

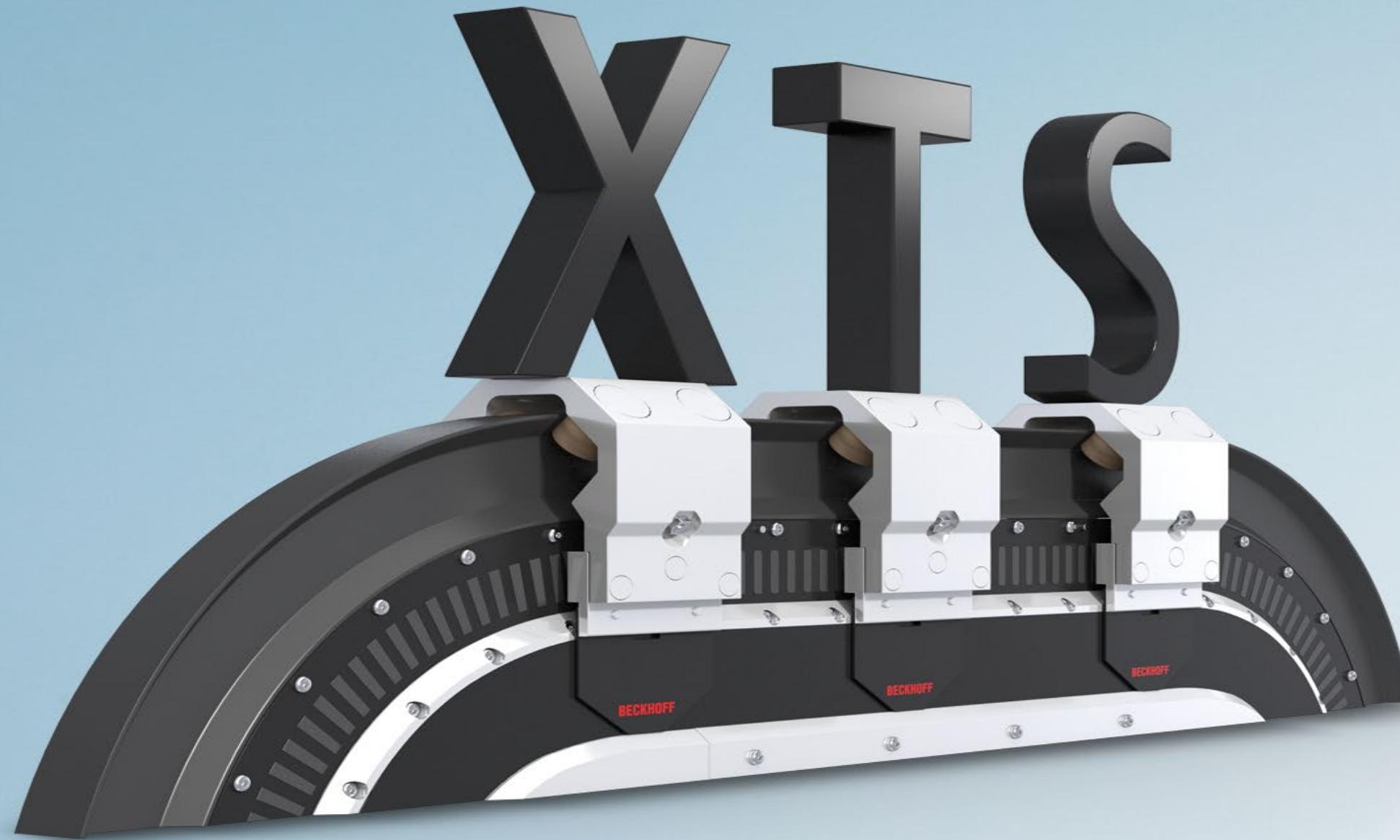
New Automation Technology

Beckhoff Automation

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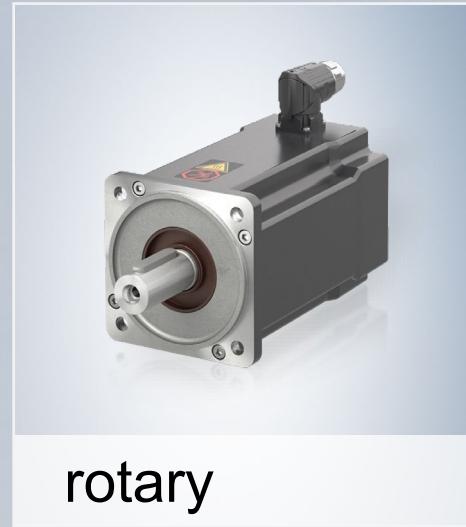




XTS | a new dimension for intelligent product transport

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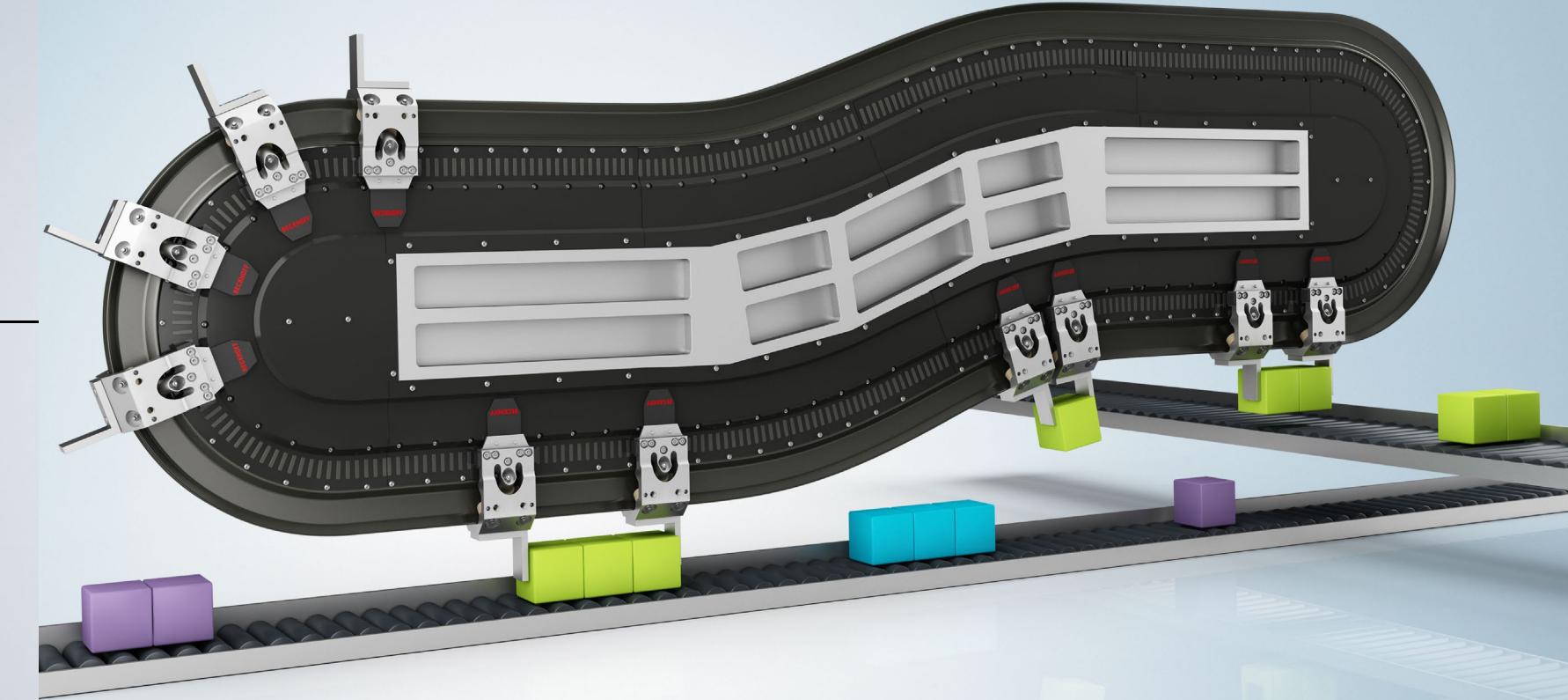
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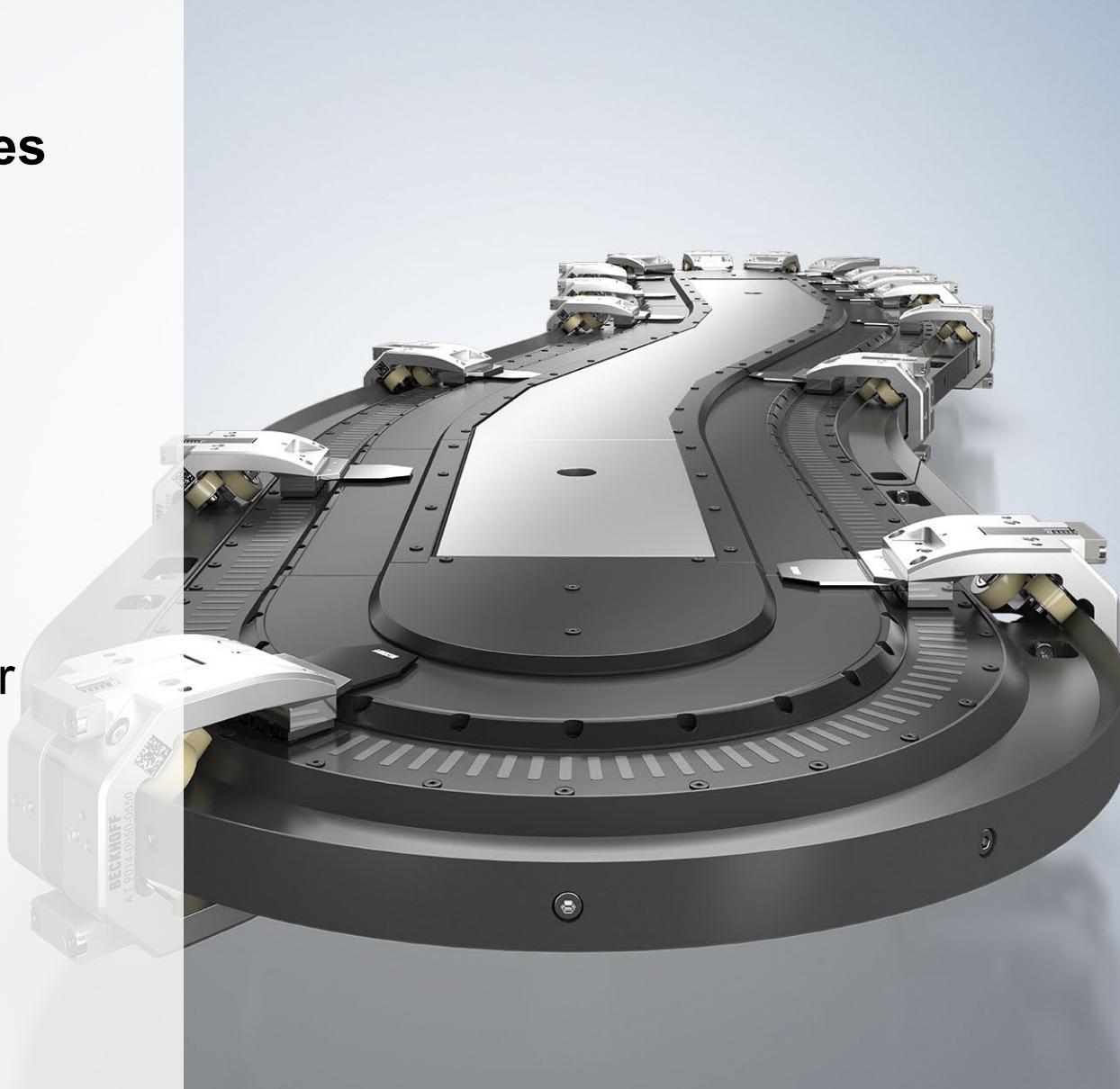
rotary



