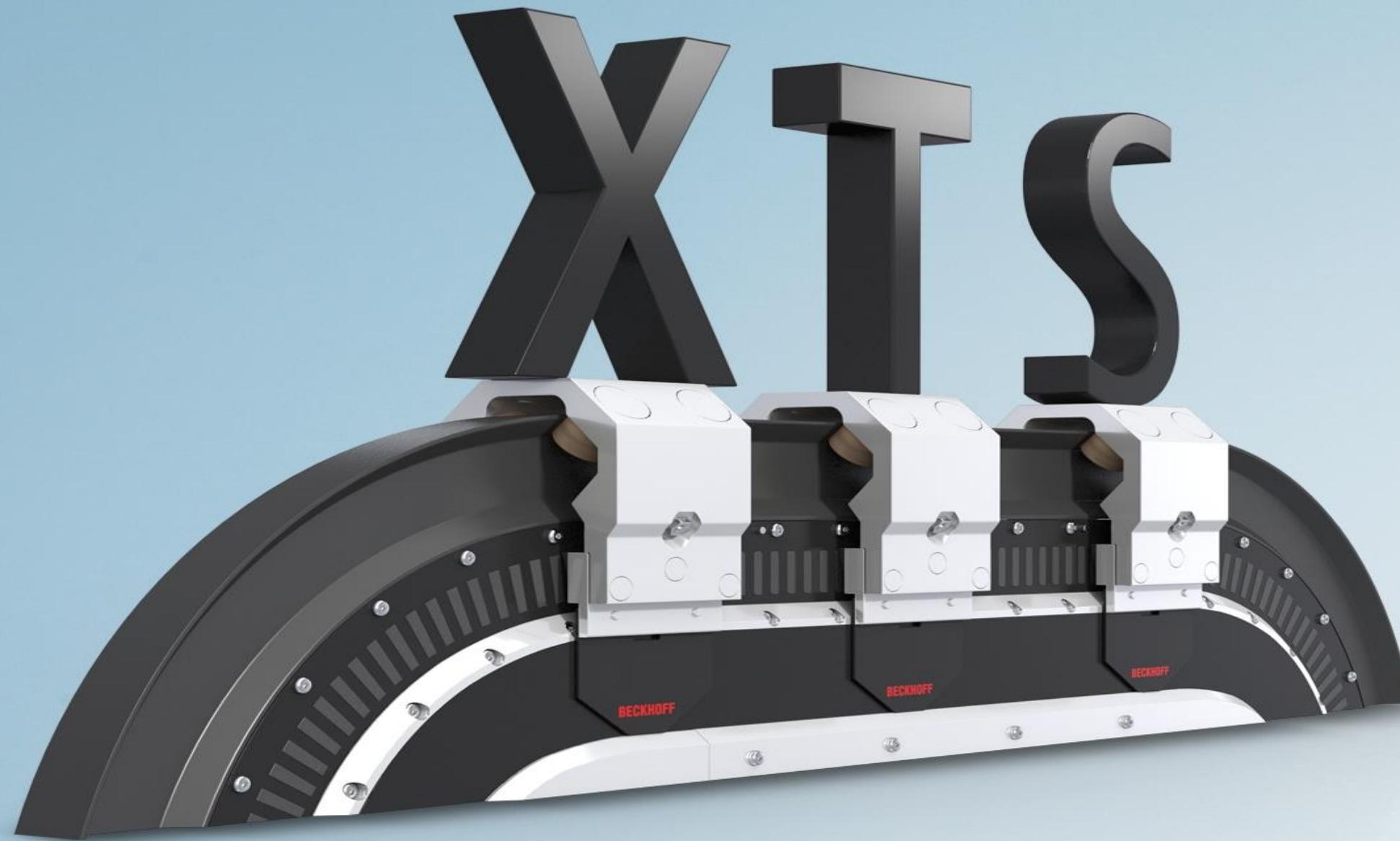


New Automation Technology

Beckhoff Automation

BECKHOFF



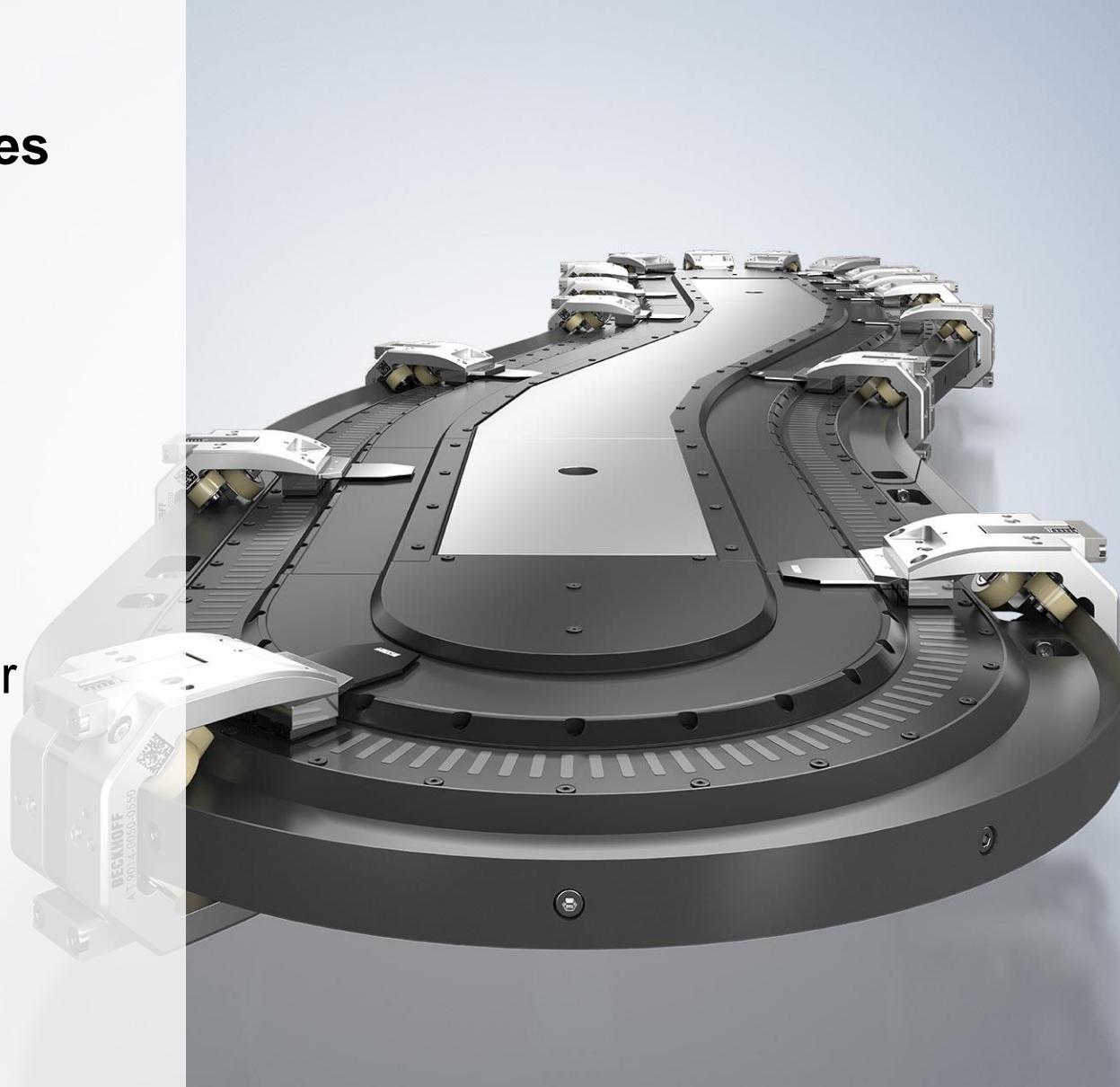


XTS | a new dimension for intelligent product transport

BECKHOFF



1. System properties
2. XTS-StarterKit
3. XTS Module
4. Preparation and Assembly
5. First Test
6. Rail mounting
7. Rerailing of Mover



