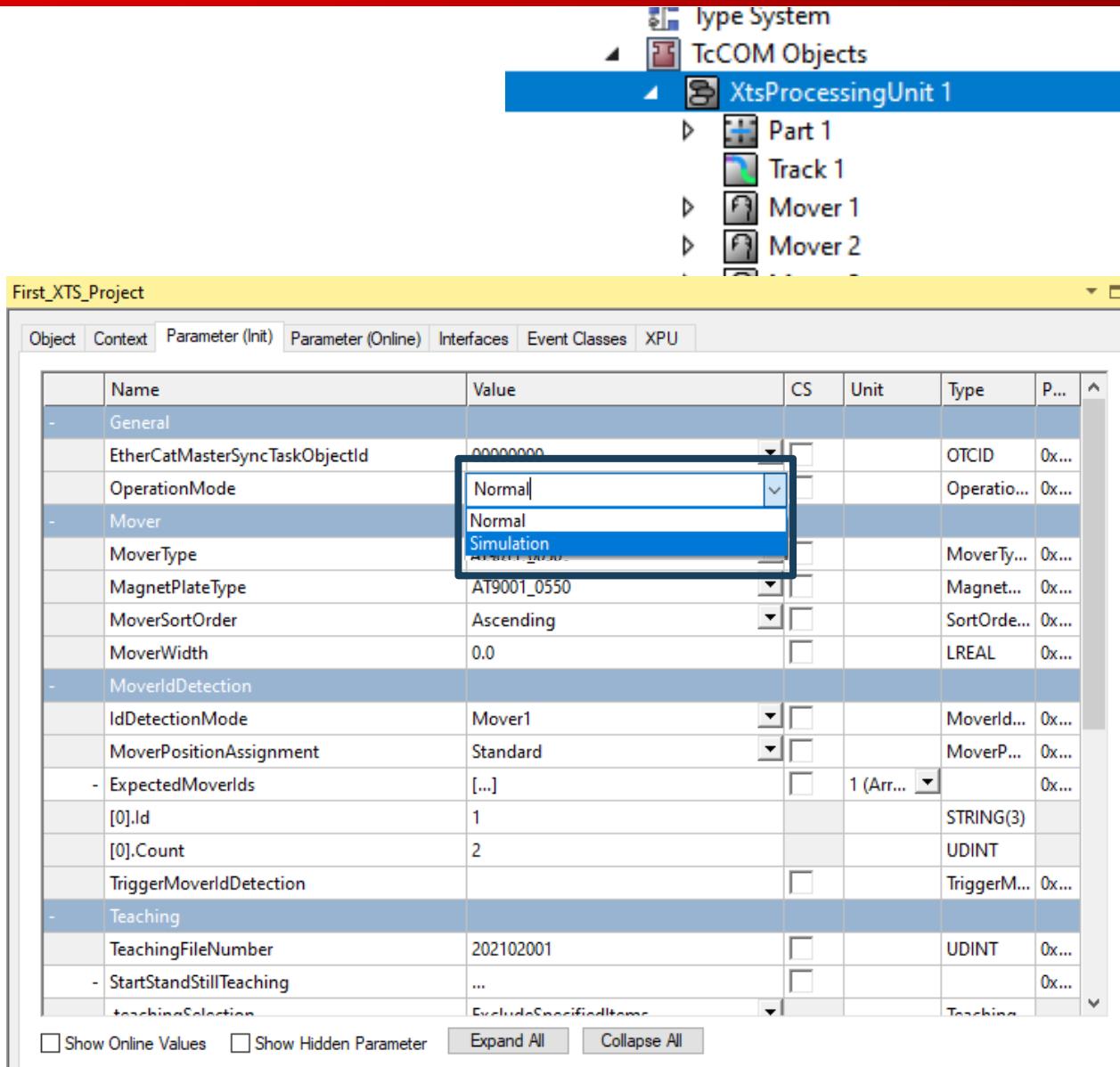
- Simulation Mode

- Change Parameter „OperationMode“

- Setup Mover Simulation parameter

- Deactivate I/O Devices

- Activate Configuration



# Simulation Mode

BECKHOFF

## ■ Simulation Mode

### – Setup Mover Simulation parameter

◀ Mover List

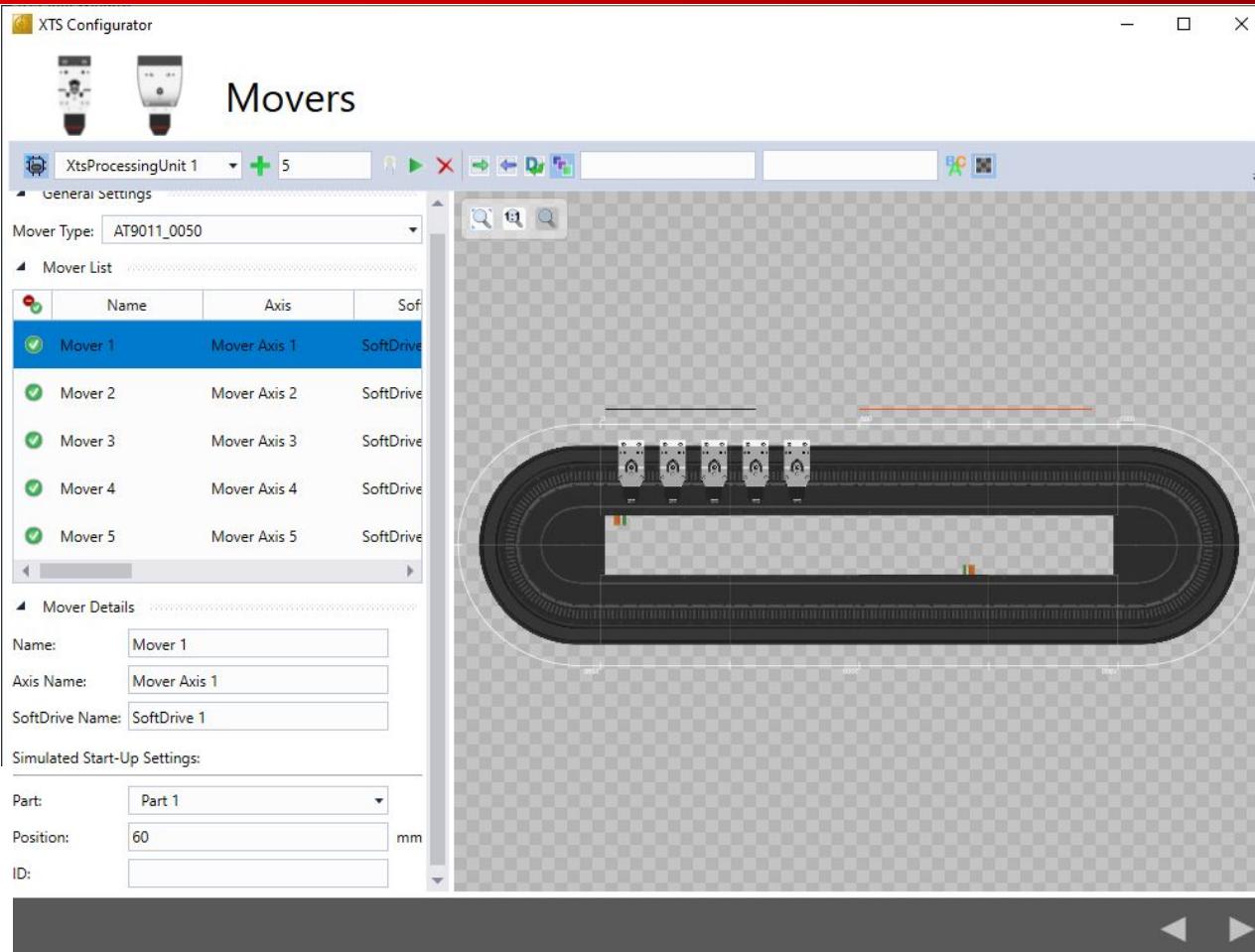
	Name	Axis	SoftDrive	Source Set	Parameter Set	Sim
<input checked="" type="checkbox"/>	Mover 1	Mover Axis 1	SoftDrive 1		@D	Part 1
<input checked="" type="checkbox"/>	Mover 2	Mover Axis 2	SoftDrive 2		@D	Part 1
<input checked="" type="checkbox"/>	Mover 3	Mover Axis 3	SoftDrive 3		@D	Part 1
<input checked="" type="checkbox"/>	Mover 4	Mover Axis 4	SoftDrive 4		@D	Part 1
<input checked="" type="checkbox"/>	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