linear



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

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



20 kg payload,
even more in coupled
operation



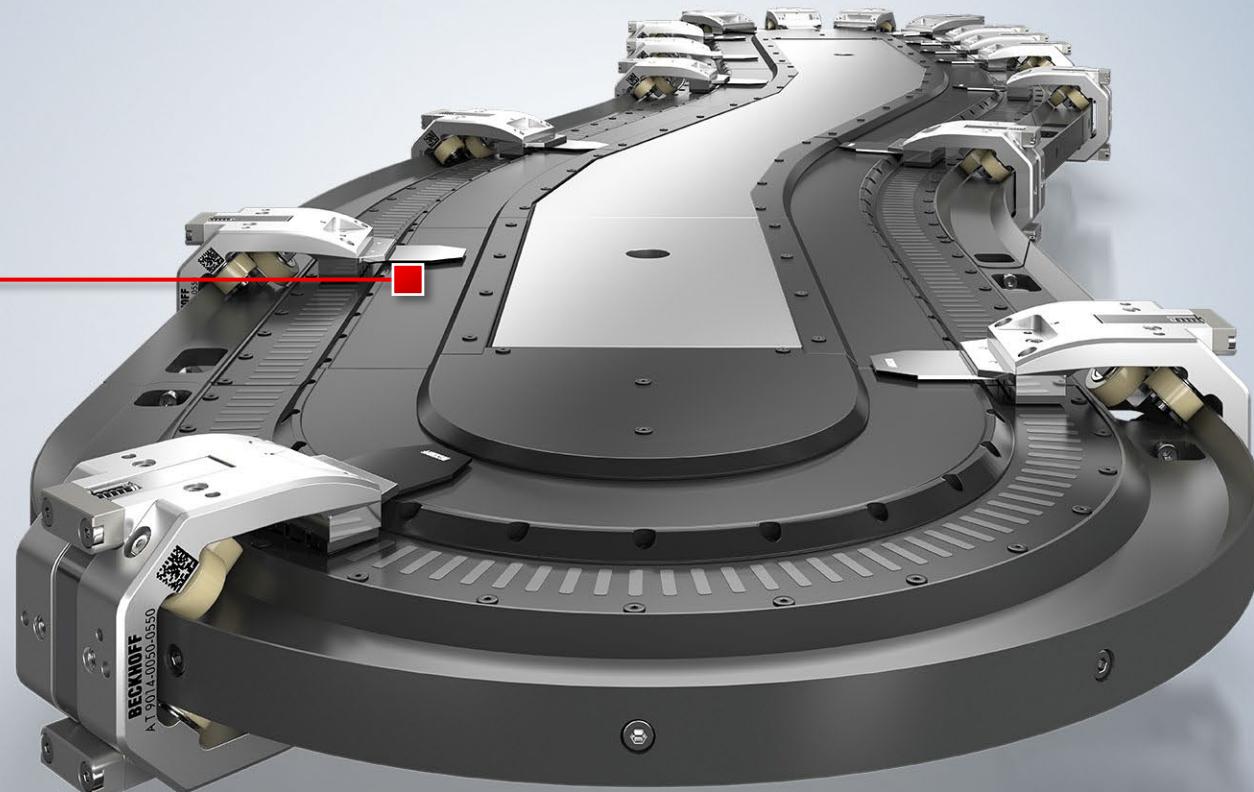
repeat accuracy
down to (\pm) 10 μm



center-to-center distance
of 50 mm possible

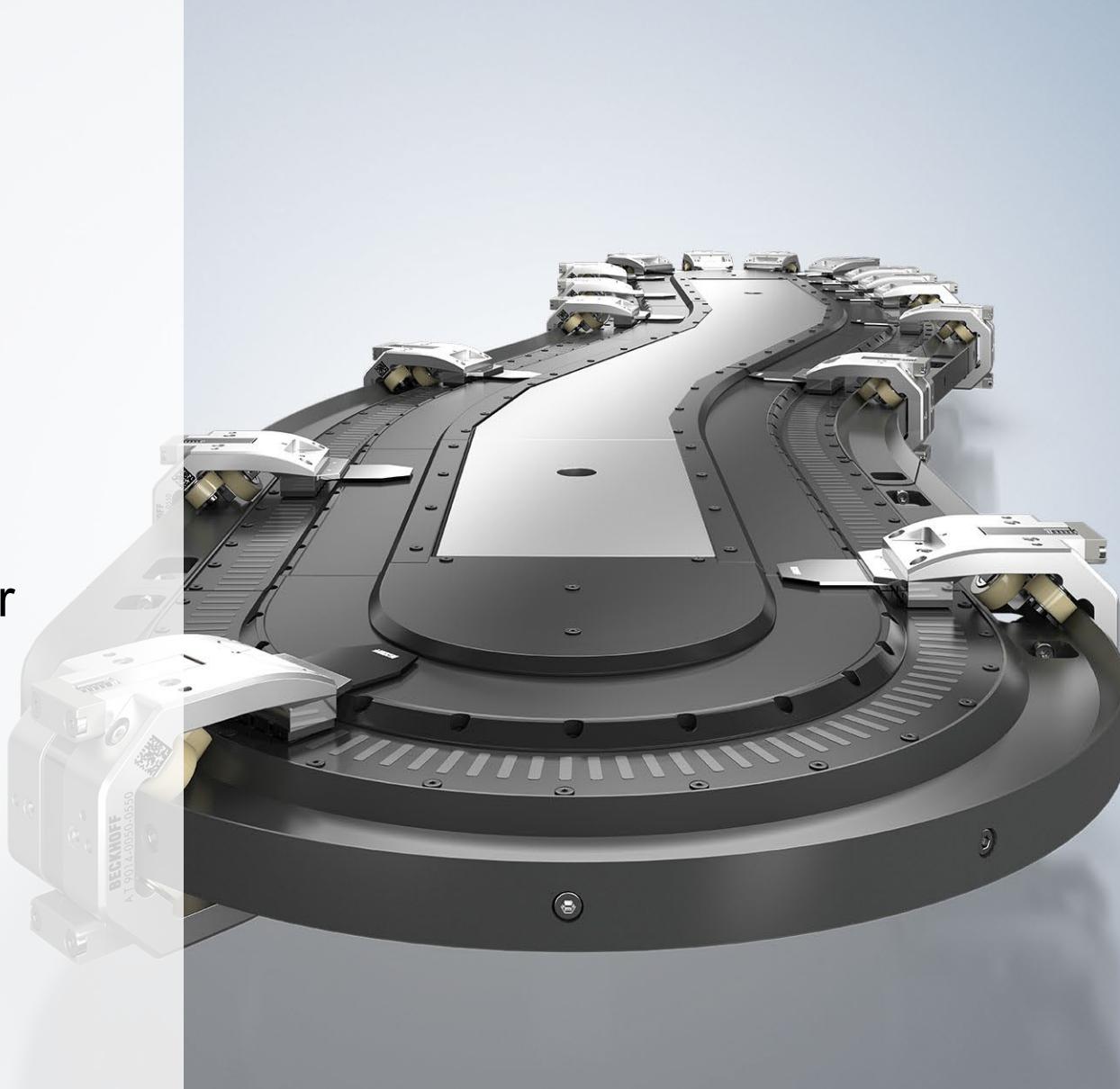


mover identification
(standard and Mover 1)



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	

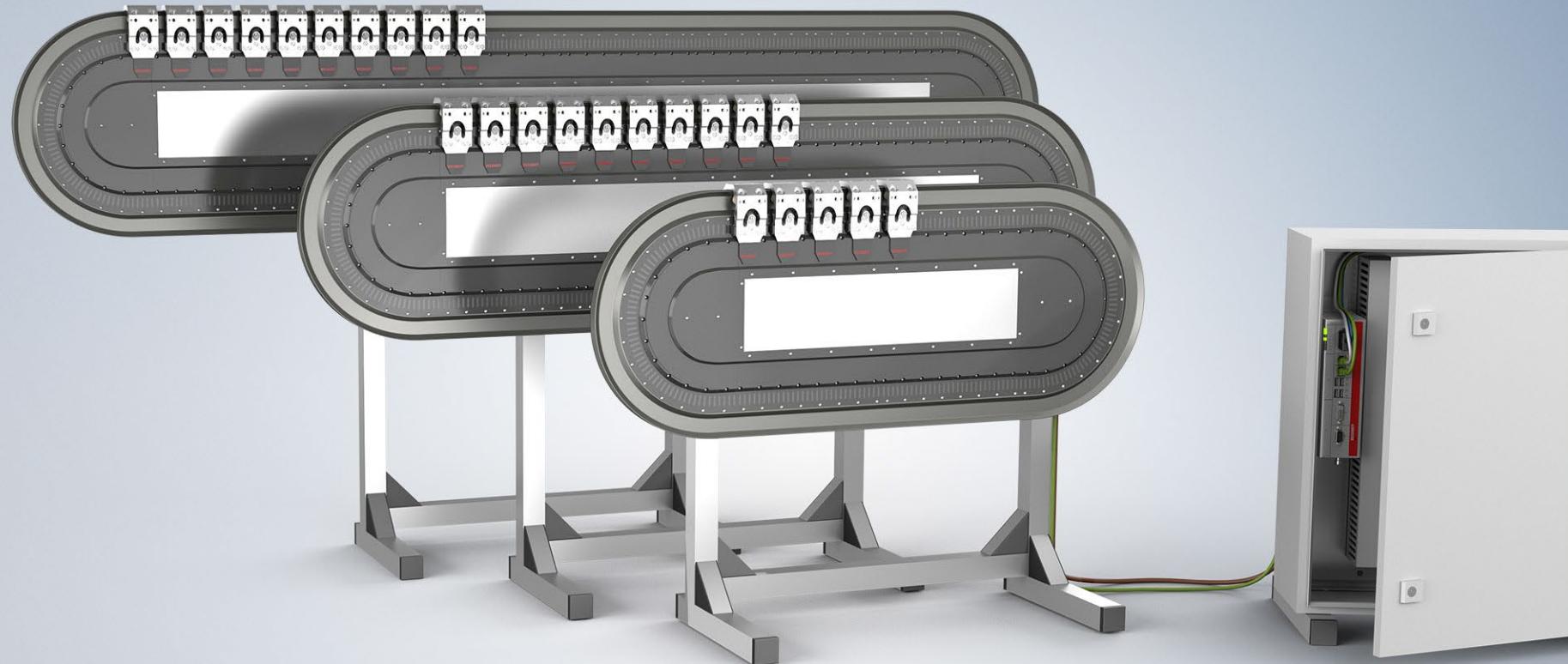
1. XTS-StarterKit
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XTS StarterKit

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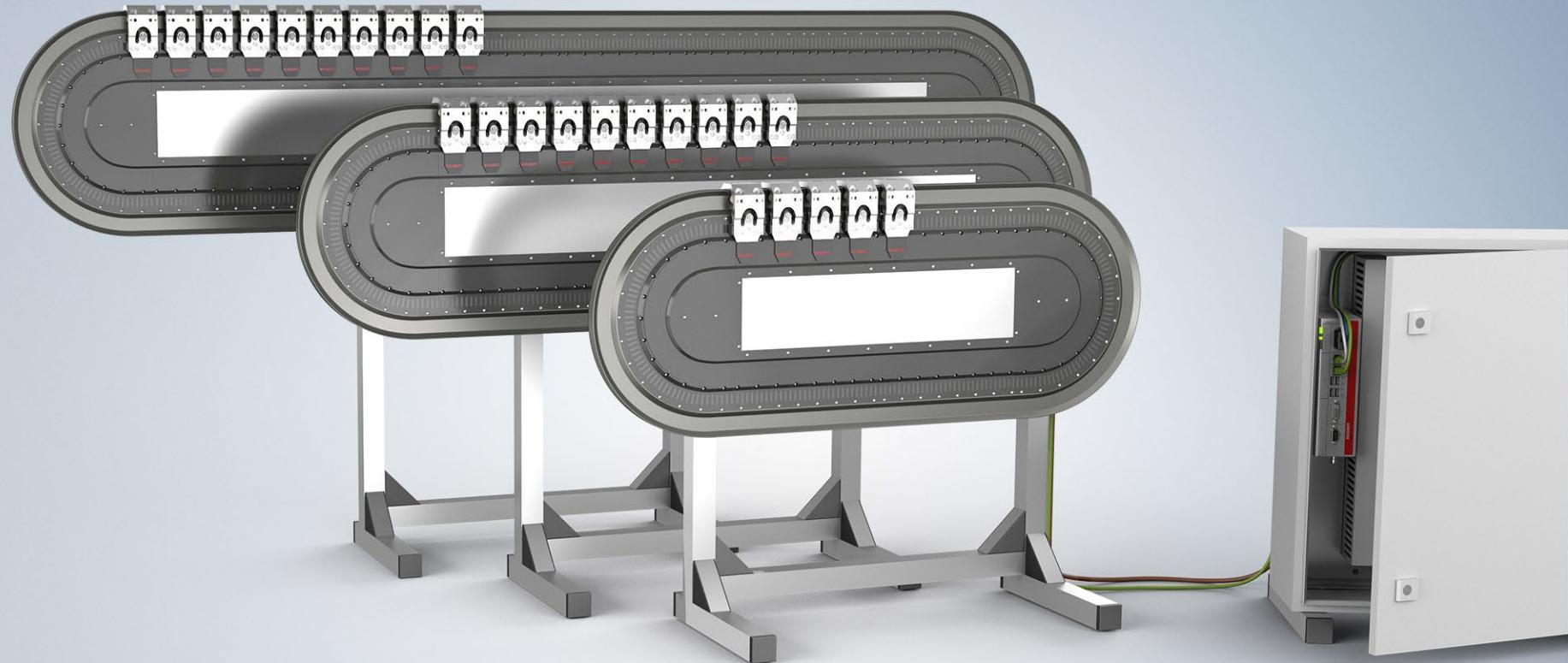
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XTS starter kits

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

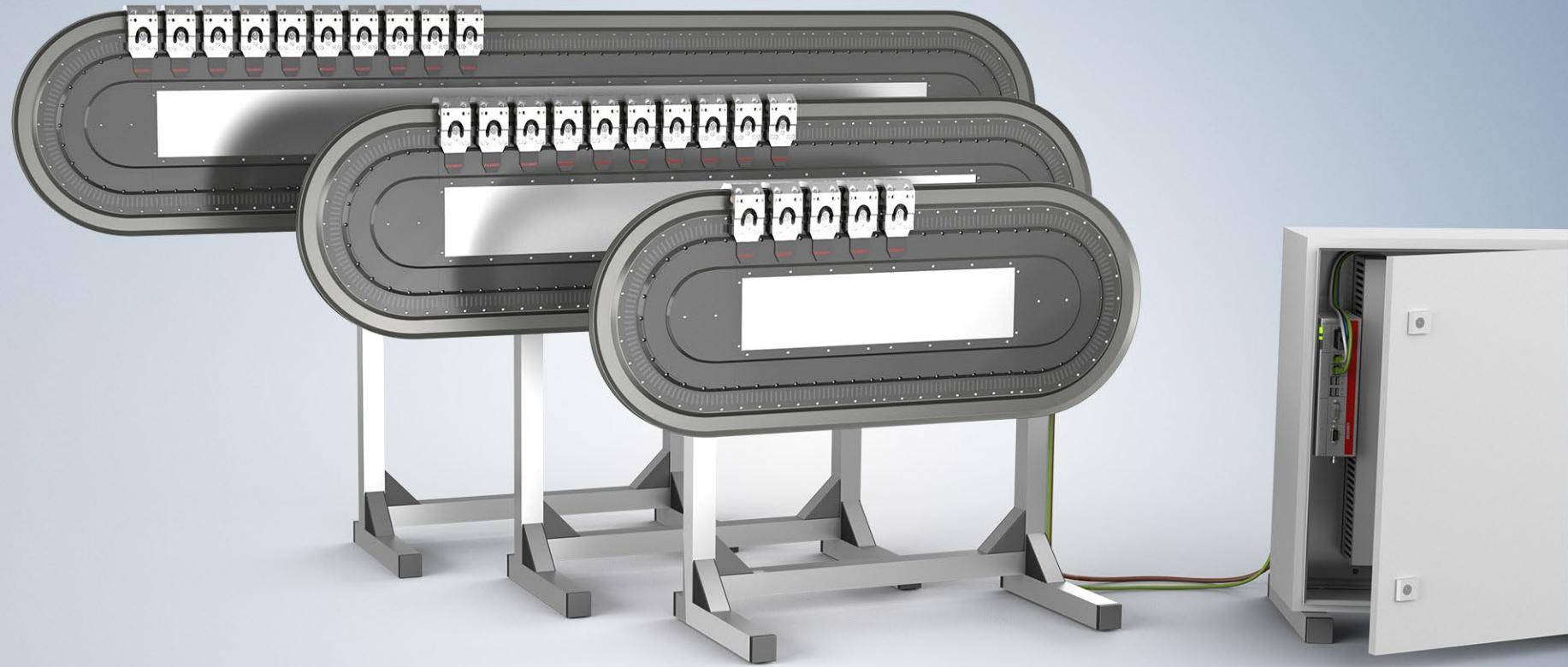
XTS starter kits
**first mover movements
possible with little effort**