System properties

BECKHOFF



speed up to 4 m/s –
acceleration up to
 10 m/s^2



20 kg payload,
even more in coupled
operation



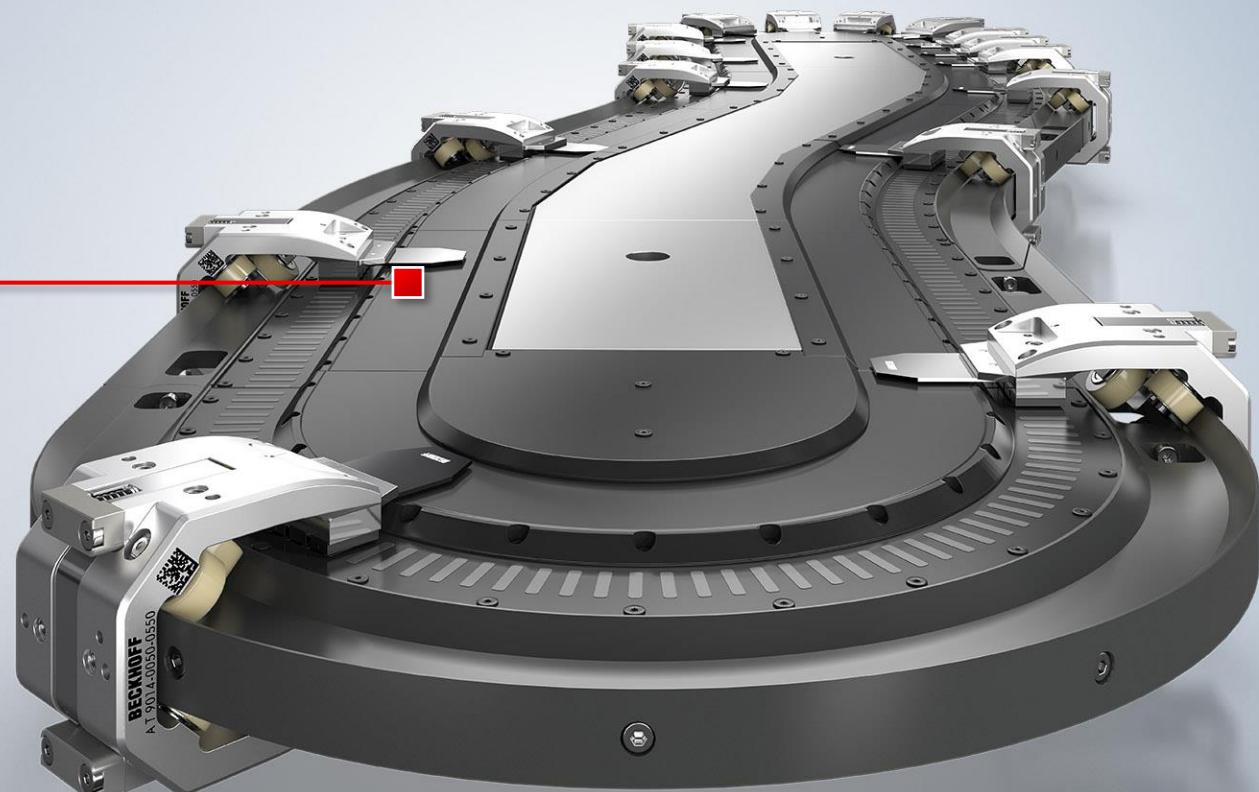
repeat accuracy
down to (\pm) 10 μm



center-to-center distance
of 50 mm possible

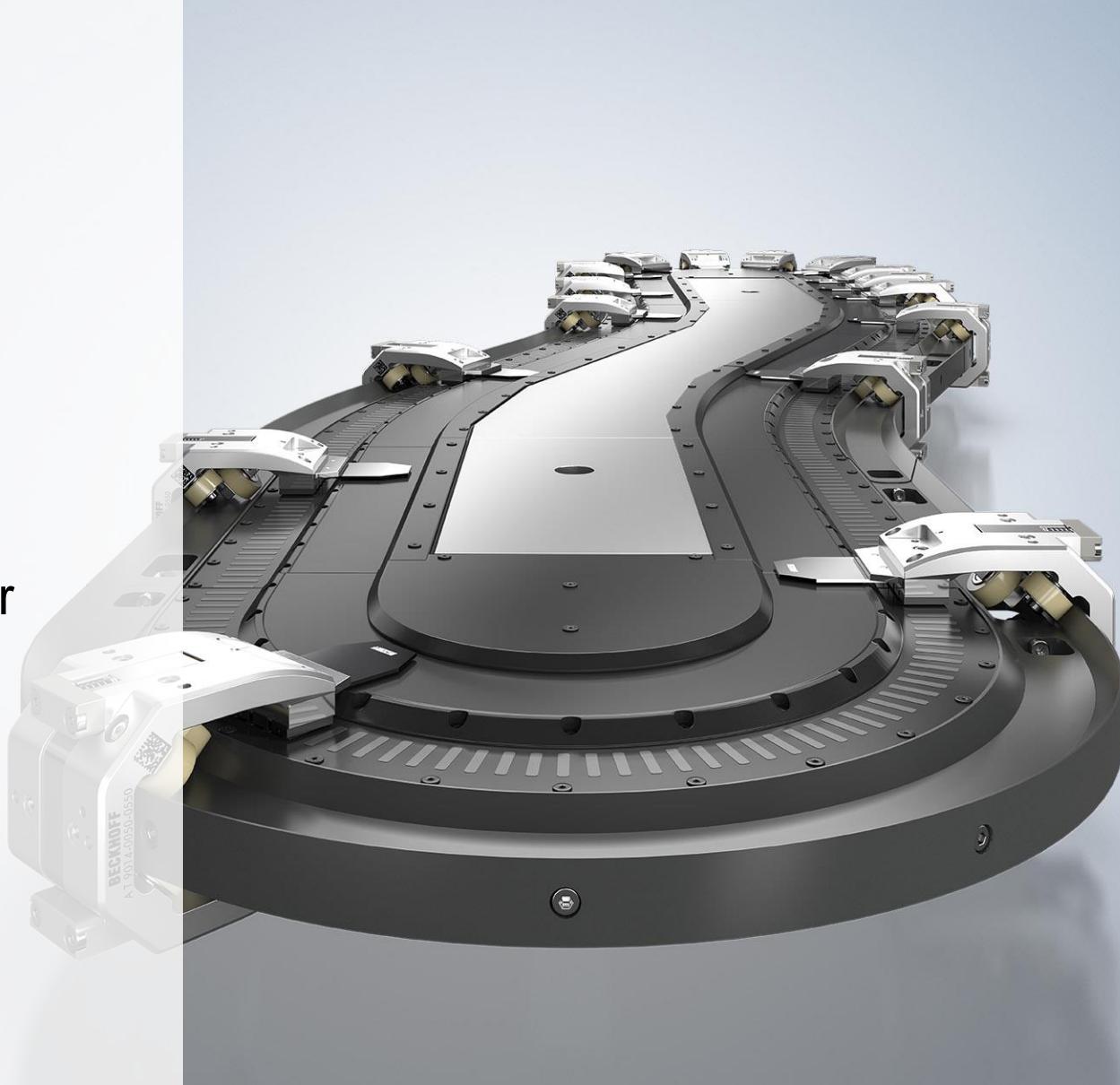


mover identification
(standard and Mover 1)



Alignment	horizontally, vertically or at any angle from 1...179°	
Magnet pitch	≥ 50 mm	
Peak force	AT9001-x550 (5-pin): 100 N, AT9001-xAA0 (10-pin): 210 N	AT9001-x775 (7-pin): 130 N, (specifications refer to straight sections)
Continuous force	AT9001-x550 (5-pin): 30 N, AT9001-xAA0 (10-pin): 75 N	AT9001-x775 (7-pin): 45 N, (specifications refer to straight sections)
Max. speed	4 m/s	
Max. payload	up to 40 kg	higher loads with reduced dynamics possible
Max. acceleration	10 g	without payload
Absolute accuracy	± 0.25 mm	within a straight module
Repeatability	$< \pm 0.01$ mm	standstill unidirectional
Synchronization accuracy	$< \pm 0.15$ mm	at 1.5 m/s within straight motor module
Max. system size	> 100 m, > 200 mover	
IP protection rating	IP65	in assembled condition for a closed system
Approvals/markings	CE, UL	

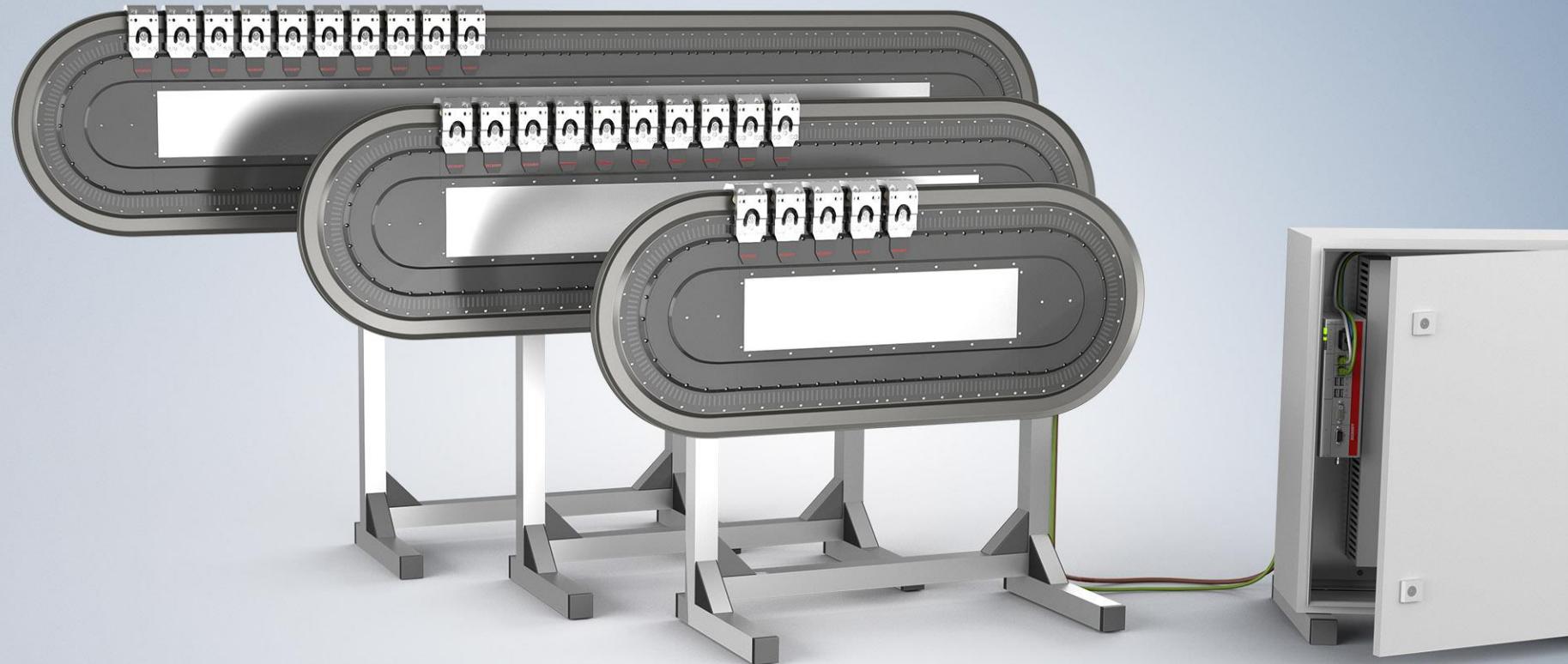
1. XTS-StarterKit
2. XTS Module
3. Preparation and Assembly
4. First Test
5. Rail mounting
6. Rerailing of Mover



