ACOPOS 6D

Multidimensional motion for adaptive manufacturing

Ihr Partner für Innovative-Maschinen-Automation

B&R Industrie-Elektronik GmbH

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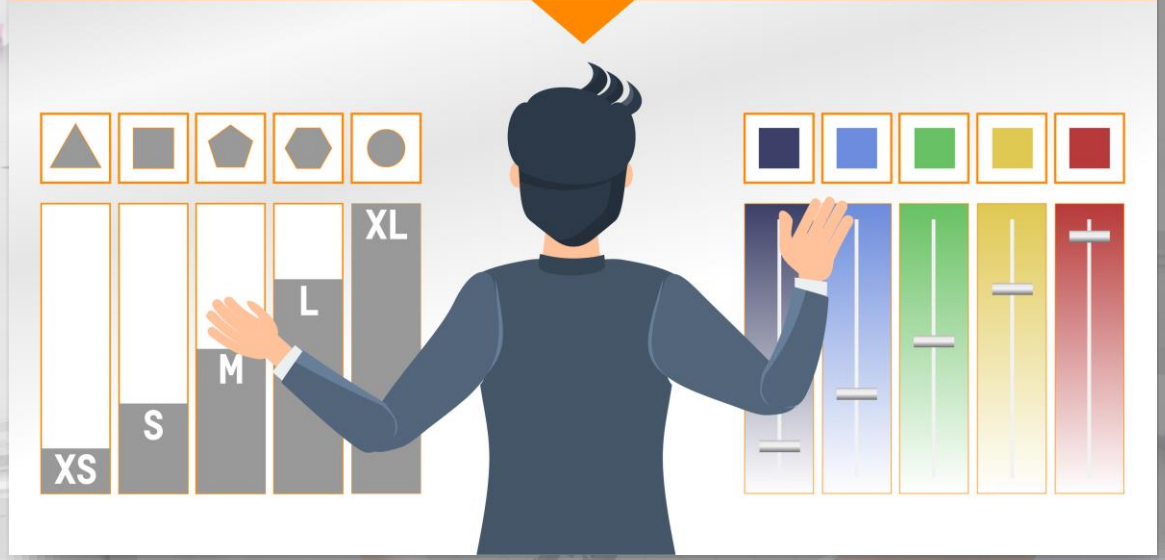
Challenges in product manufacturing

- Product proliferation and smaller batch size
- Shorter product lifecycles
- Unpredictable demand fluctuation
- Mass customization

Today's challenges



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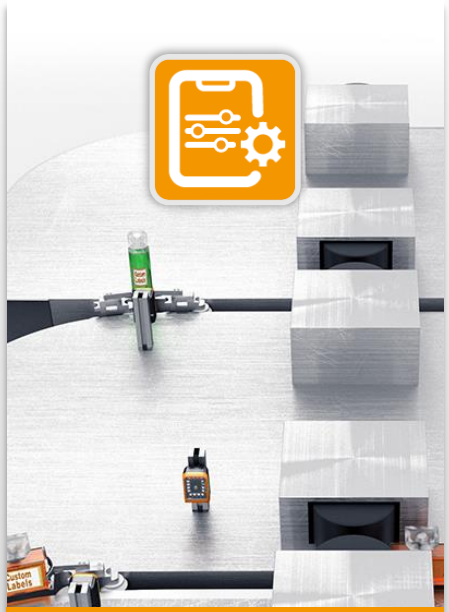
Adaptive manufacturing pillars

Zero-downtime changeover

Ready for unknown future products

High productivity and accelerated time-to-market



Profitable small-batch production

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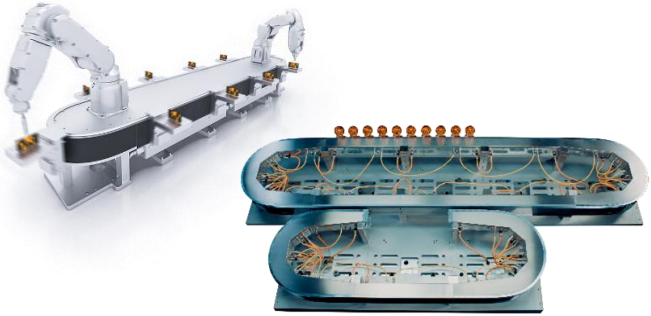
Complete portfolio for adaptive manufacturing



1D

single / double / triple axes
multi axes
cabinet or field mounting
induction / servo / dc / stepper motors
from 100W up 500kW

2D

free definition of trak layout
fully electromagnetic diverter
independent movement of shuttles
extremely high position accuracy
hygienic design
up to 10kg load

3-6D

arm / scara / delta robot
robot controller part of the machine PLC
1µs jitter
fast reaction
easy synchronization
small footprint

Integrierte Vision – Das Auge der adaptiven Maschine

Reaktionsfähigkeit in Echtzeit

Vision

Das integrierte Vision-System ermöglicht eine frühzeitige Auswertung von Produkt und Qualität

Durch die Integration wird das Ergebnis mit dem Track-System in Echtzeit ausgetauscht und erlaubt eine Prozessanpassung im laufenden Betrieb

Individuelle Produktkontrolle ermöglicht Track & Trace und die Rückverfolgbarkeit in Echtzeit

Strategic cooperation with Planar Motor Inc (PMI)

Partner

Planar Motor Inc. (PMI),

- Headquartered in Vancouver Canada
- Founded in 2017
- Spin-off from the University of British Columbia

Main founder Dr. Xiaodong Lu researches since more then 15 years at the university of British Columbia and MIT in the field of magnetically-levitated planar motion technology

Key success factors

- Very innovative and dynamic company
- Strong IP portfolio
- Most superior product developed in the market so far

Cooperation

Basis

- Strategic cooperation agreement
- B&R is second largest/significant shareholder in planar Motor Inc. and holds specific shareholder right including board seat.