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

XTS starter kits

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AT2000-0500

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

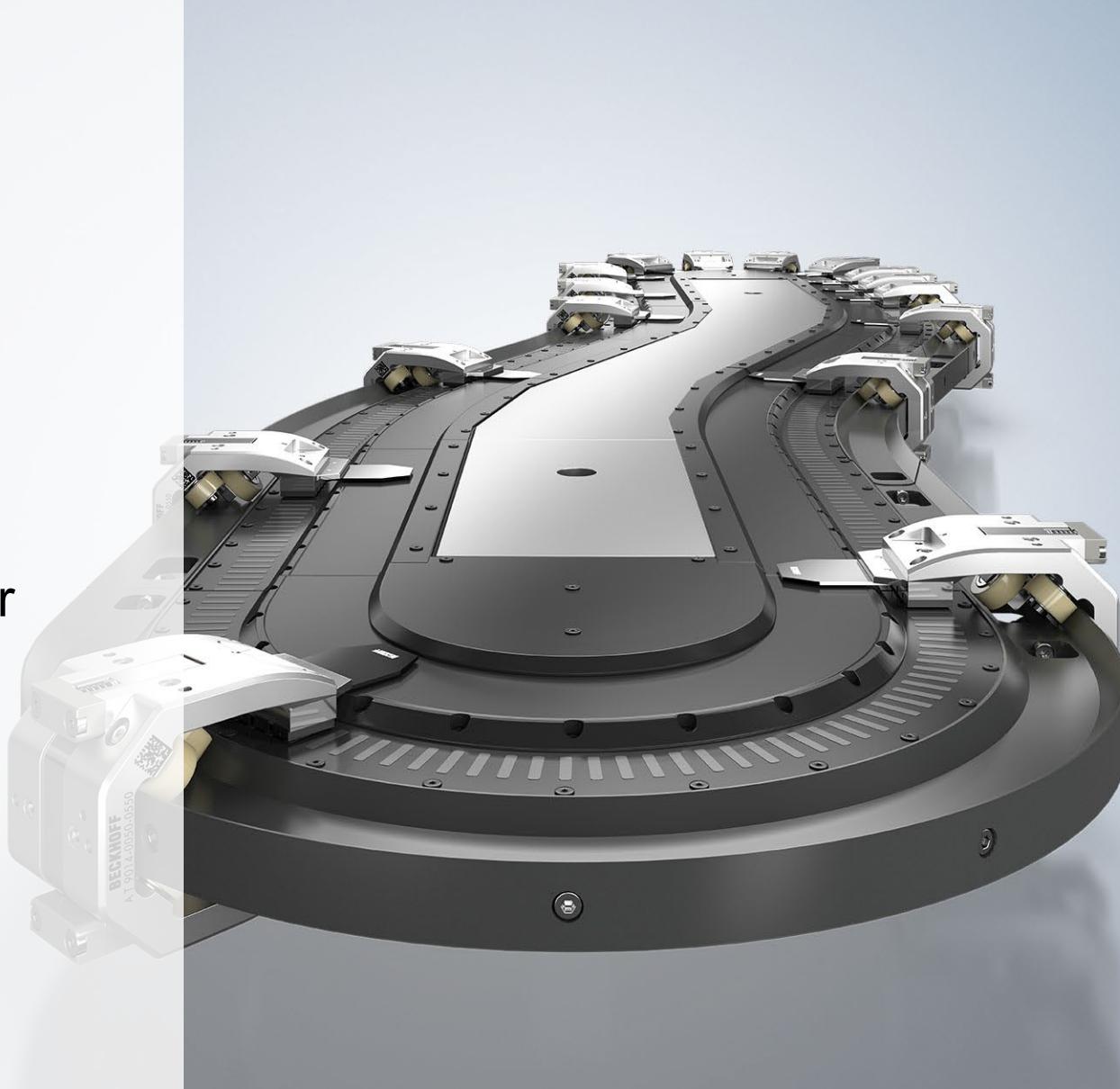
AT2000-1000

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

AT2000-1500

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

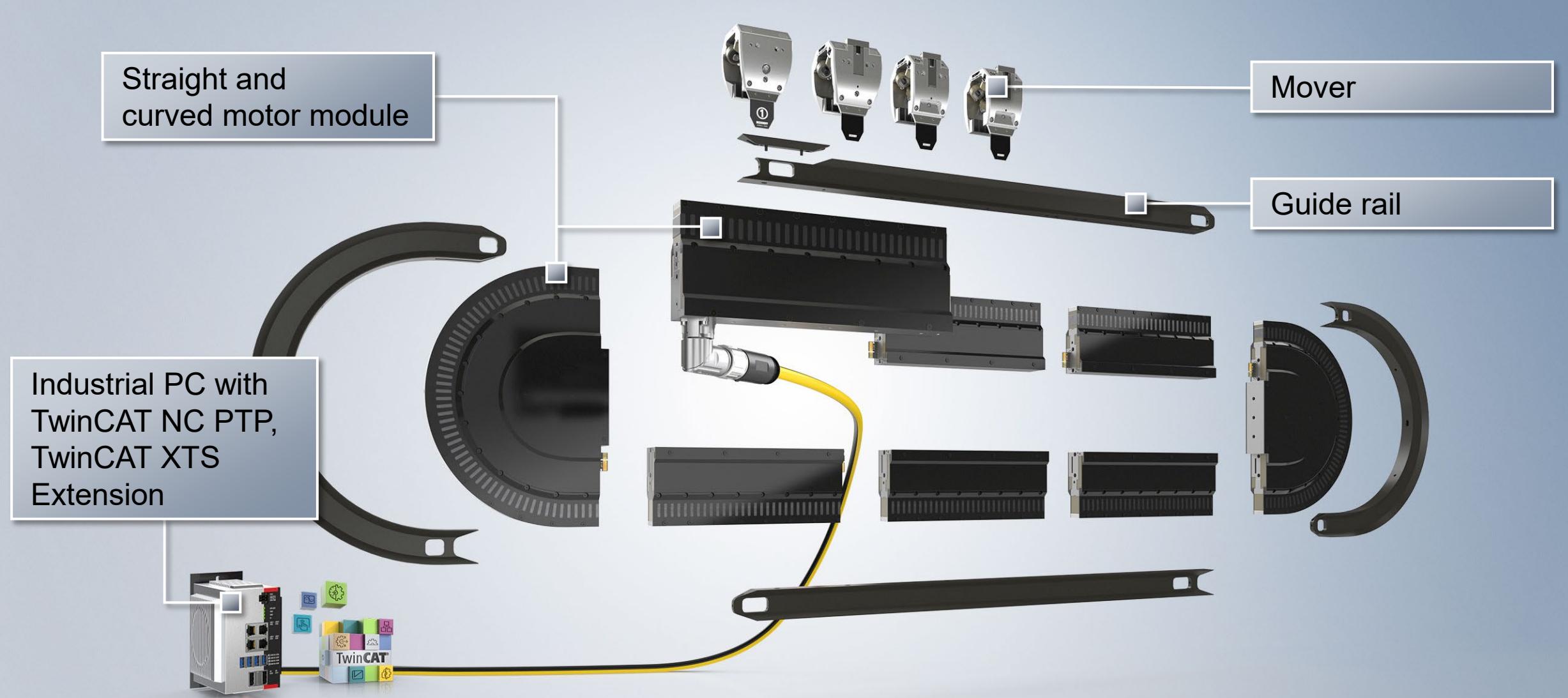
1. XTS-StarterKit
- 2. XTS Module**
3. Preparation and Assembly
4. First Test
5. Rail mounting
6. Rerailing of Mover



XTS Modules

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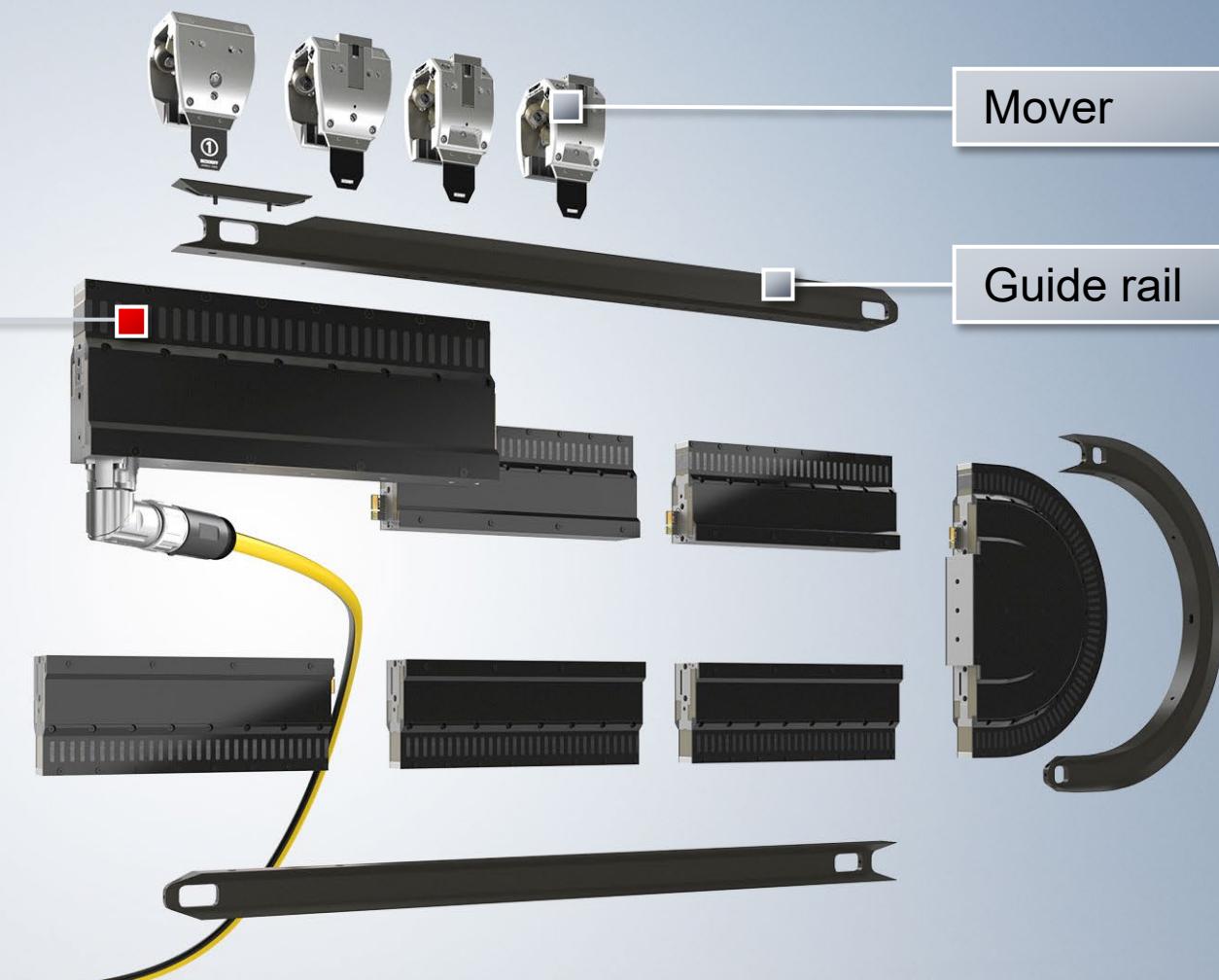
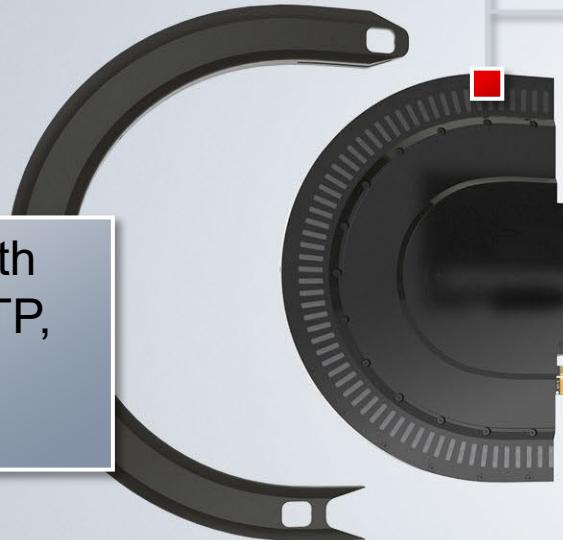