XTS StarterKit

BECKHOFF

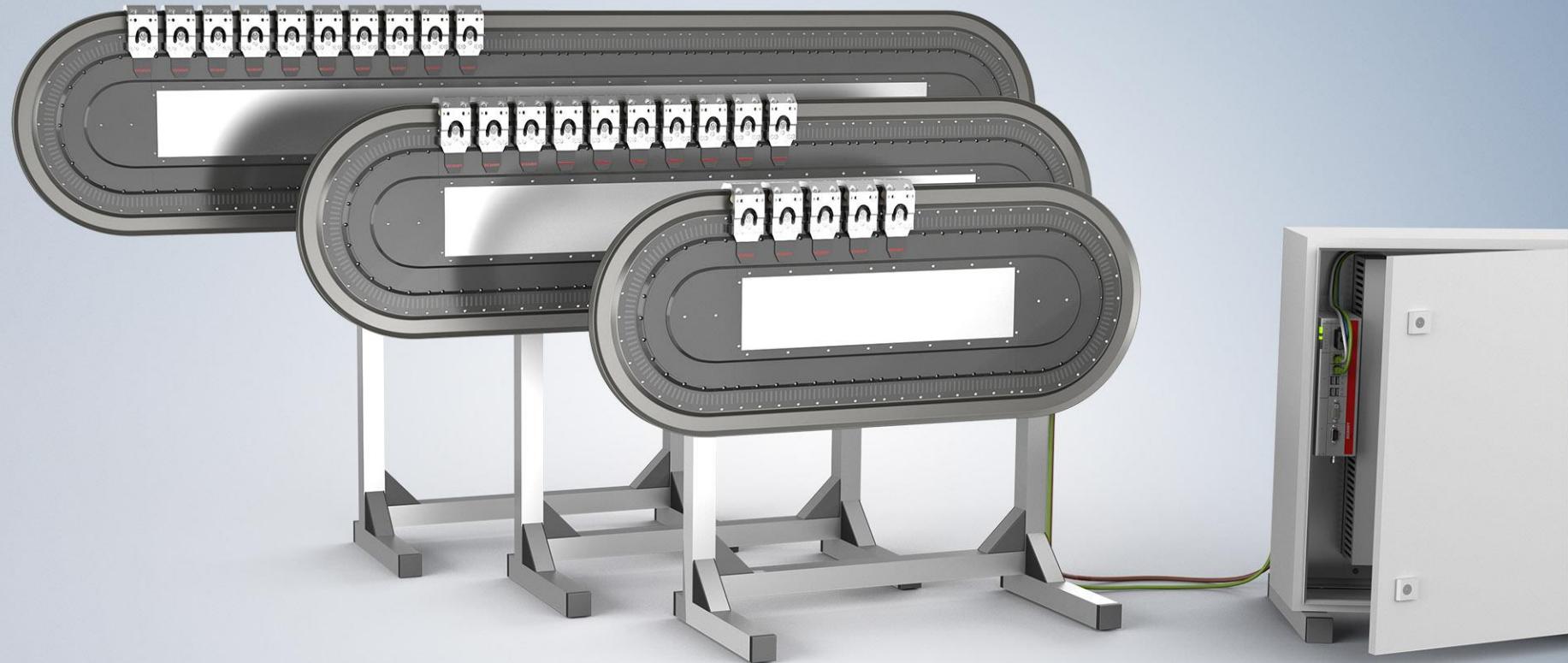




XTS starter kits
**plug-and-play solutions
for office environments**

XTS starter kits
**first mover movements
possible with little effort**

XTS starter kits
**one day of support and
programming assistance**



AT2000-0500

**starter kit small,
500 mm straight length**

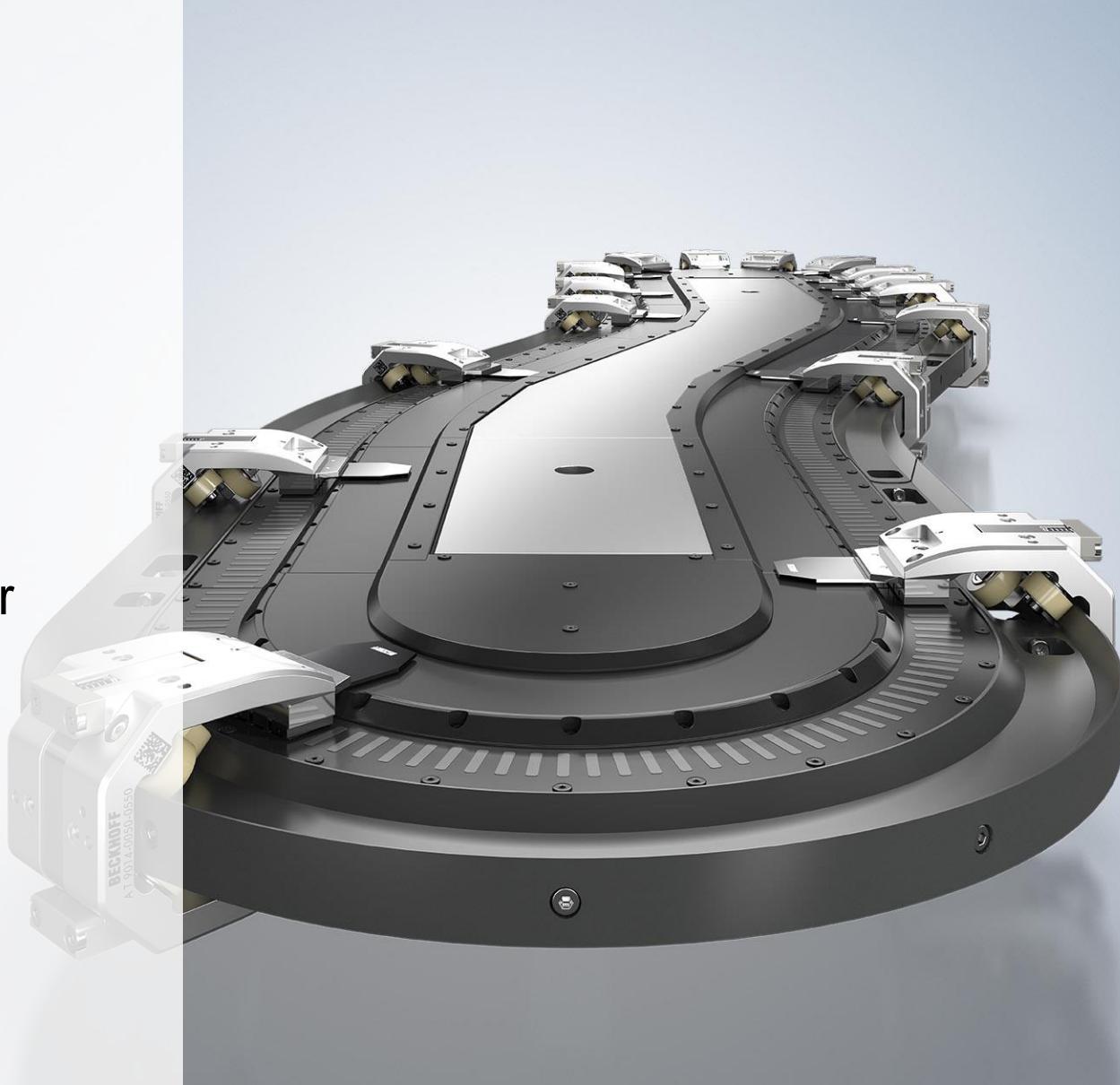
AT2000-1000

**starter kit medium,
1000 mm straight length**

AT2000-1500

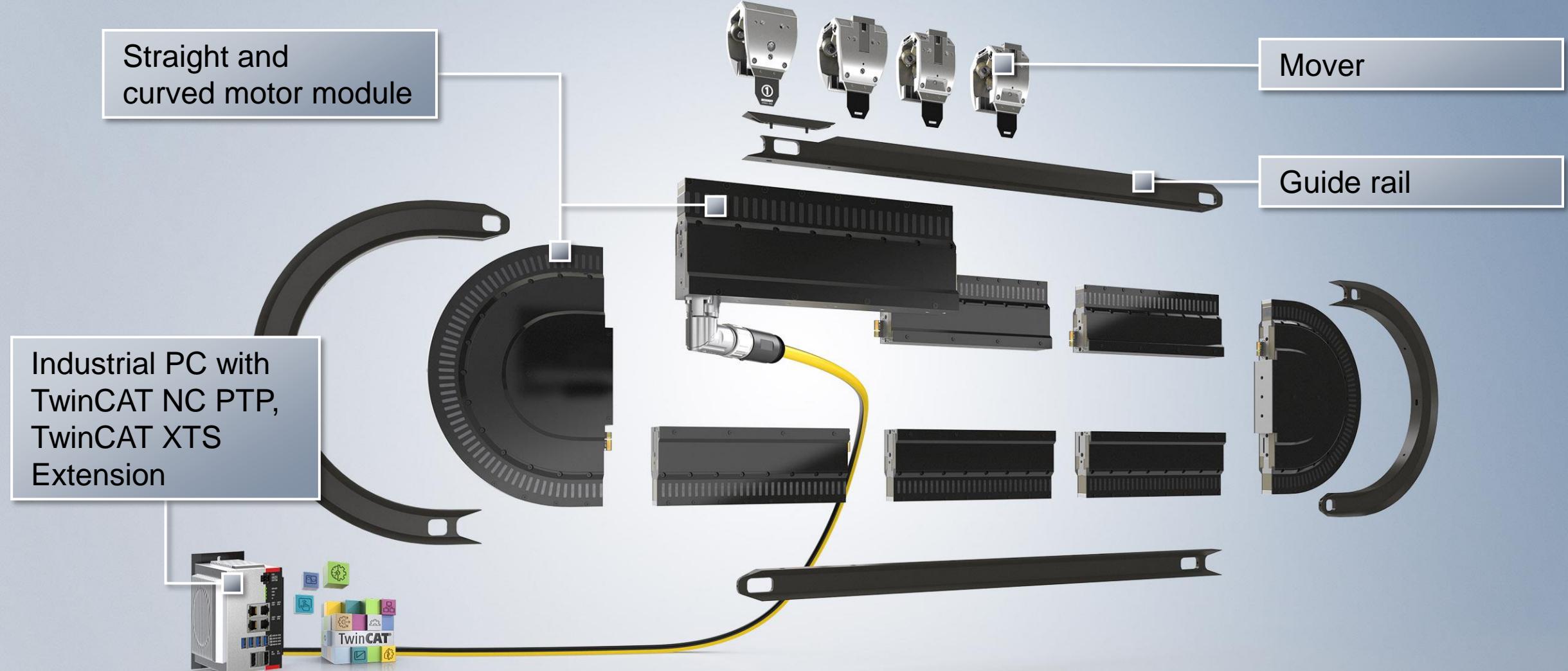
**starter kit large,
1500 mm straight length**

1. XTS-StarterKit
- 2. XTS Module**
3. Preparation and Assembly
4. First Test
5. Rail mounting
6. Rerailing of Mover



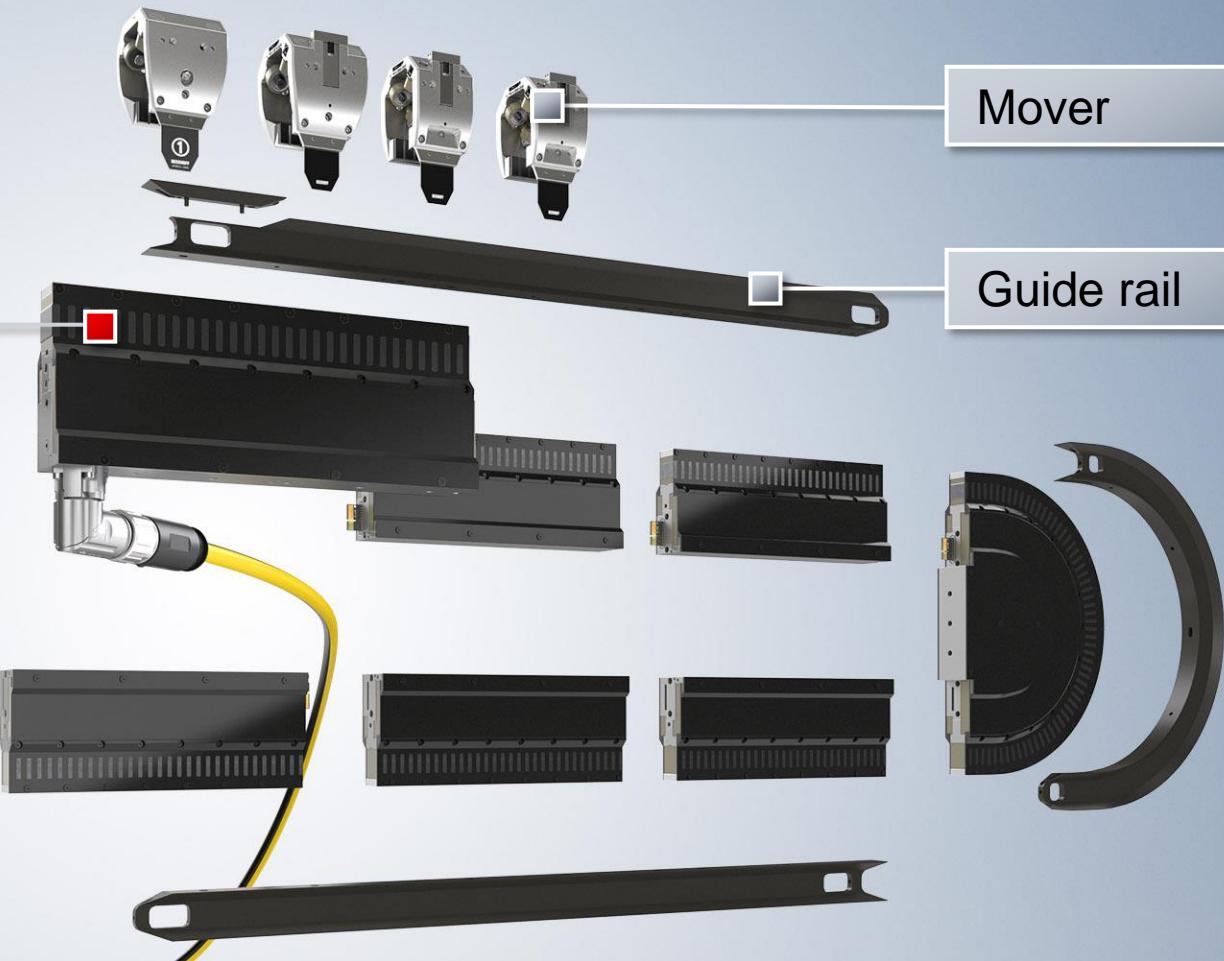
XTS Modules

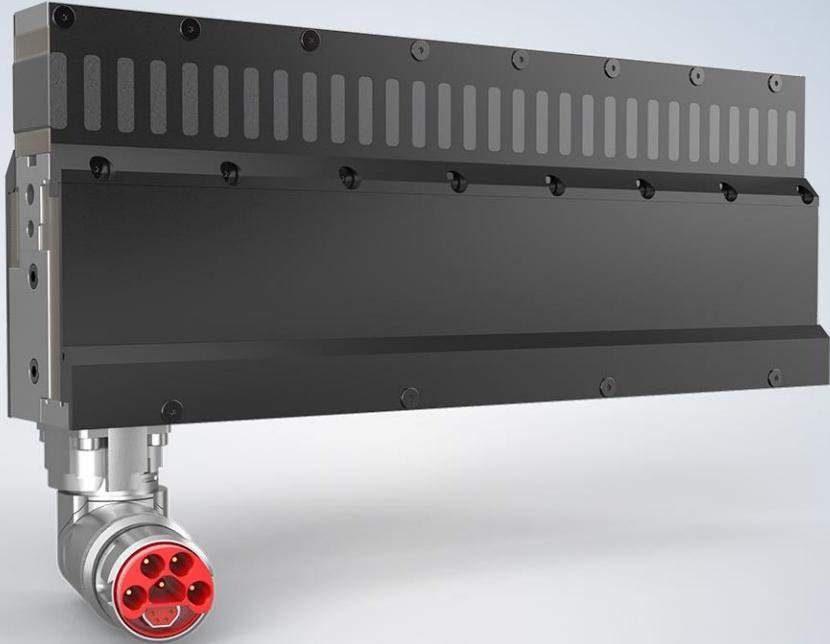
BECKHOFF



Straight and curved motor module

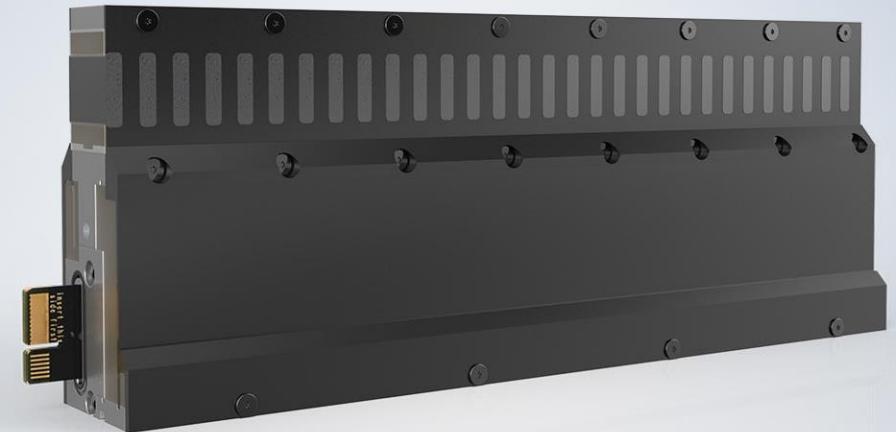
Industrial PC with
TwinCAT NC PTP,
TwinCAT XTS
Extension