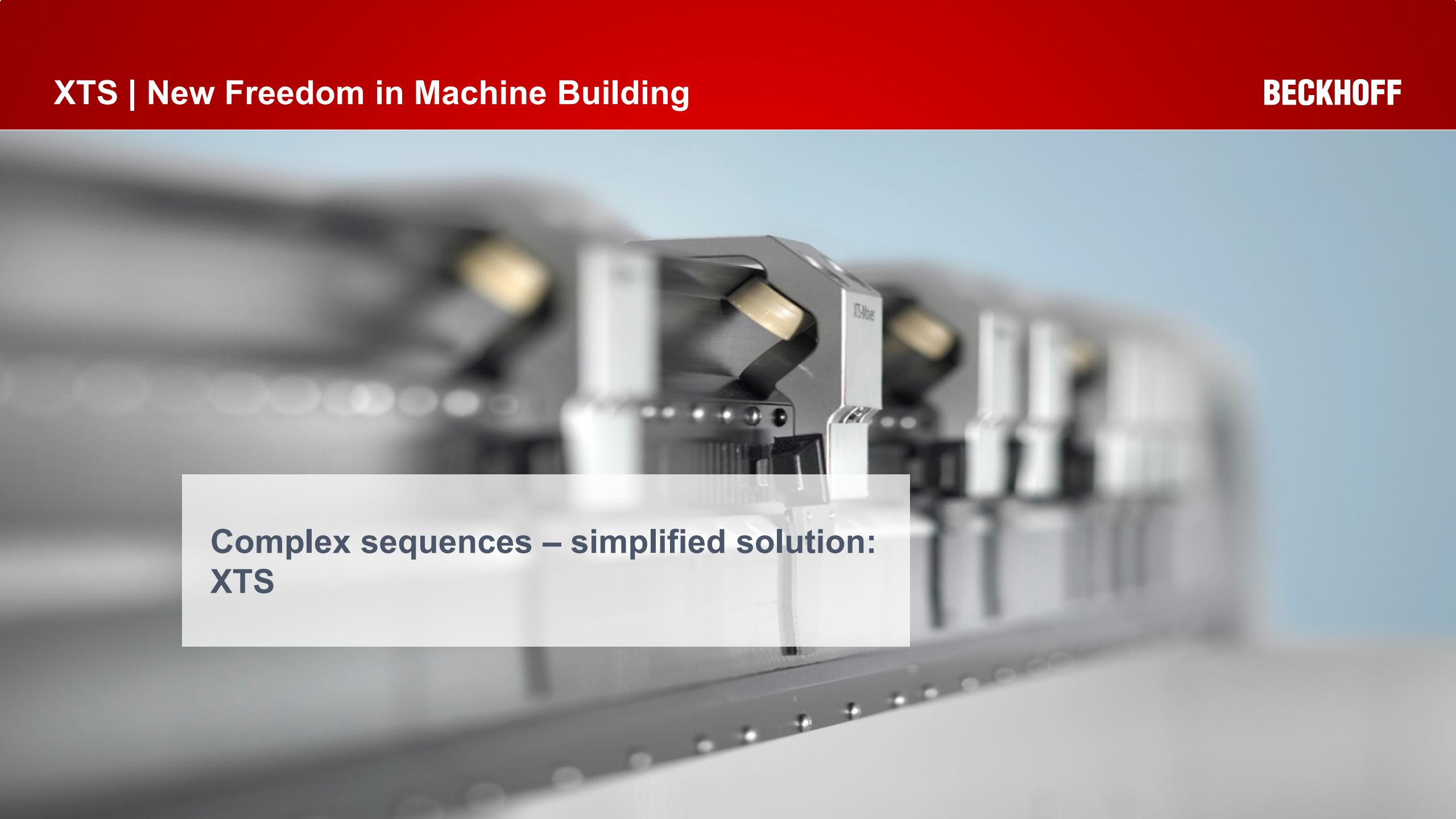
- Simulation Mode

- Simulation Mode Parameter

The screenshot shows the 'First\_XTS\_Project' window in the Beckhoff XTS software. The top navigation bar includes tabs for Object, Context, Parameter (Init), Parameter (Online), Interfaces, Event Classes, and XPU. The Parameter (Init) tab is selected. The main area displays a hierarchical tree view of objects under 'XtsProcessingUnit 1', which includes 'Part 1', 'Track 1', 'Mover 1', and 'Mover 2'. Below this is a detailed table of parameters:

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

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



Complex sequences – simplified solution:  
**XTS**

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