The XTS motor module

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Straight and curved motor module

Industrial PC with
TwinCAT NC PTP,
TwinCAT XTS
Extension

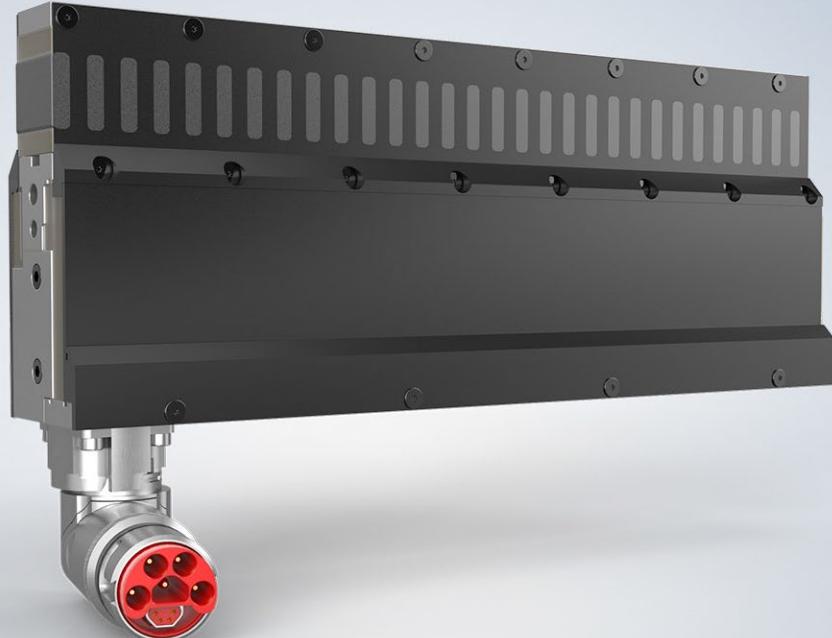


XTS Modules

The XTS motor module

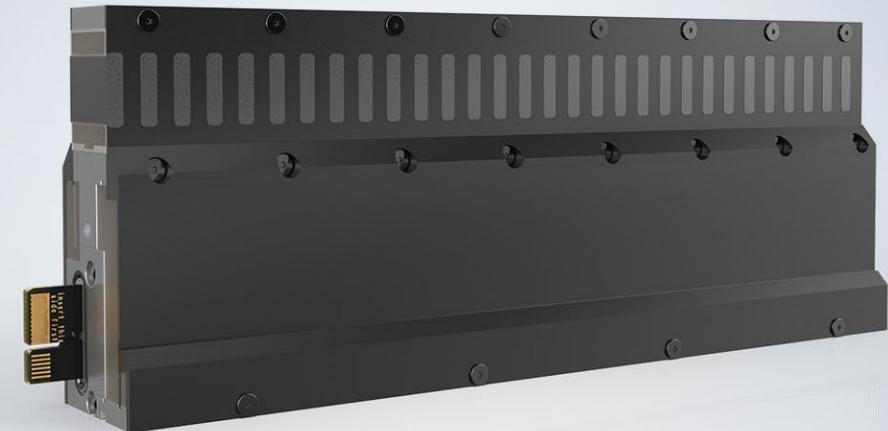
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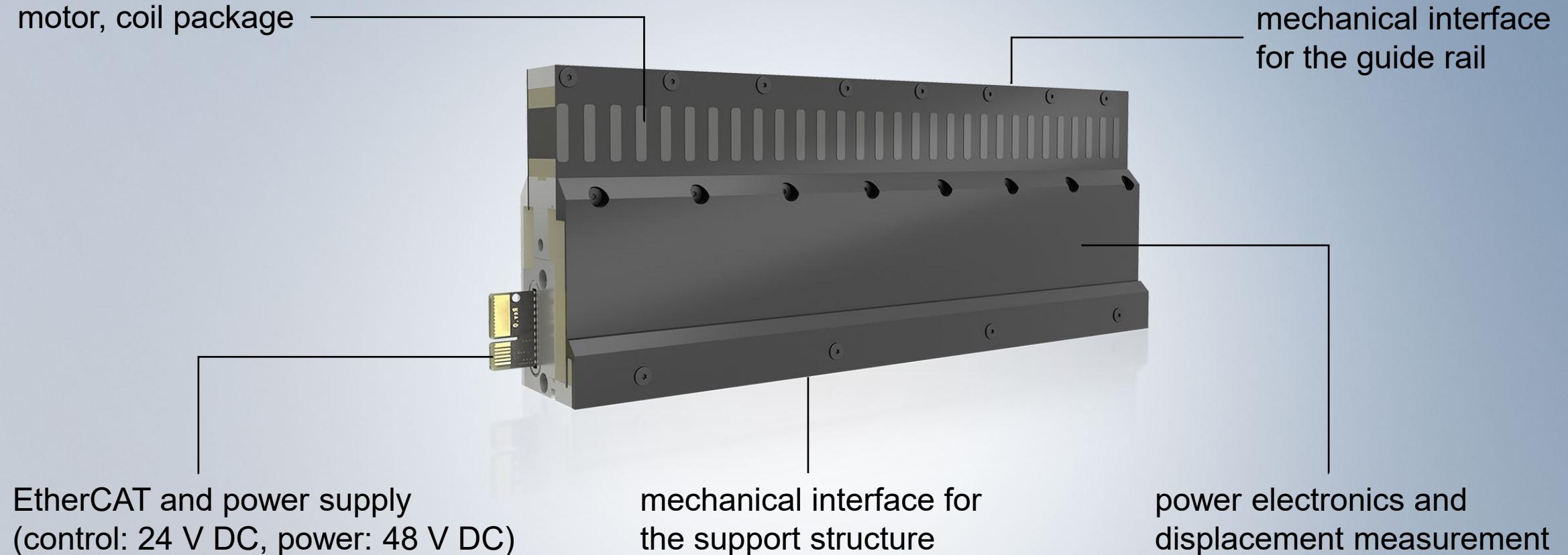


Fully integrated
motor function and multi-position
detection

Fully integrated
power supply and data
communication



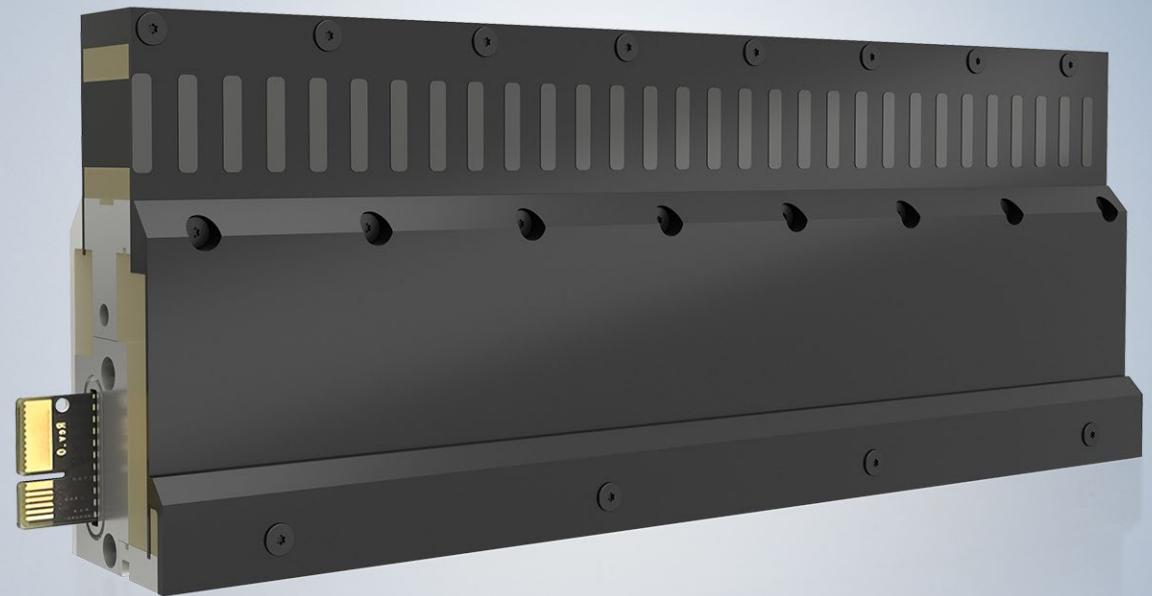
Fully integrated
interface for machine bed and
guide rail



The XTS motor module

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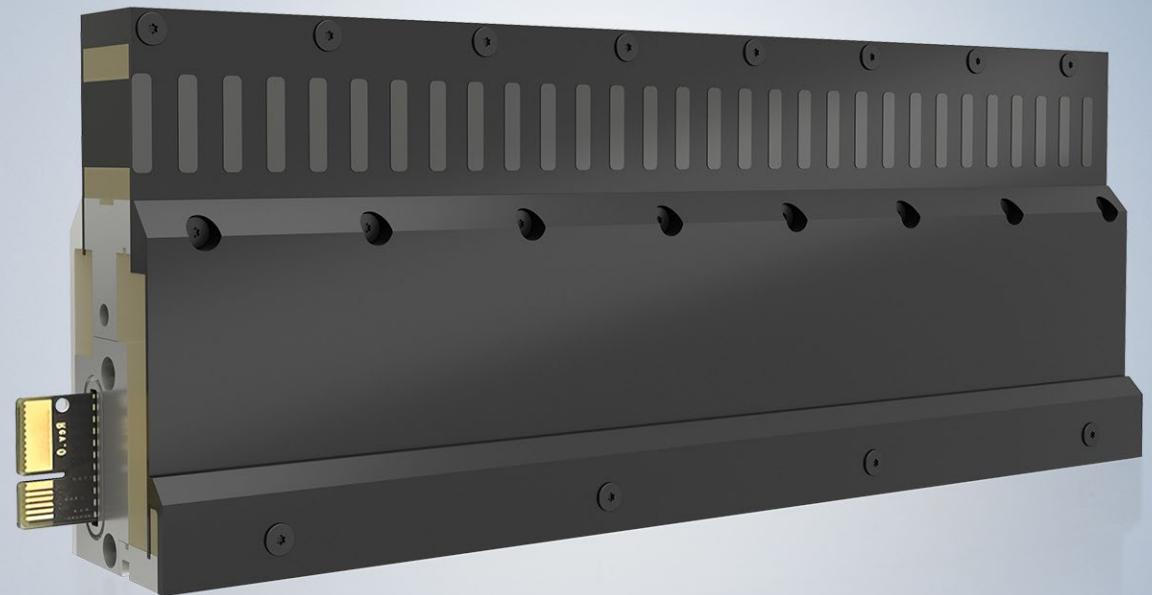
- power supply, EtherCAT
 - motor modules with/without supply cables
 - supply can be connected internally across motor modules
 - supply voltage in the protective low voltage range
- power electronics
 - output stages integrated in coil package
 - temperature monitoring of output stage
 - temperature model of the coils for optimum peak load utilization (I^2T model)



The XTS motor module

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- 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

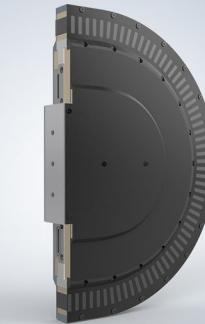
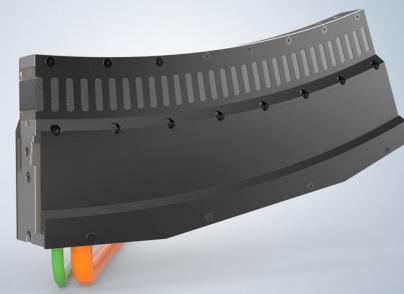
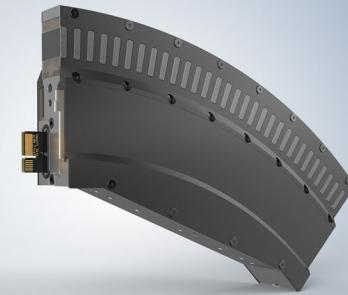
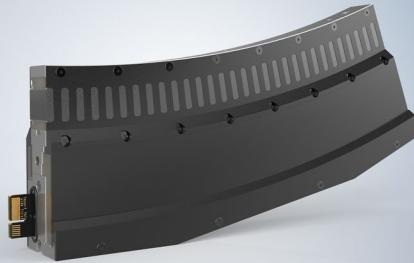
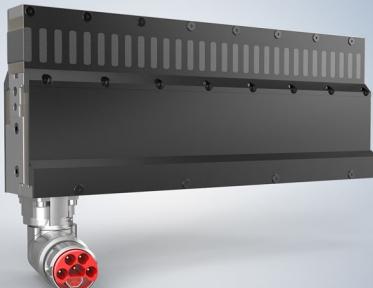
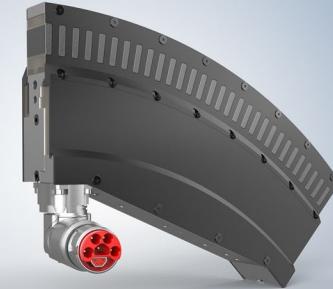