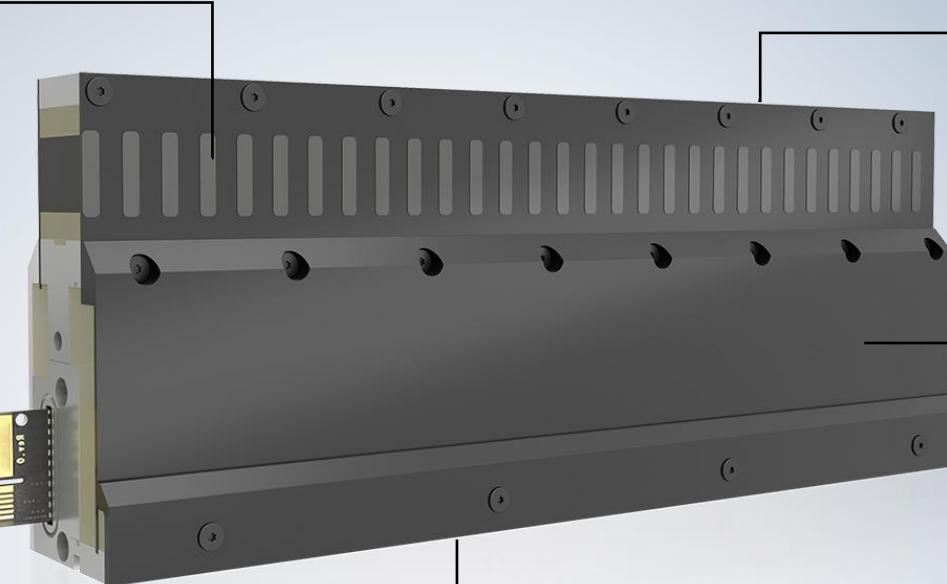
Fully integrated
motor function and multi-position
detection

Fully integrated
power supply and data
communication



Fully integrated
interface for machine bed and
guide rail

motor, coil package



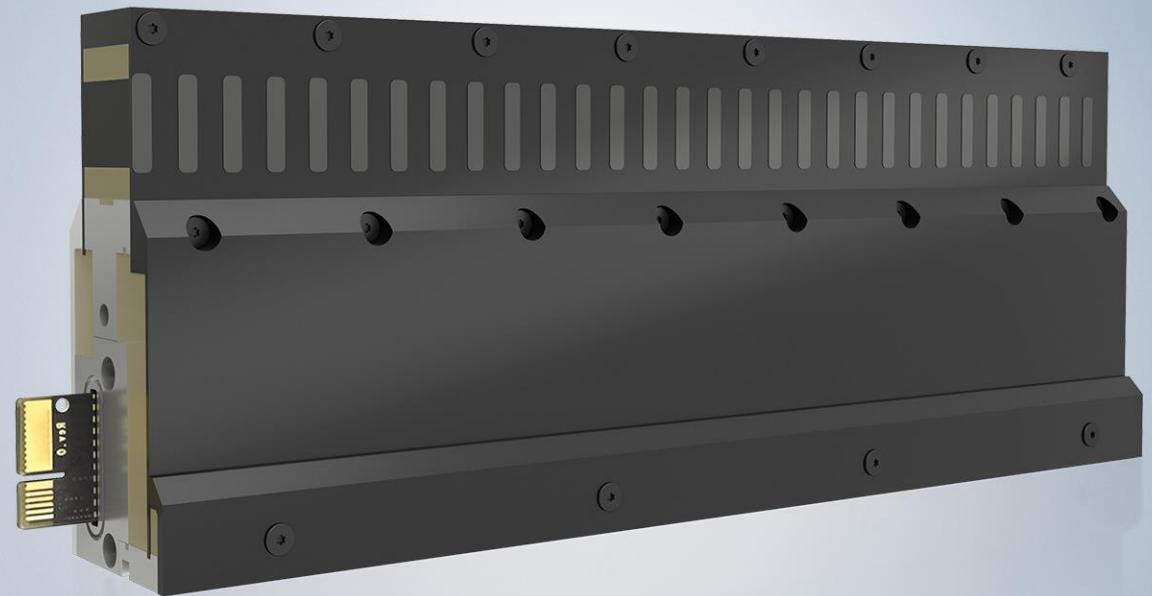
mechanical interface
for the guide rail

EtherCAT and power supply
(control: 24 V DC, power: 48 V DC)

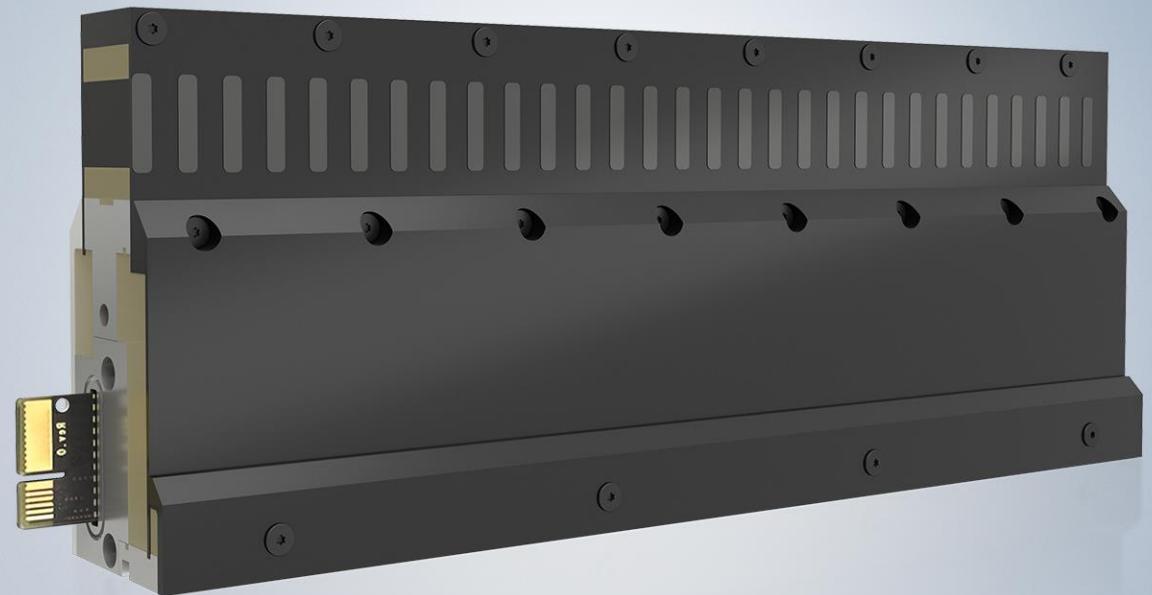
mechanical interface for
the support structure

power electronics and
displacement measurement

- power supply, EtherCAT
 - motor modules with/without supply cables
 - supply can be connected internally across motor modules
 - supply voltage in the protective low voltage range
- power electronics
 - output stages integrated in coil package
 - temperature monitoring of output stage
 - temperature model of the coils for optimum peak load utilization (I²T model)



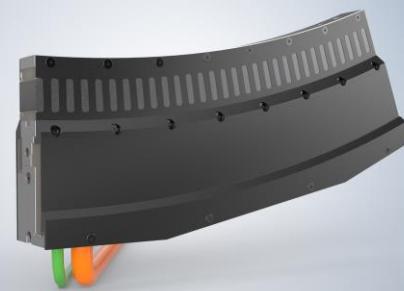
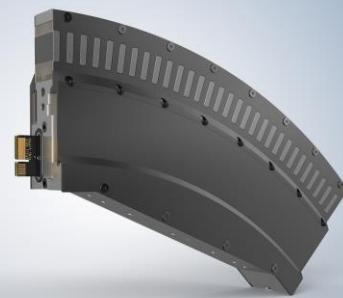
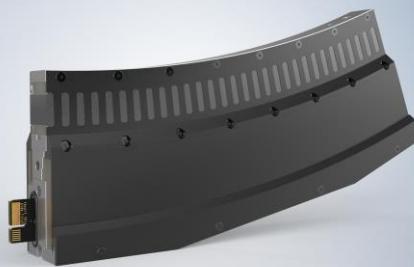
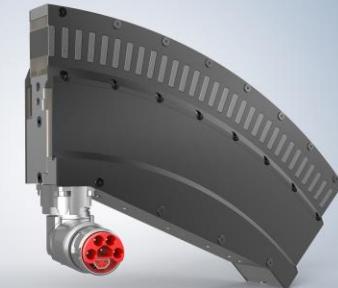
- position feedback
 - non-contact position detection with an encoder flag attached to the mover
 - absolute accuracy of ± 0.25 mm
 - positions are available immediately after switching on
→ no homing necessary
 - multi-position detection: no position restrictions even at the module limits