XTS Modules

The XTS motor module

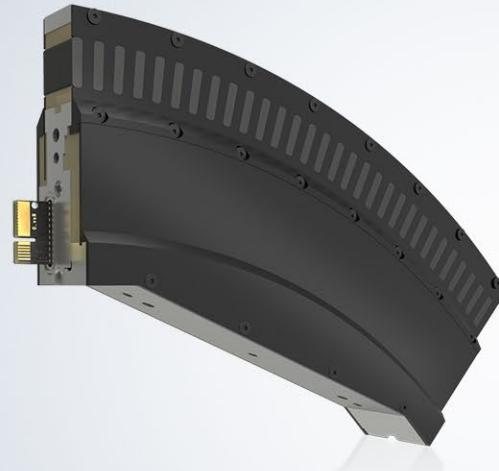
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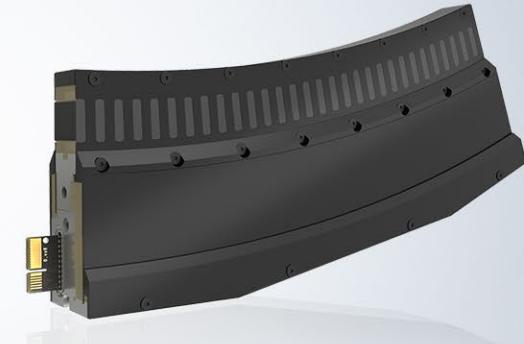




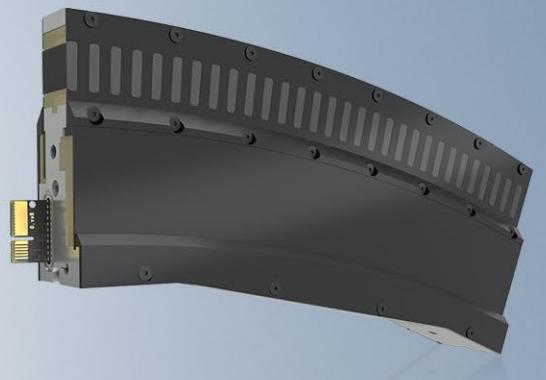
180° curve
(clothoid)
in 500 mm



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

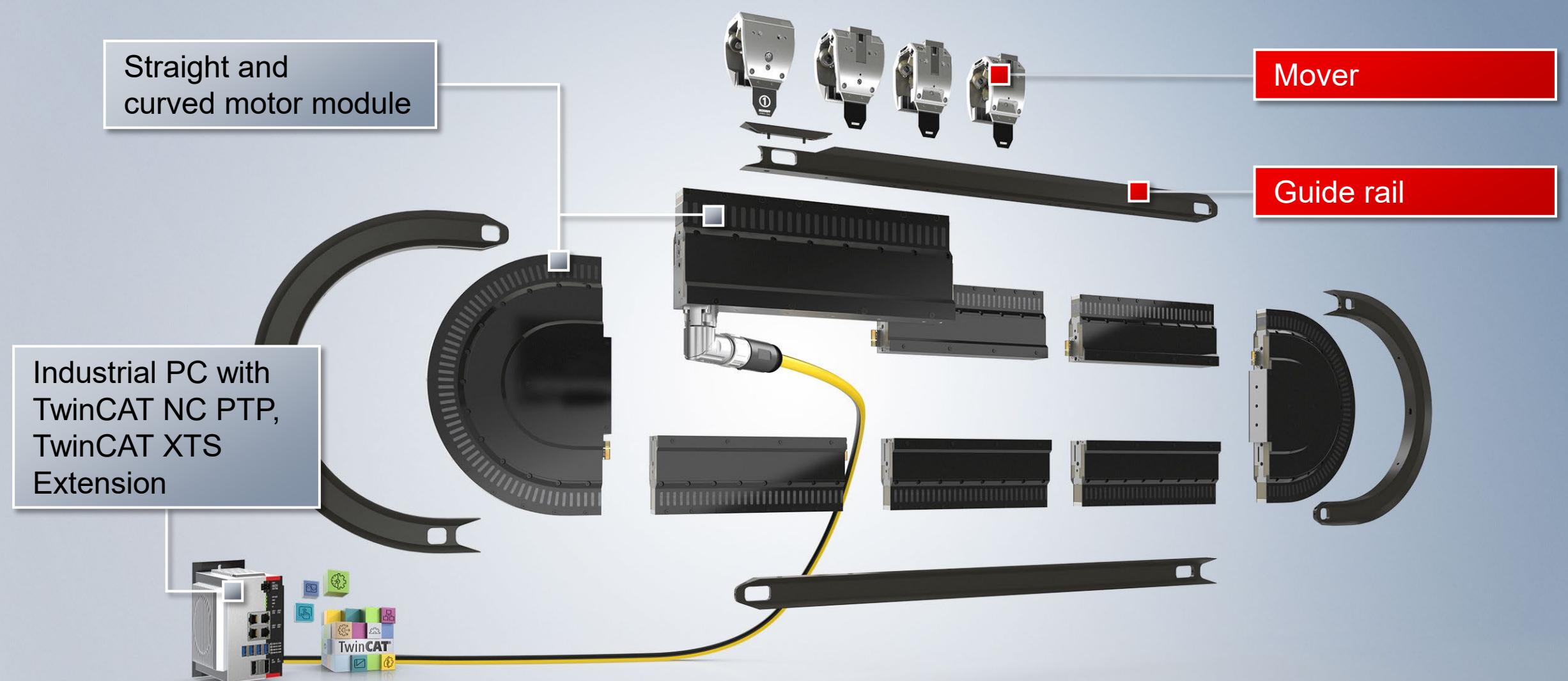
XTS Modules

The XTS motor module /Flexible track layouts

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Beckhoff system solution



Guide rail system, mounted parallel with the motor modules





Plastic rollers on aluminum
guide rail

**no need for constant
lubrication**

Guide rail mounted on
motor module

low total costs

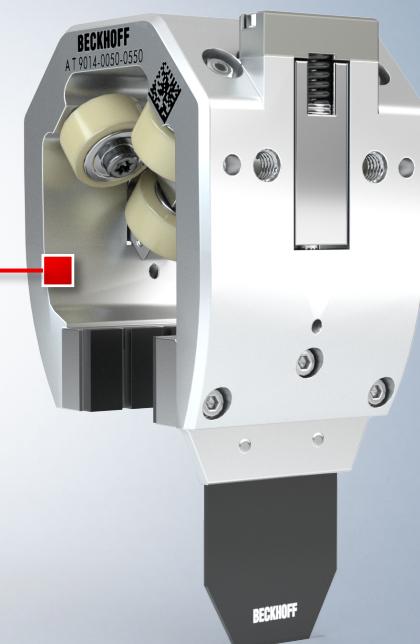
Modular system offers
expansion options

flexibly adaptation

 center-to-center
distance min. 60 mm

 300 g standard
payload, even more
mass in tests

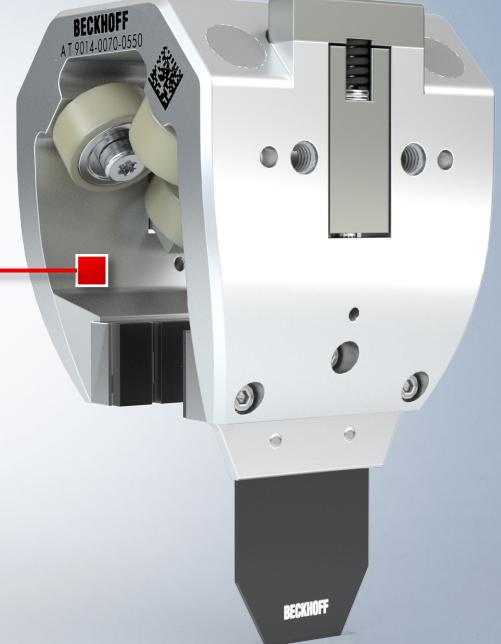
 30,000 km mileage
with Ø 1.5 m/s
during long-term test



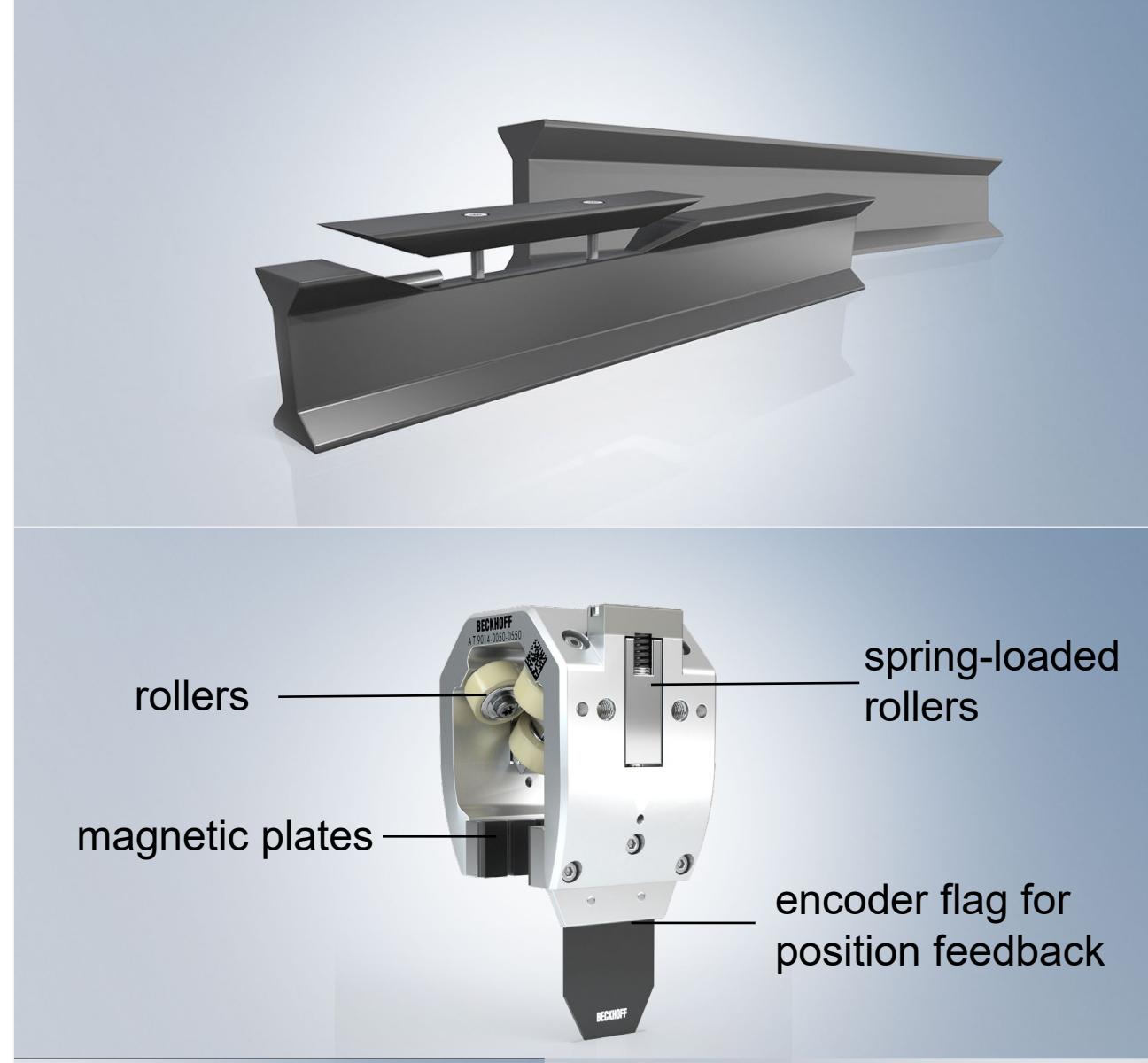
 center-to-center
distance min. 70 mm

 600 g standard
payload, even more
mass in tests

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



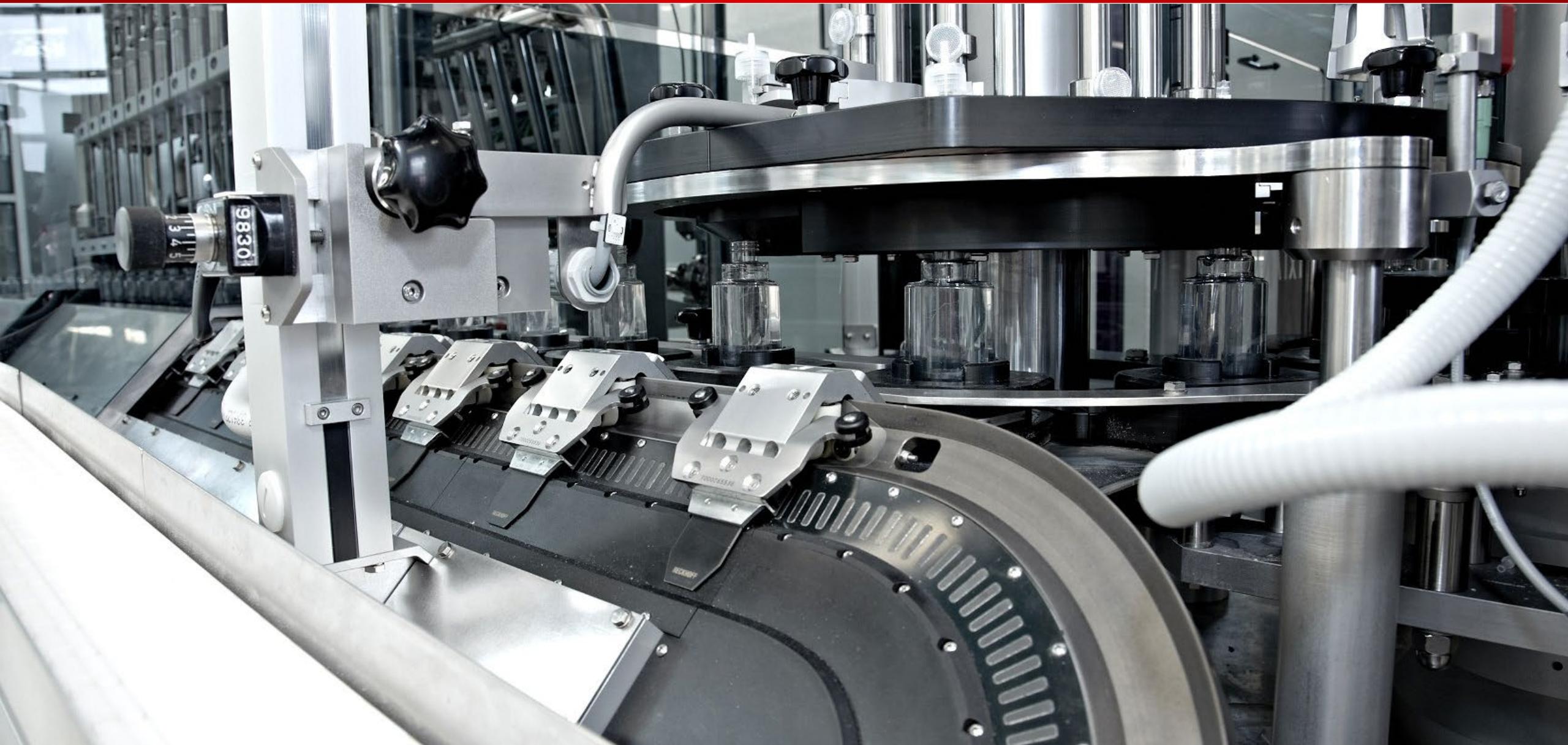
- guide rail made of aluminium
 - straight and curved segments
 - abrasion-resistant hard anodised aluminium surface
 - simple assembly of the guide rail via mechanical interface on the motor module
- mover with plastic rollers
 - backlash-free running through optimized geometry
 - no lubrication necessary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



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

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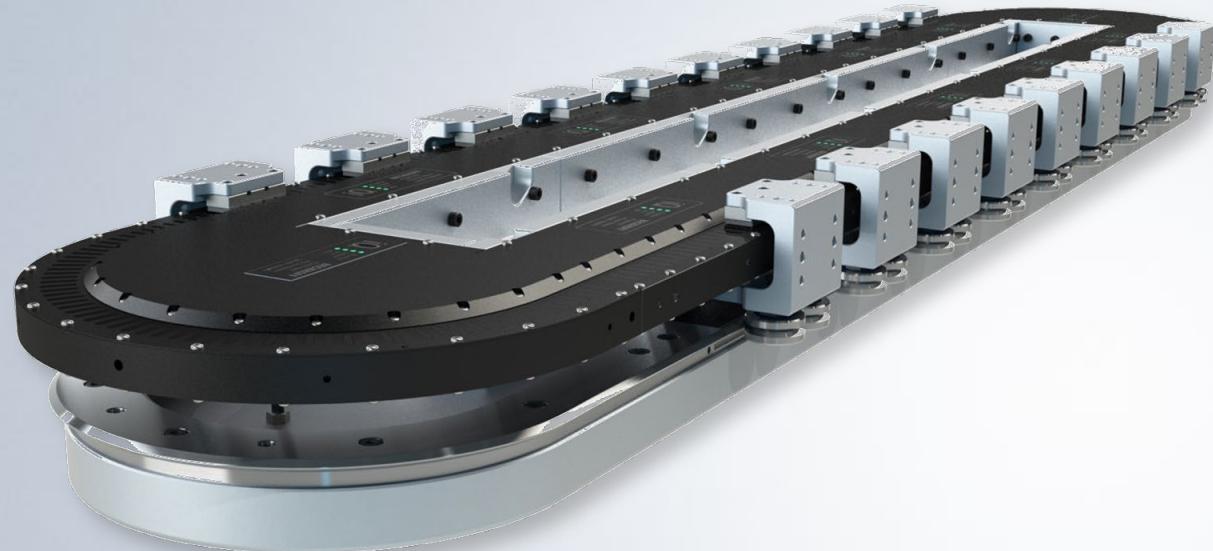


XTS Modules

Guide rail system mounted parallel with the motor modules

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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

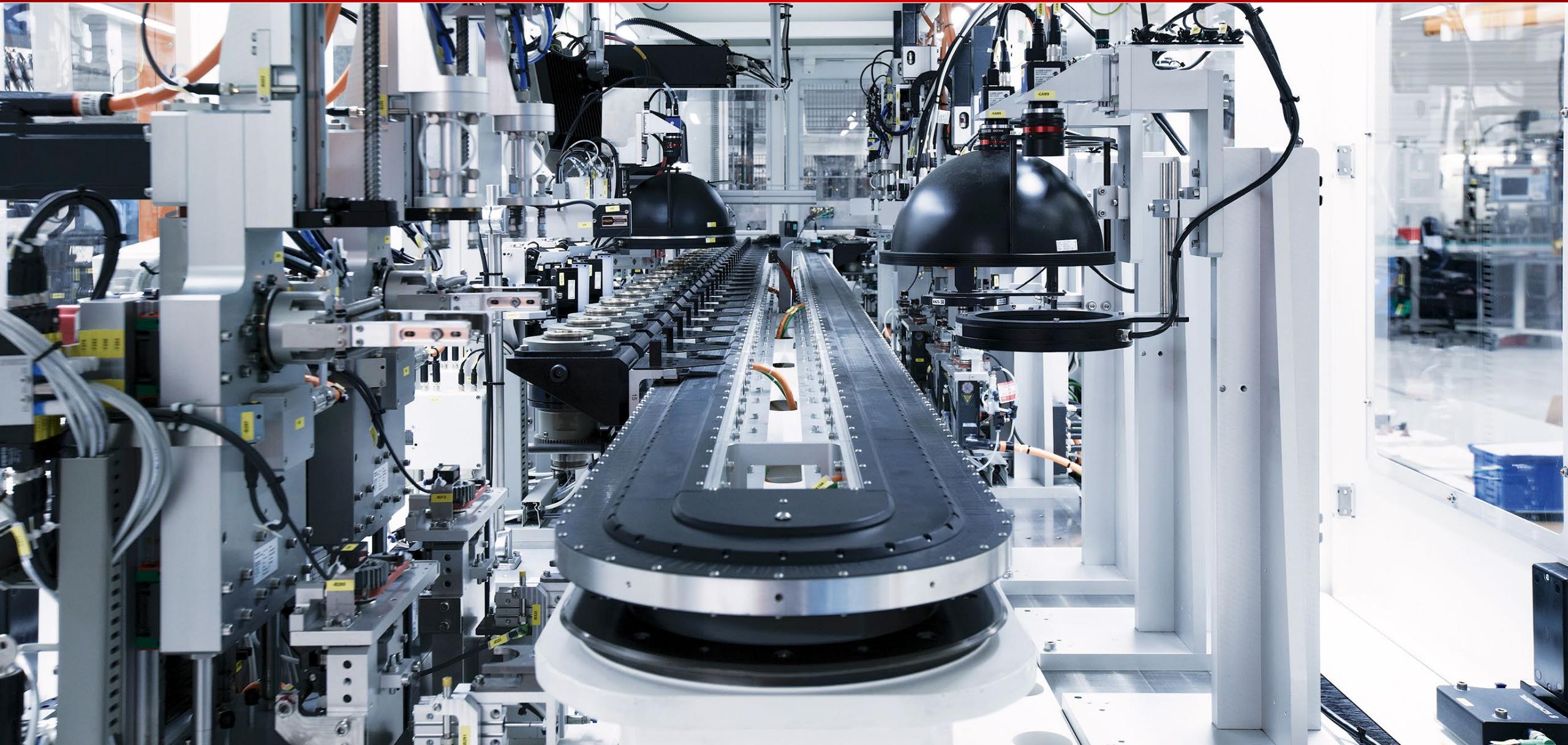
- guidance system routed in parallel to accept higher process forces
- hardened steel V-guide to ensure high accuracy over prolonged periods of time
- with automatic lubrication system
→ lubricant is fed to the guide surfaces of the rails
- 1-track: rail system for 180° curve (clothoid)
- PRT2: rail system for round, oval and rectangular systems
- motor modules available with upper profile without drill holes
→ increased ease of cleaning



Application example: Optical inspection system – GEFASOFT, Germany

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XTS Modules guide rail and movers Comparison

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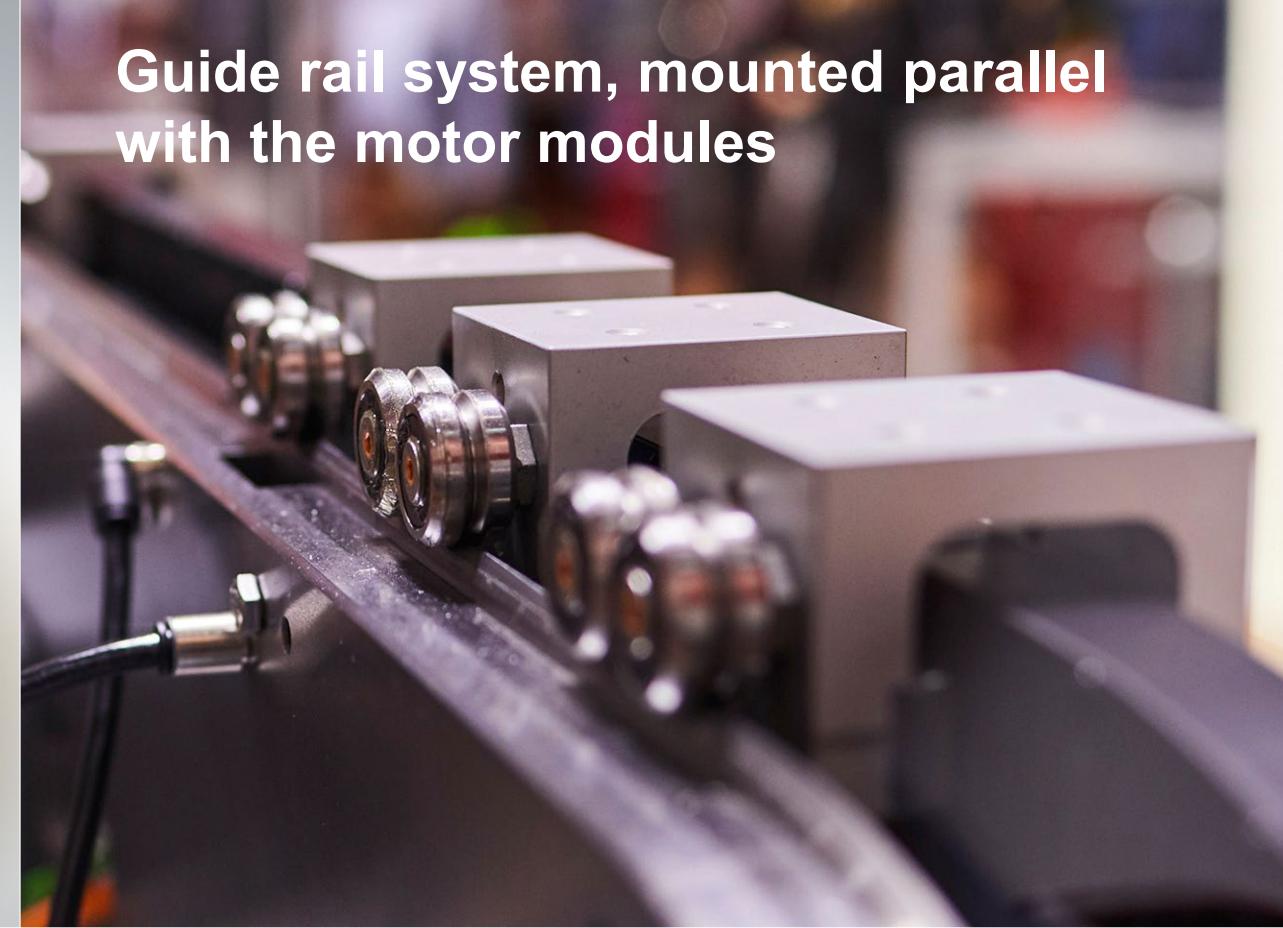
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Beckhoff system solution



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

Guide rail system, mounted parallel with the motor modules



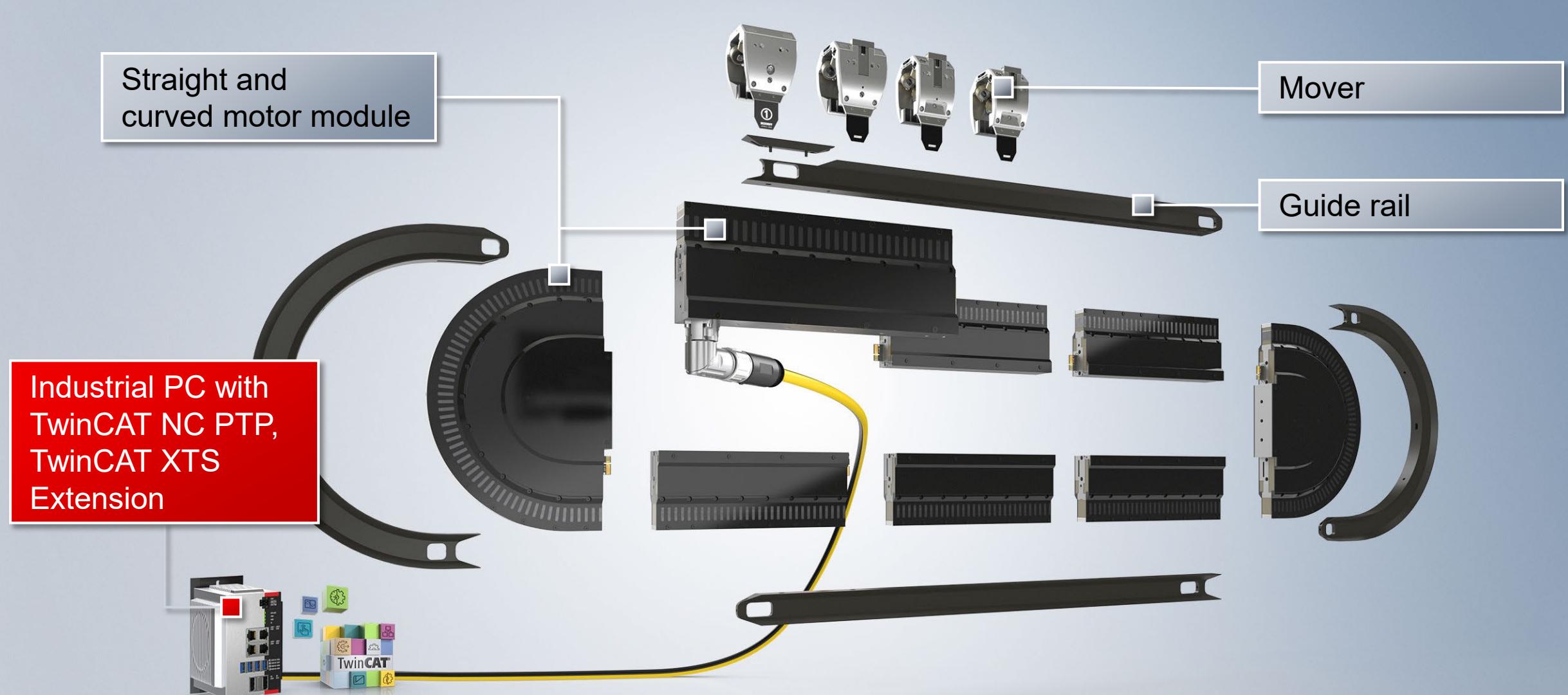
- higher loads
- higher process forces
- maximised service life