XTS Modules

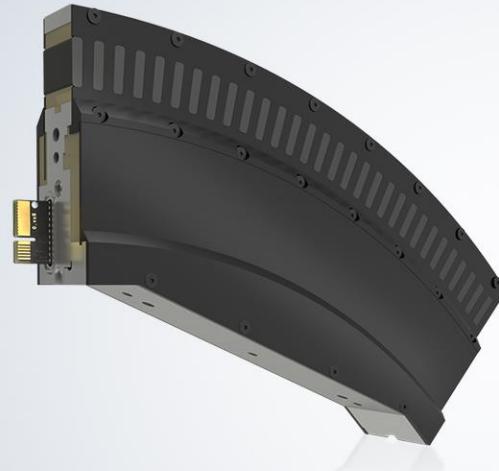
The XTS motor module

BECKHOFF

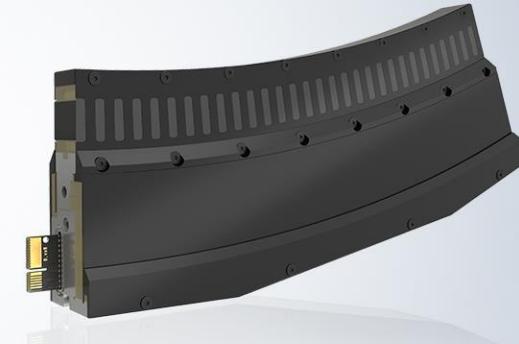




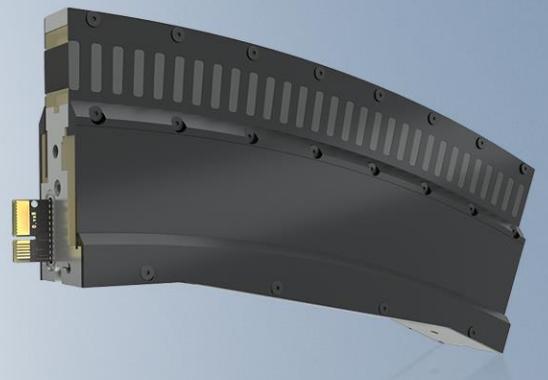
180° curve
(clothoid)
in 500 mm



45° curve
in 250 mm for
Ø 637 mm



-22.5° curve
in 250 mm for
Ø 1273 mm



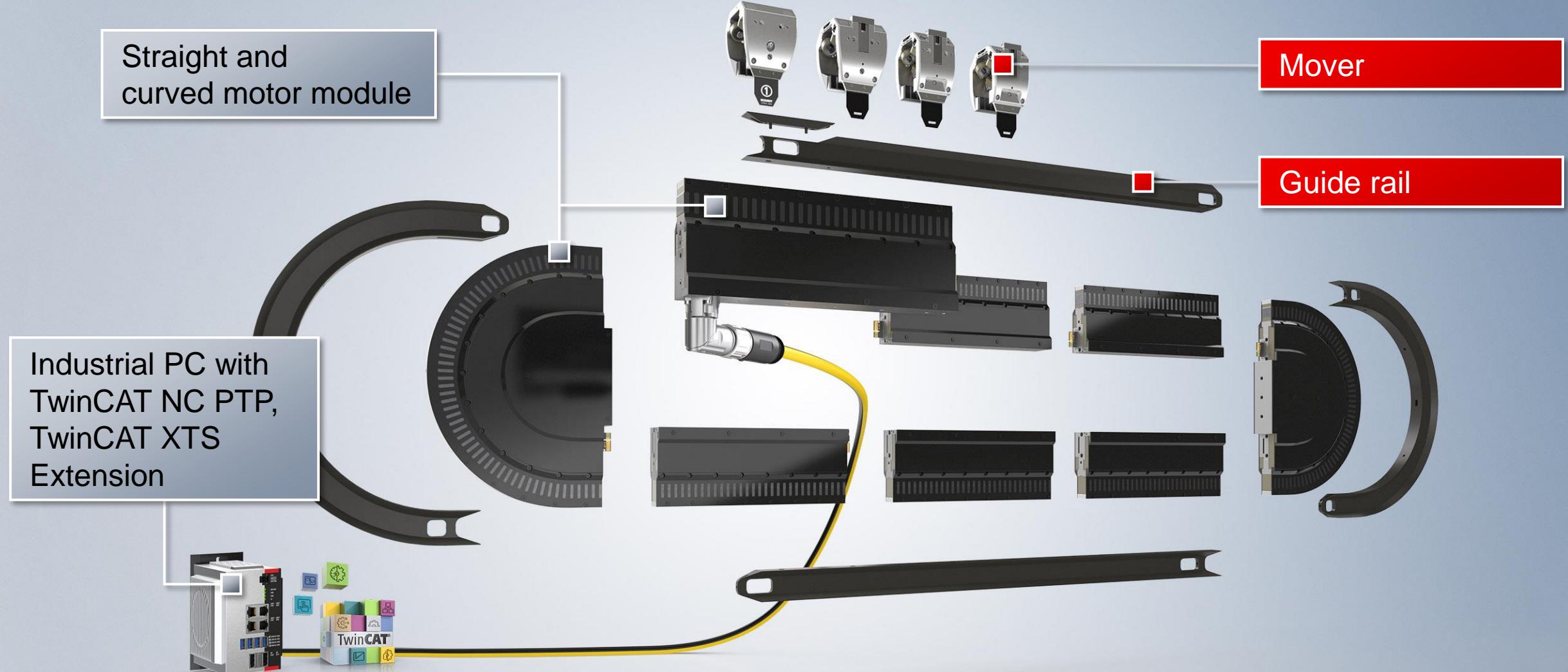
22.5° curve
in 250 mm for
Ø 1273 mm

XTS Modules

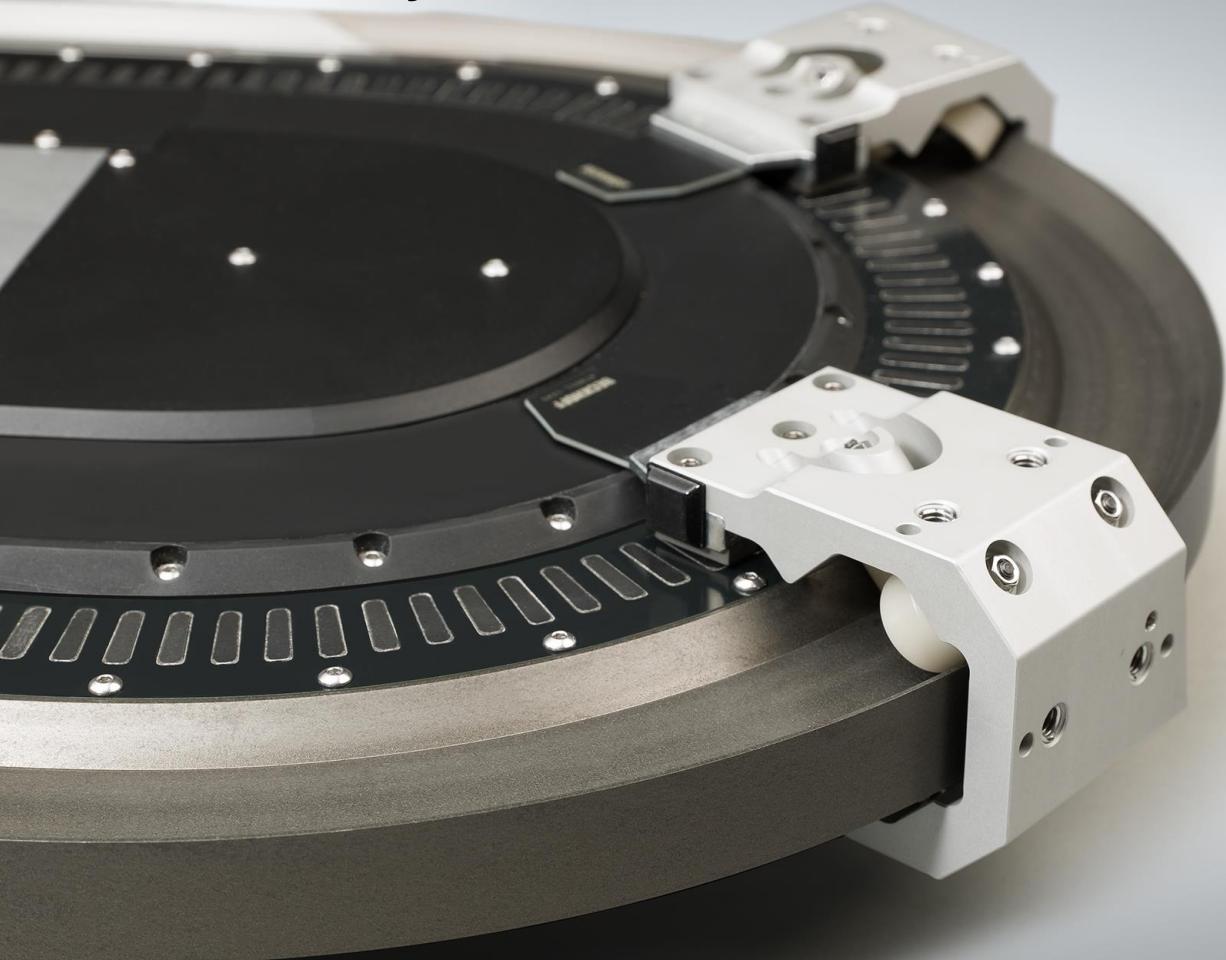
The XTS motor module /Flexible track layouts

BECKHOFF





Beckhoff system solution



Guide rail system, mounted parallel
with the motor modules



XTS Modules

System solution – mover and guide rail

BECKHOFF



Plastic rollers on aluminum
guide rail

**no need for constant
lubrication**

Guide rail mounted on
motor module

low total costs

Modular system offers
expansion options

flexibly adaptation

XTS Modules

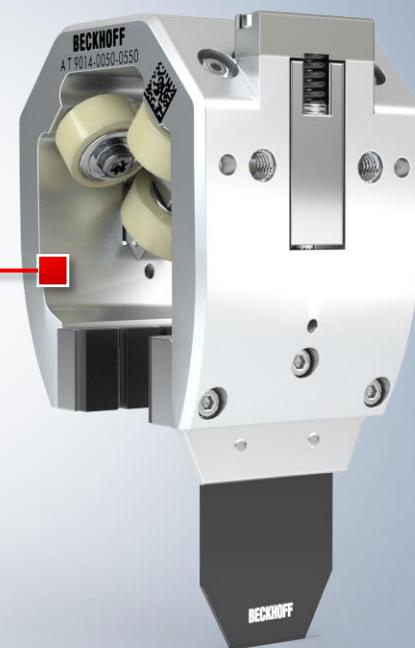
System solution – mover and guide rail

BECKHOFF

 center-to-center
distance min. 60 mm

 300 g standard
payload, even more
mass in tests

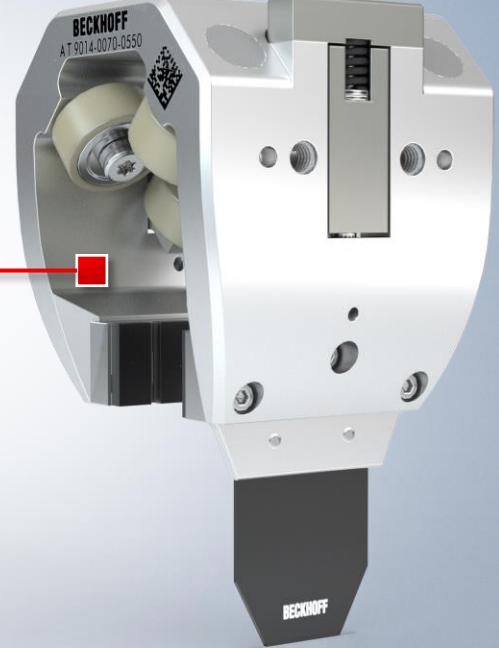
 30,000 km mileage
with Ø 1.5 m/s
during long-term test