XTS Modules

The control system

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XTS Modules

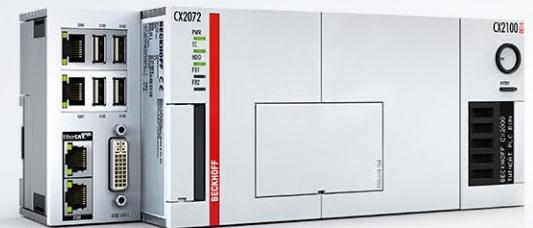
The control system

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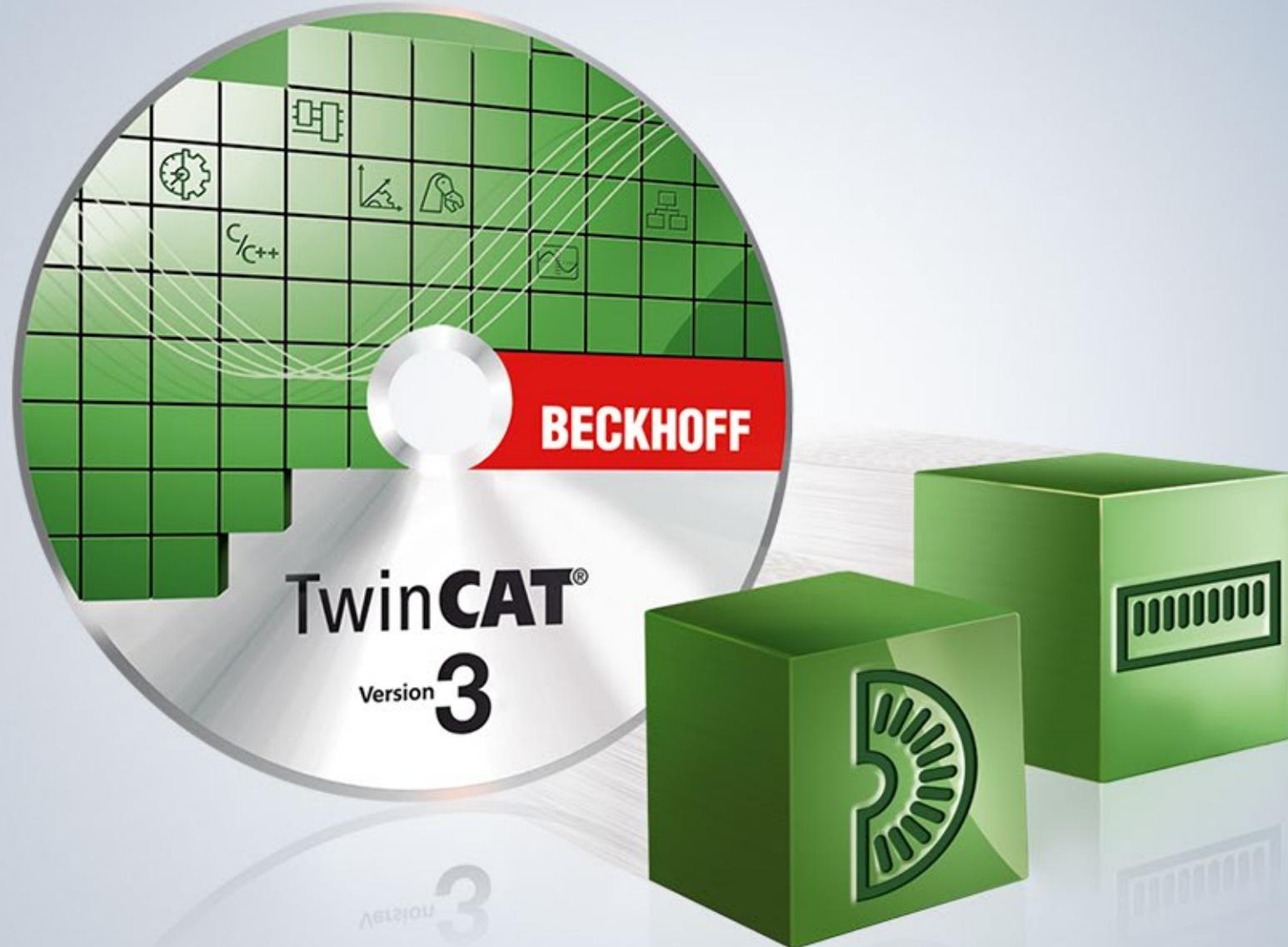
PC-based control
Data is available centrally
(diagnostics, predictive maintenance ...)



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



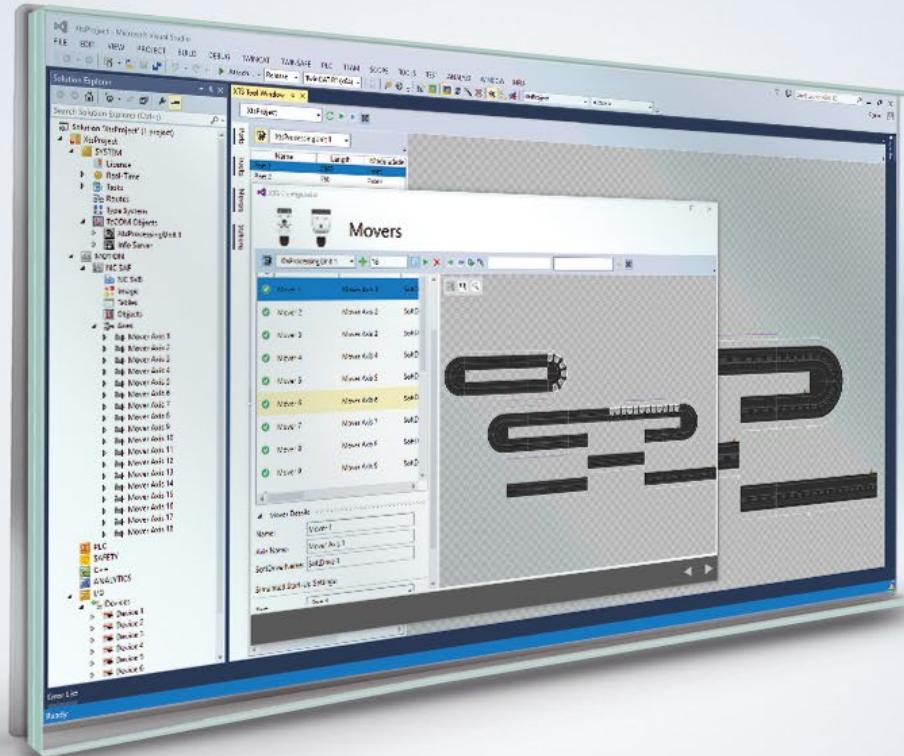
- creating visualizations with a single mouse click
- extensive visualization options with TwinCAT3
- Different levels of detail enable easy system diagnostics.

XTS Modules

The control system | XTS Extension

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XTS software

Integrated simulation functions facilitate plant design

XTS software

Software tools simplify configuration

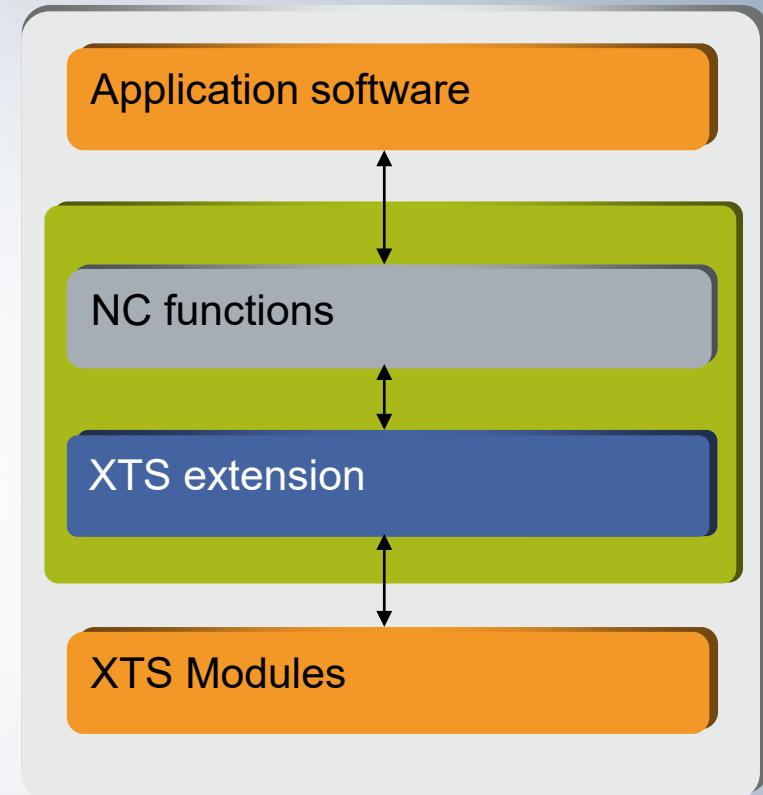
XTS software

Motion control function blocks reduce engineering effort

XTS Extension



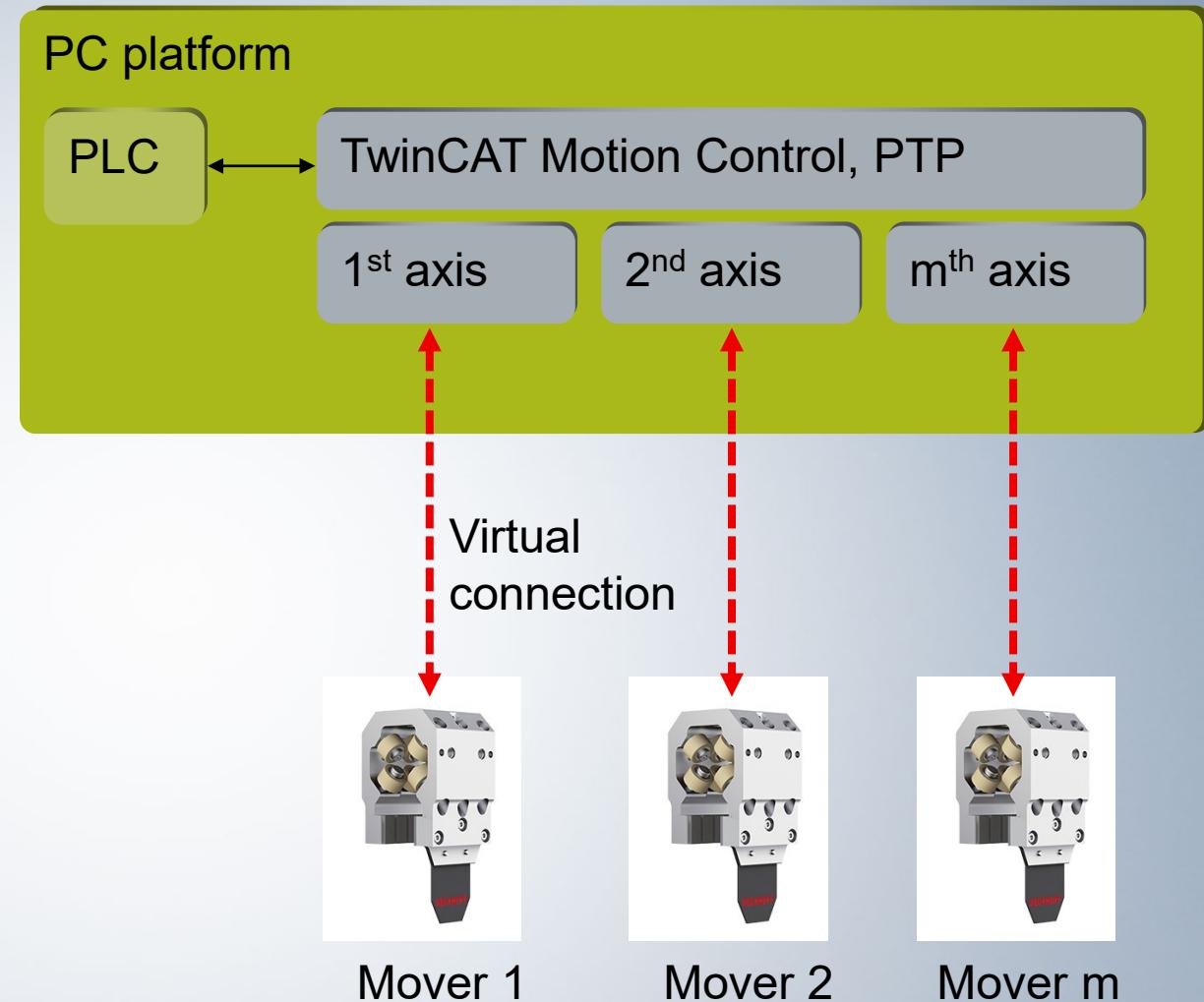
- From the point of view of application programming, a mover appears like a “normal” servo axis