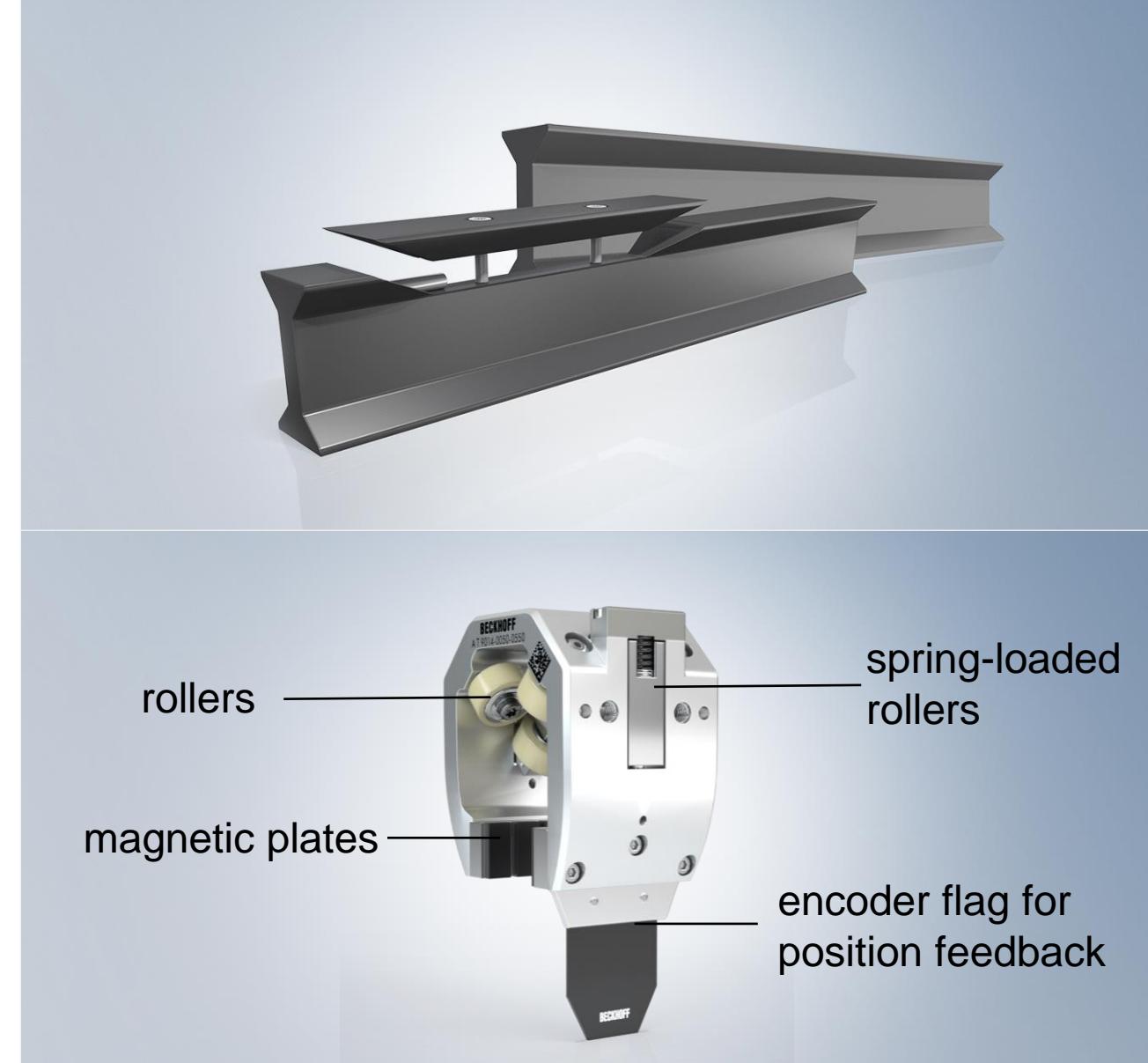
 center-to-center
distance min. 70 mm

 600 g standard
payload, even more
mass in tests

 25,000 km service
life with Ø 1.5 m/s
during long-term test

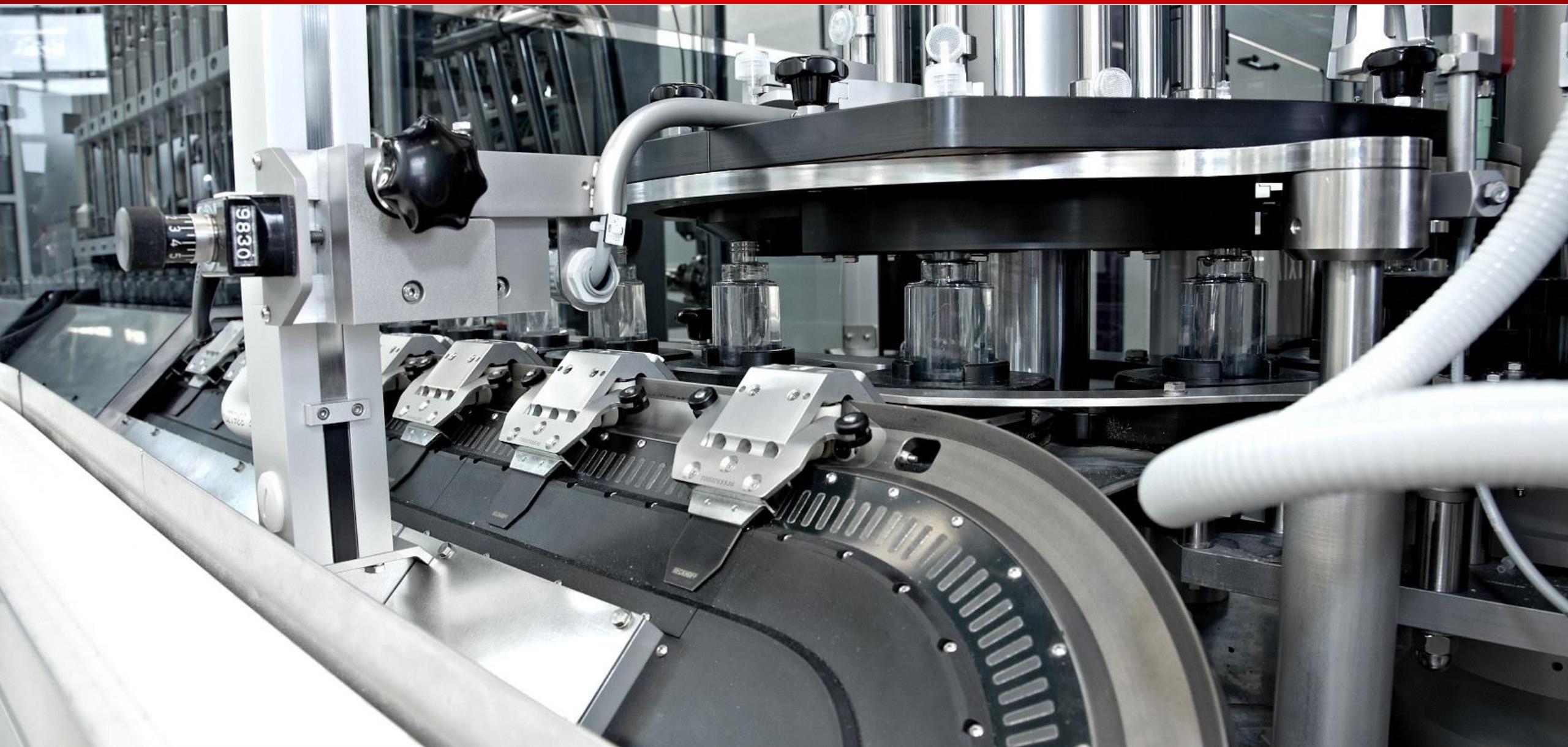


- guide rail made of aluminium
 - straight and curved segments
 - abrasion-resistant hard anodised aluminium surface
 - simple assembly of the guide rail via mechanical interface on the motor module
- mover with plastic rollers
 - backlash-free running through optimized geometry
 - no lubrication necessary
 - spring-loaded rollers reduce service interval



Application example: Cosmetics filling line – Groninger & Co. GmbH, Germany

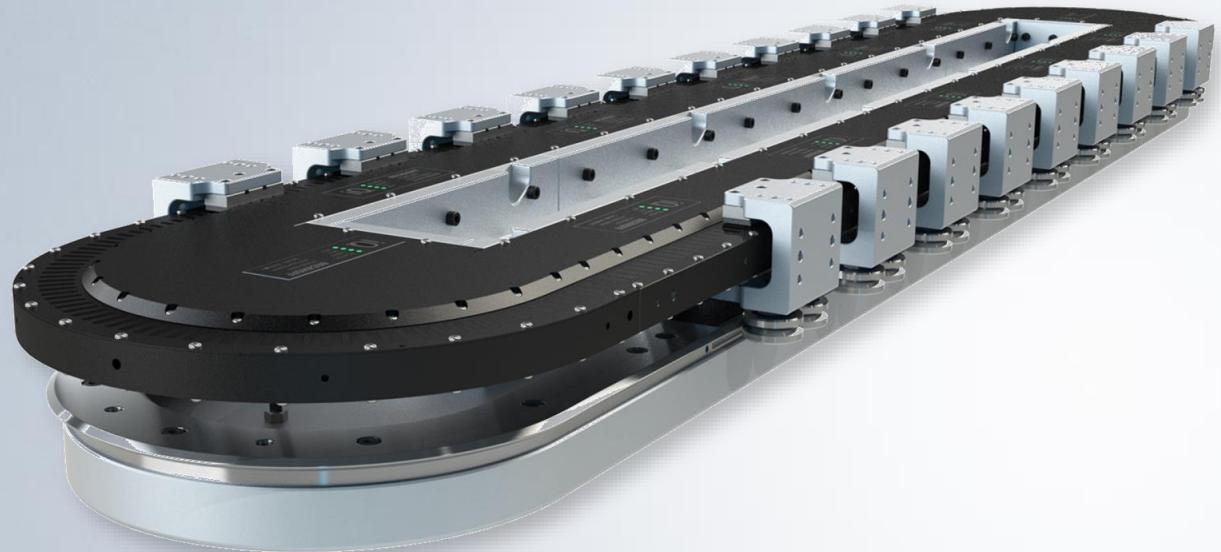
BECKHOFF



XTS Modules

Guide rail system mounted parallel with the motor modules

BECKHOFF



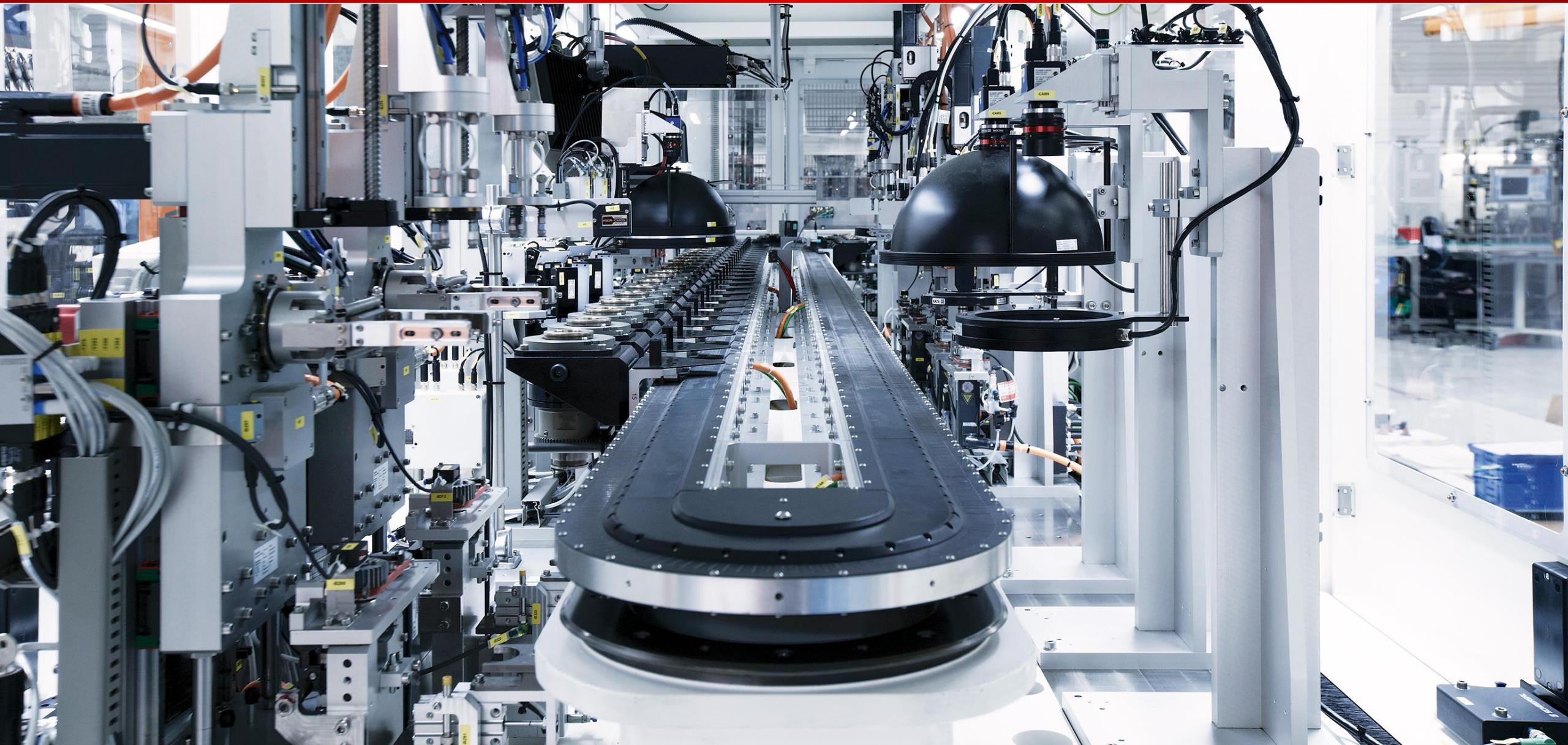
Parallel guide rail absorbs
weight forces
high payloads