XTS Extension



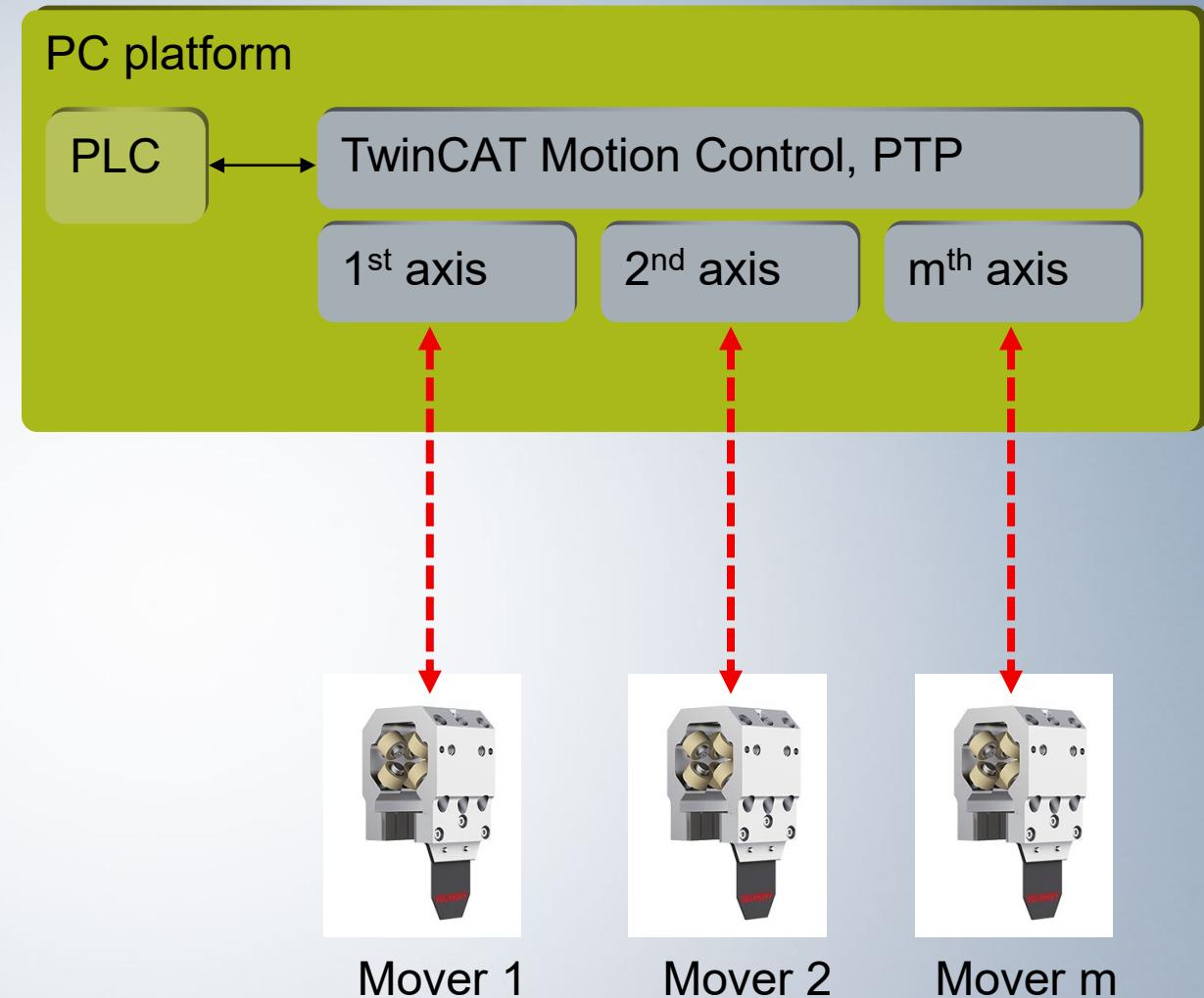
- The XTS extension in TwinCAT decouples servo algorithms from the hardware components and calculates them centrally.



Motion Control



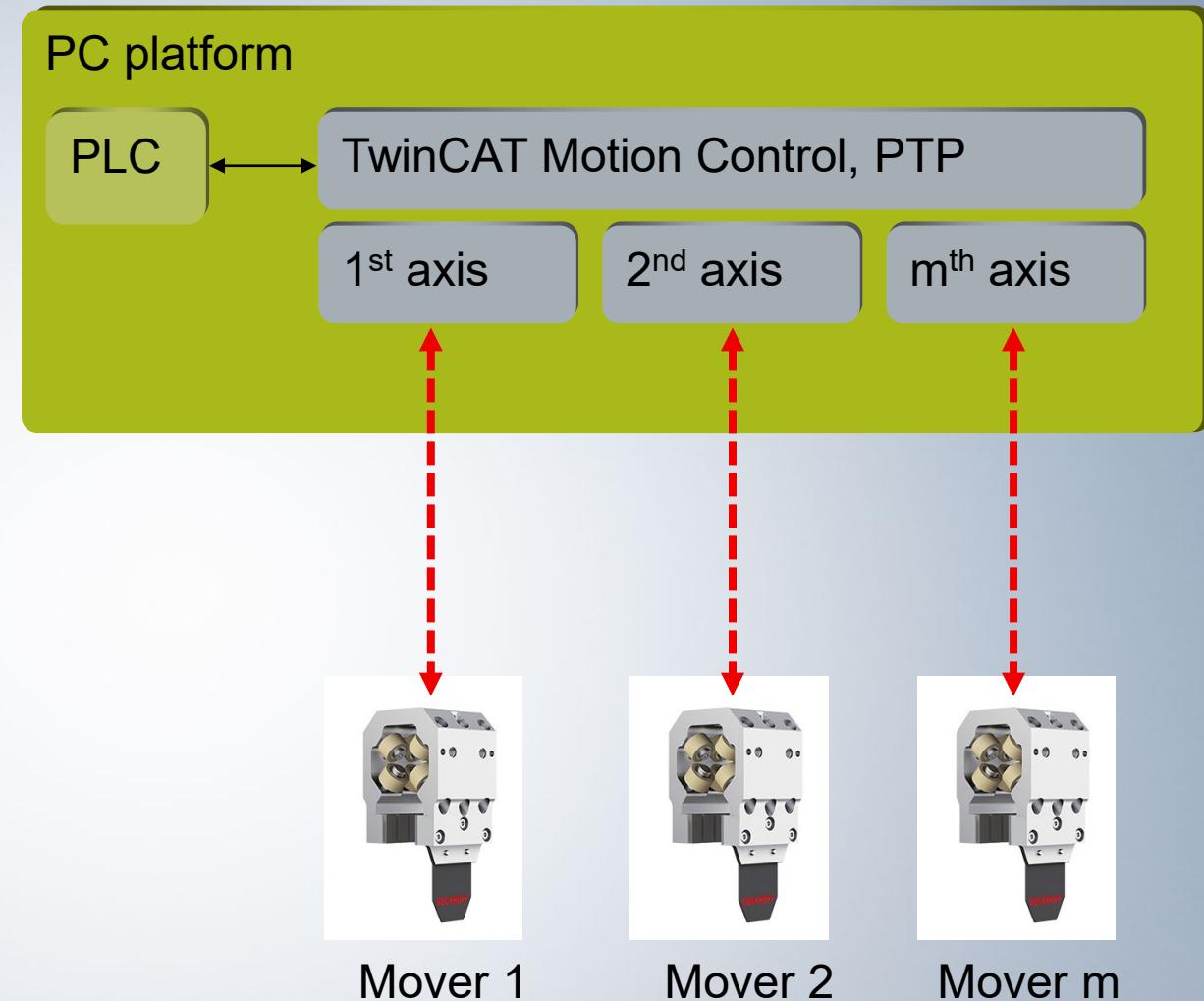
- all motion control functions are available, e.g.
 - flying saw
 - electrical gear unit
 - cam plates



Motion Control



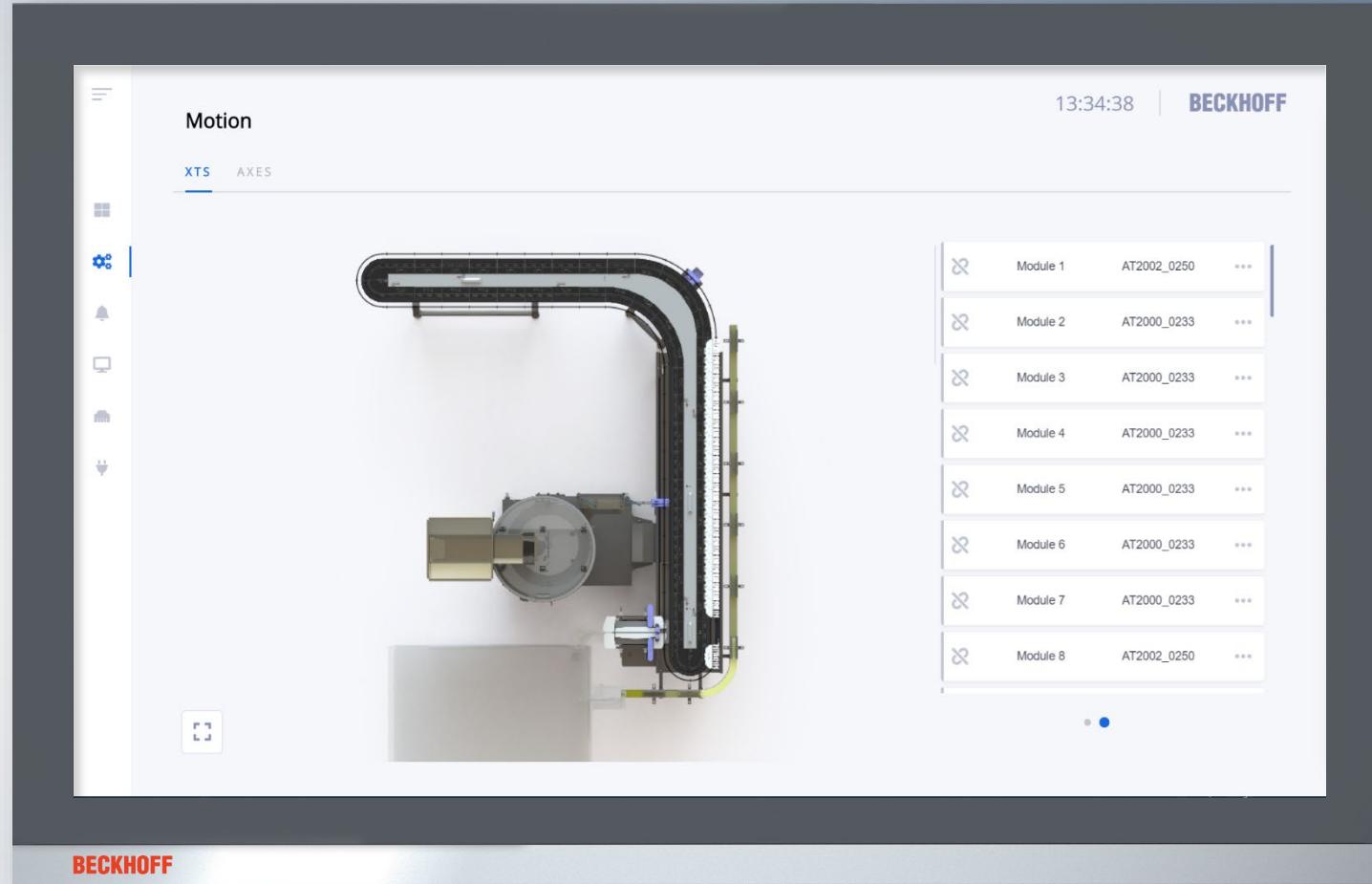
- functional extensions handle typical XTS requirements
 - automatic accumulation
 - collision and jerk avoidance
 - centrifugal force limitation



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 EC-Diag HMI Control software interface. The top bar shows the time as 13:34:38 and the Beckhoff logo. The main area is divided into several sections:

- Motion**: A ladder logic diagram for motion control, showing various contacts and coils.
- AXES**: A detailed view of axis configurations, including parameters like *Achse 1 Position*, *Achse 1 Geschwindigkeit*, and *Achse 1 Drehrichtung*.
- Detaillansicht**: A table showing detailed status for multiple axes, such as *Achse 1 Position*, *Achse 1 Geschwindigkeit*, and *Achse 1 Drehrichtung*.
- Tabelle 2.6 (EL1200)**: A table titled "Tabelle 2.6 (EL1200)" with columns for *Position*, *Geschwindigkeit*, and *Drehrichtung*.
- Behan-CAT**: A section for managing components, showing items like *EL1200*, *beckhoff-autoren-hoch*, and *el1200*.
- Online**: An online status indicator.
- Präsentations**: A presentation mode section.

The bottom of the interface features the Beckhoff logo.

XTS | New Freedom in Machine Building

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Complex sequences – simplified solution:
XTS

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