Steel rollers on steel
guide rail
high durability

Movers with different magnet
plate sets
high process forces supported

Application example: Optical inspection system – GEFASOFT, Germany

BECKHOFF



XTS Modules guide rail and movers Comparison

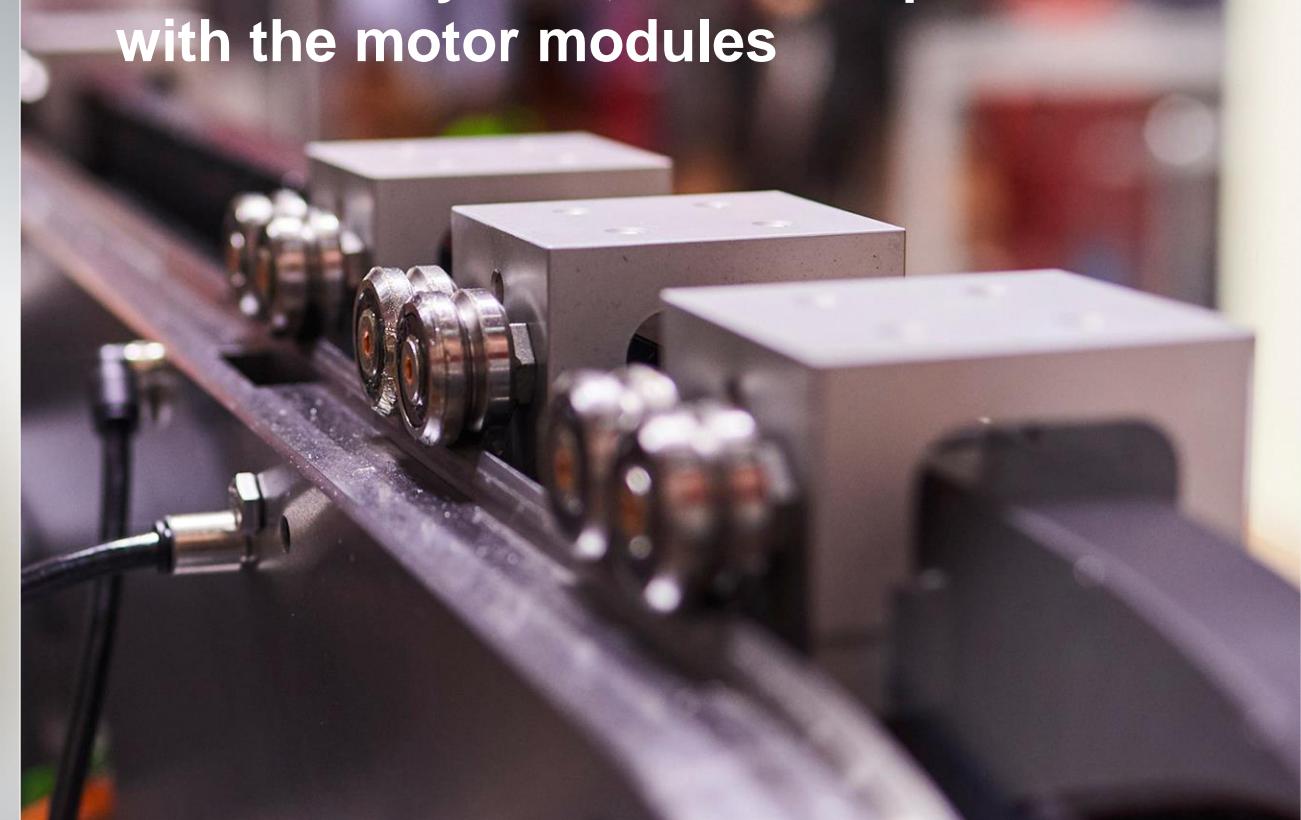
BECKHOFF

Beckhoff system solution



- highest level of dynamics
- low costs
- lubricant-free

Guide rail system, mounted parallel with the motor modules

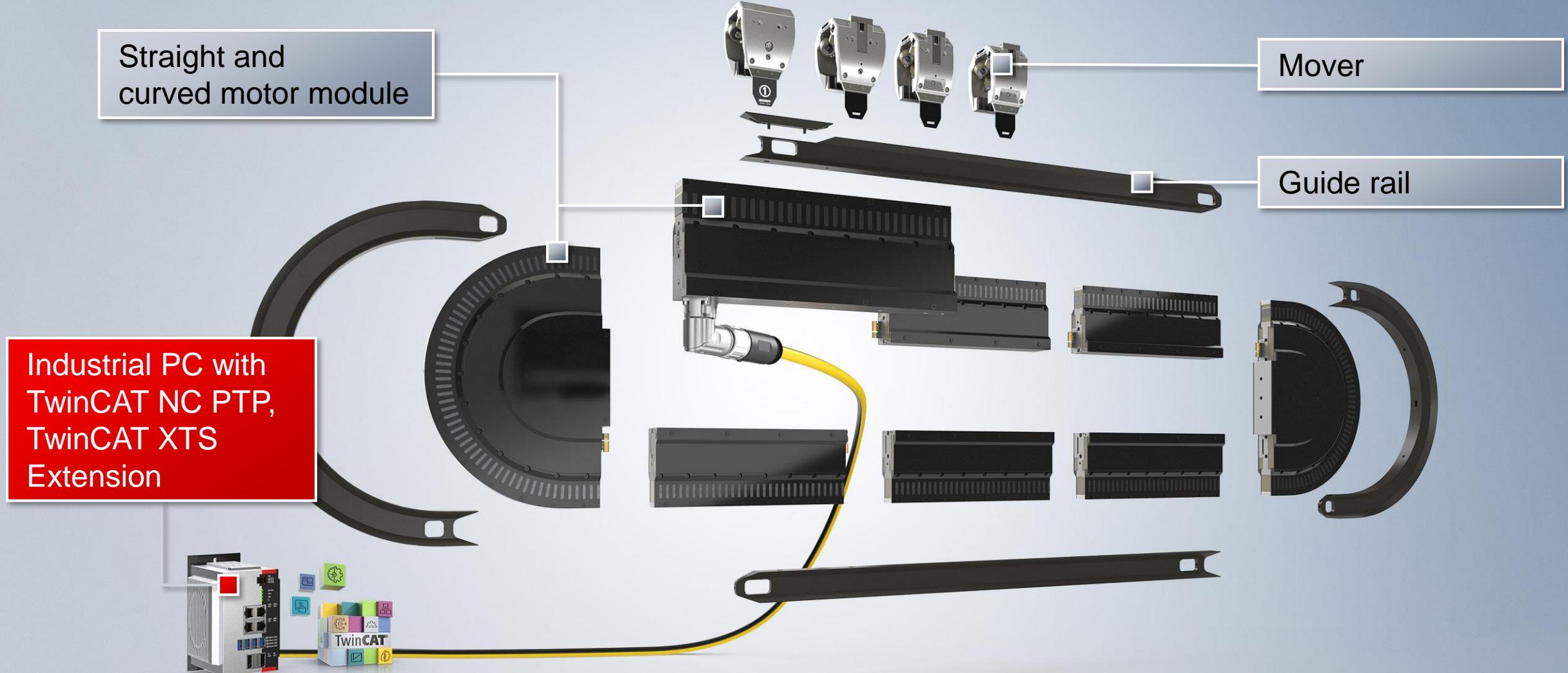


- higher loads
- higher process forces
- maximised service life

XTS Modules

The control system

BECKHOFF



XTS Modules

The control system

BECKHOFF



PC-based control

Data is available centrally
(diagnostics, predictive
maintenance ...)



PC-based control

real-time coupling
between process and hardware



PC-based control

suitable configurations
for controlling the overall process



XTS Extension



- easy handling of desired movements
- All motion control functions are available:
flying saw, electrical gear unit, cam plates ...

Motion Control

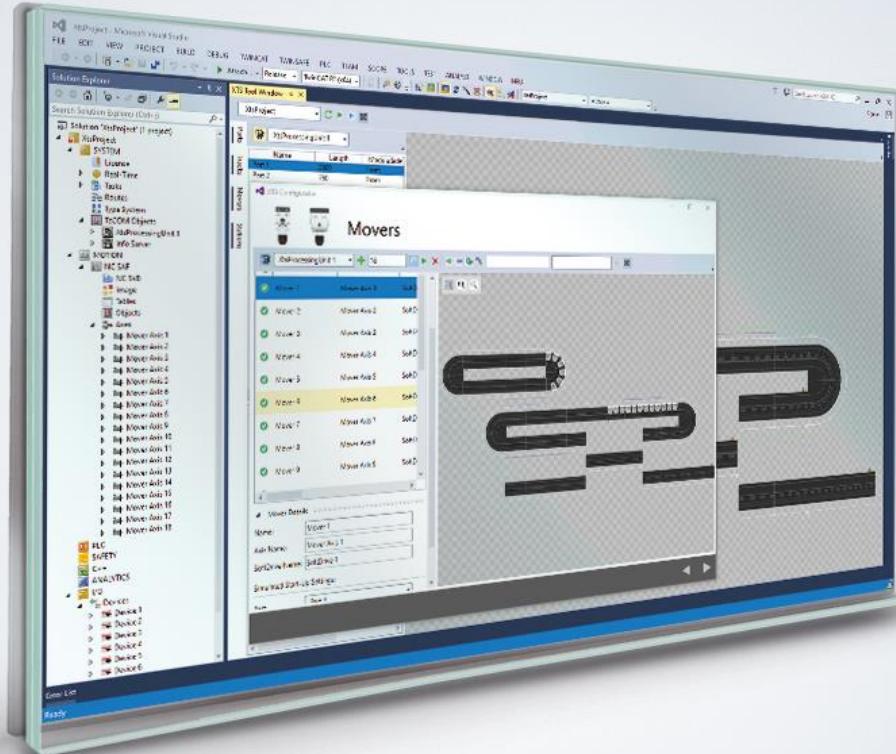


- functional extensions handle typical XTS requirements
- automatic accumulation, collision and jerk avoidance, centrifugal force limitation

HMI



- creating visualizations with a single mouse click
- extensive visualization options with TwinCAT3
- Different levels of detail enable easy system diagnostics.



XTS software

Integrated simulation functions
facilitate plant design

XTS software

Software tools simplify
configuration

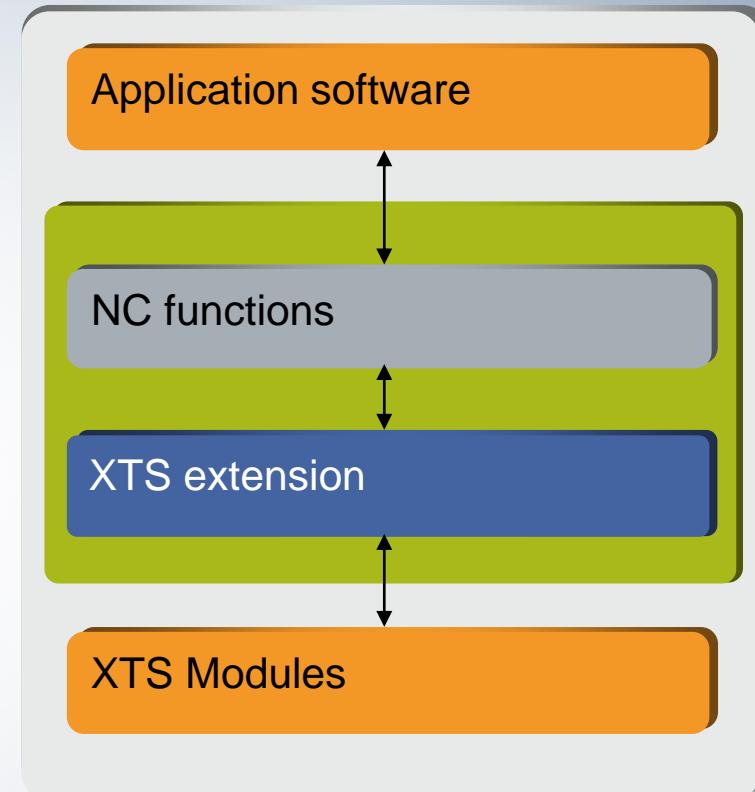
XTS software

Motion control function blocks
reduce engineering effort

XTS Extension



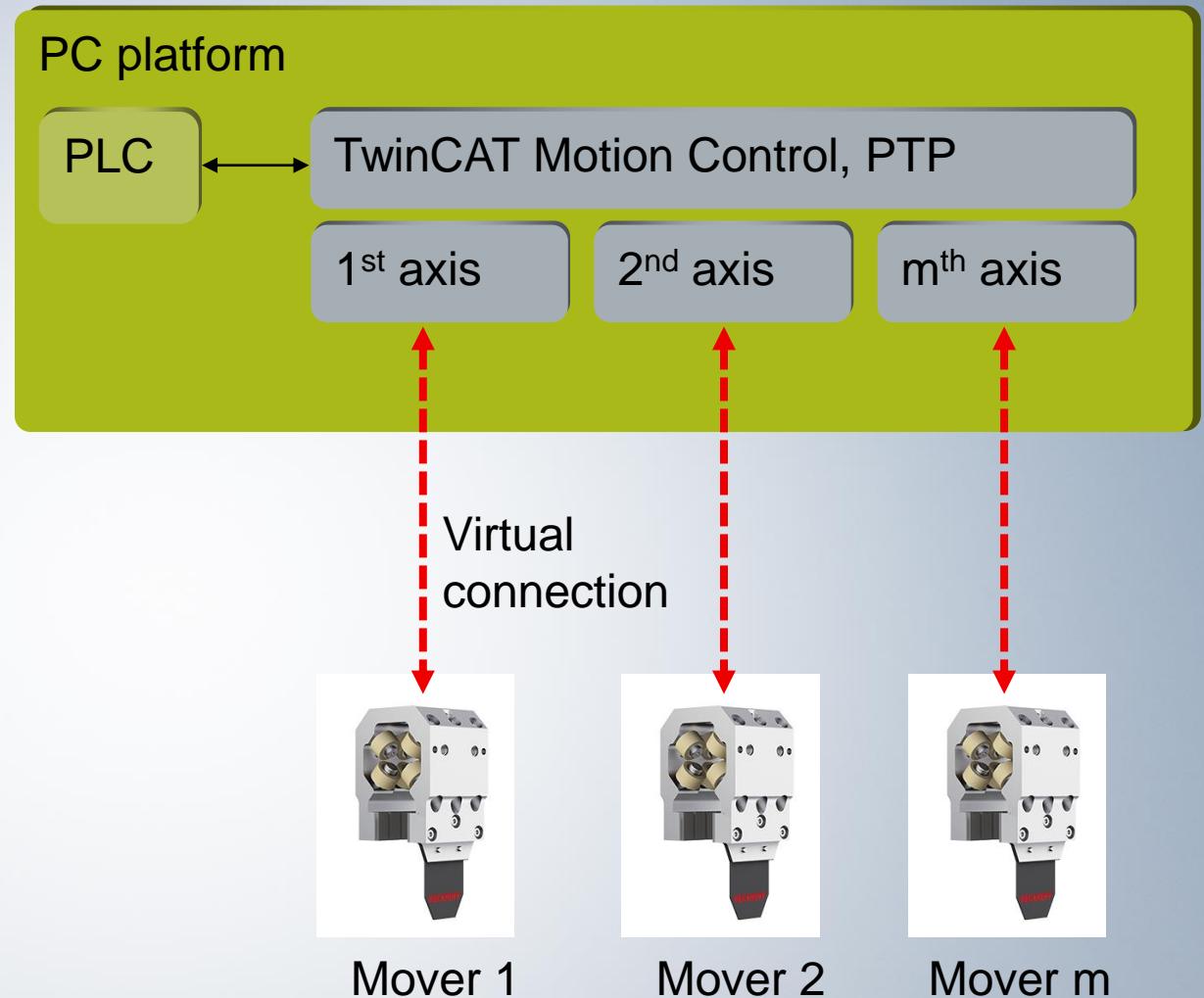
- From the point of view of application programming, a mover appears like a “normal” servo axis



XTS Extension



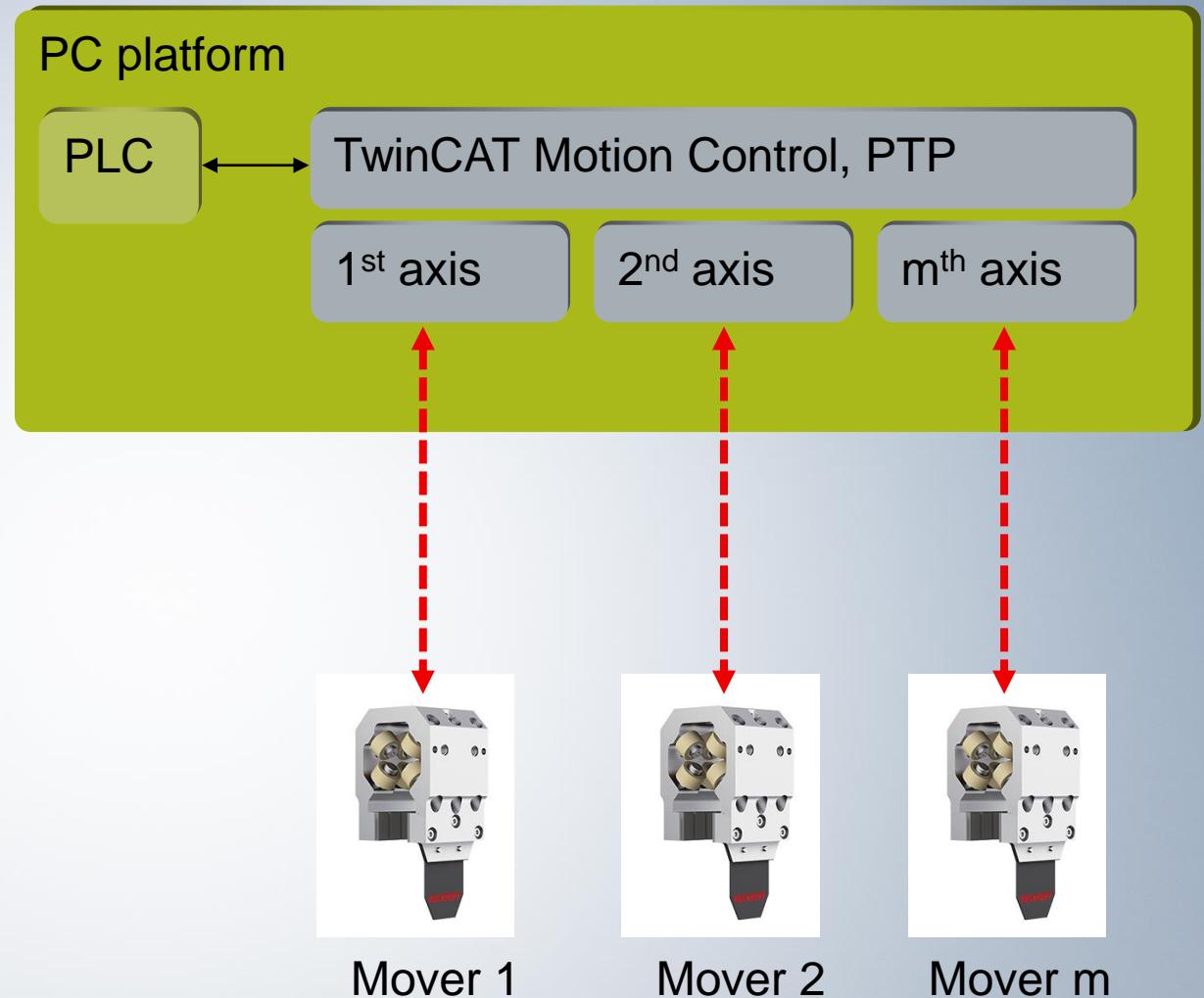
- The XTS extension in TwinCAT decouples servo algorithms from the hardware components and calculates them centrally.



Motion Control



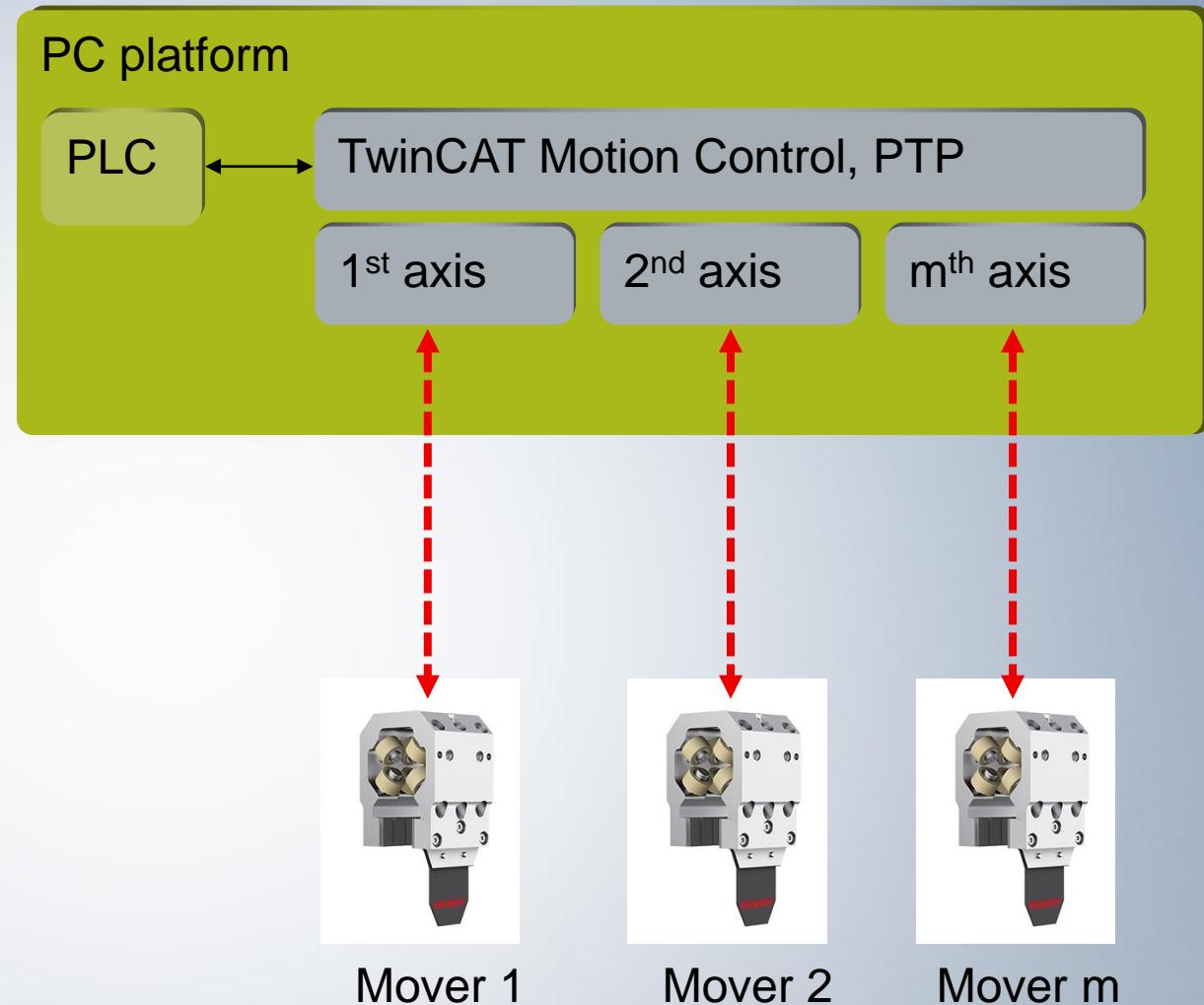
- all motion control functions are available, e.g.
 - flying saw
 - electrical gear unit
 - cam plates



Motion Control



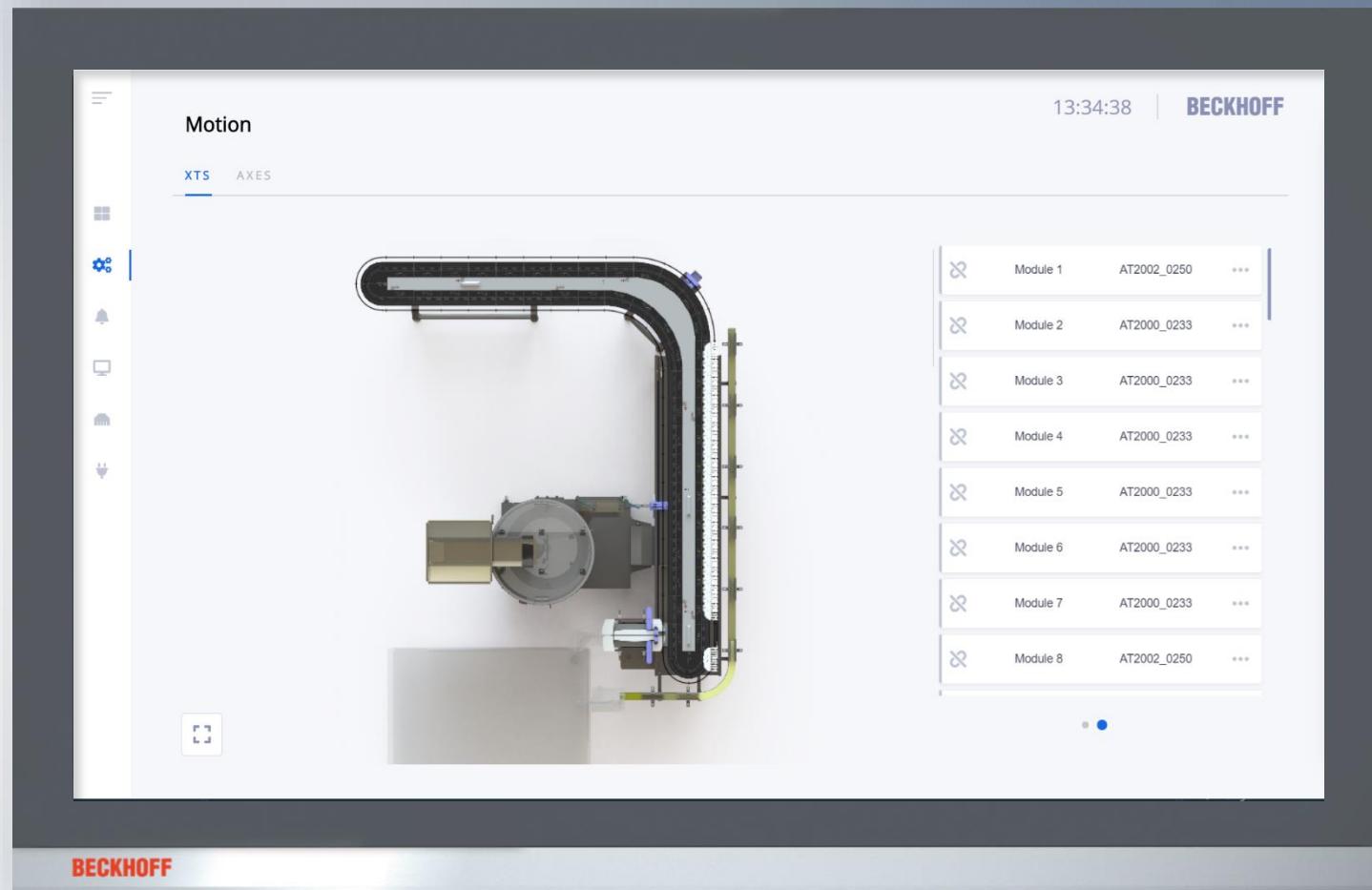
- functional extensions handle typical XTS requirements
 - automatic accumulation
 - collision and jerk avoidance
 - centrifugal force limitation



HMI



- XTS HMI Control offers visualization options for the machine operator



HMI



- EC-Diag HMI Control offers visualization options for the machine operator

The screenshot displays the BECKHOFF Motion Control software interface. On the left, a ladder logic diagram shows two parallel branches. The top branch contains a coil labeled 'T1' and a normally open contact. The bottom branch contains a coil labeled 'T2' and a normally closed contact. Both branches lead to a common output coil labeled 'T3'. On the right, there are two windows: one titled 'Detaillansicht' showing a table of values for various axes, and another titled 'Toren 2.0 (EL1200)' showing a terminal configuration for a 'Digital Input' module.



Complex sequences – simplified solution:
XTS

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