Areas of cooperation

- R&D
- Manufacturing
- Marketing, Sales and Support

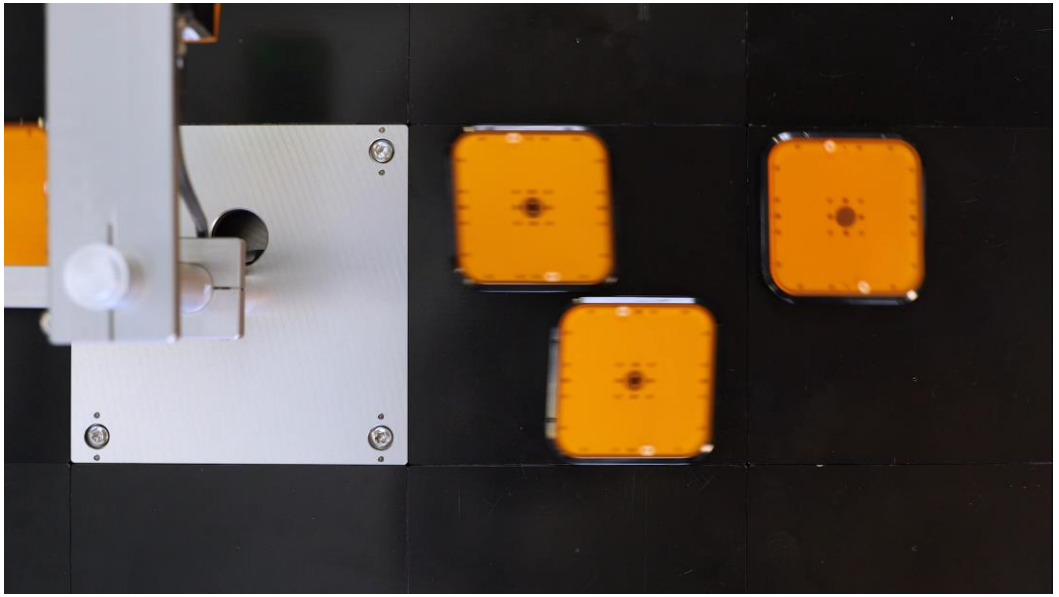
Smart movements

6 degree of freedom movements

- X, Y

Flexible movement commands

- Linear, Arc, Short Axis, Pre-built Trajectory
- Cyclic set position



Smart movements

6 degree of freedom movements

- X, Y

Flexible movement commands

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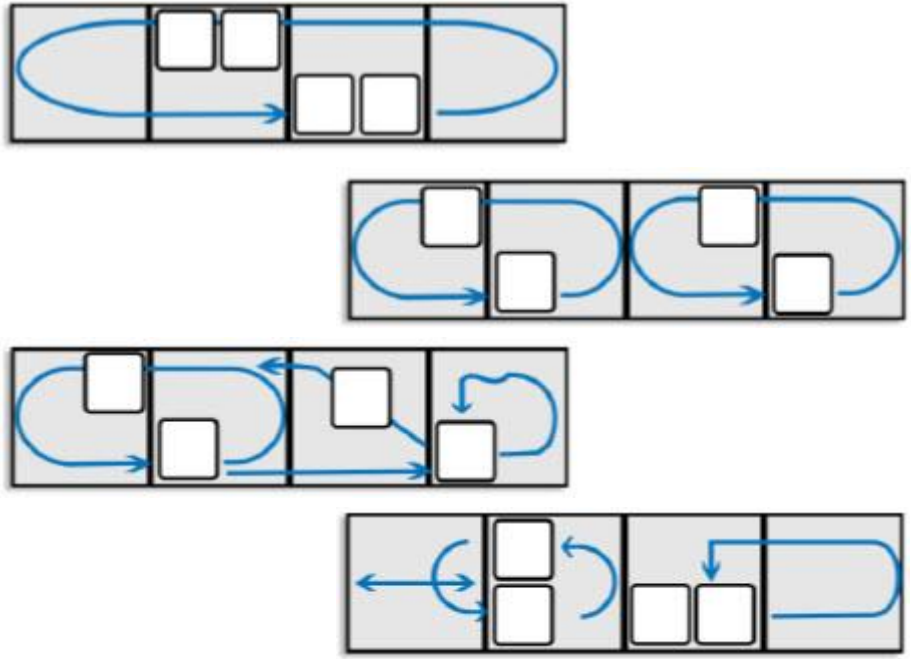


Smart movements

6 degree of freedom movements

- X, Y
- Z

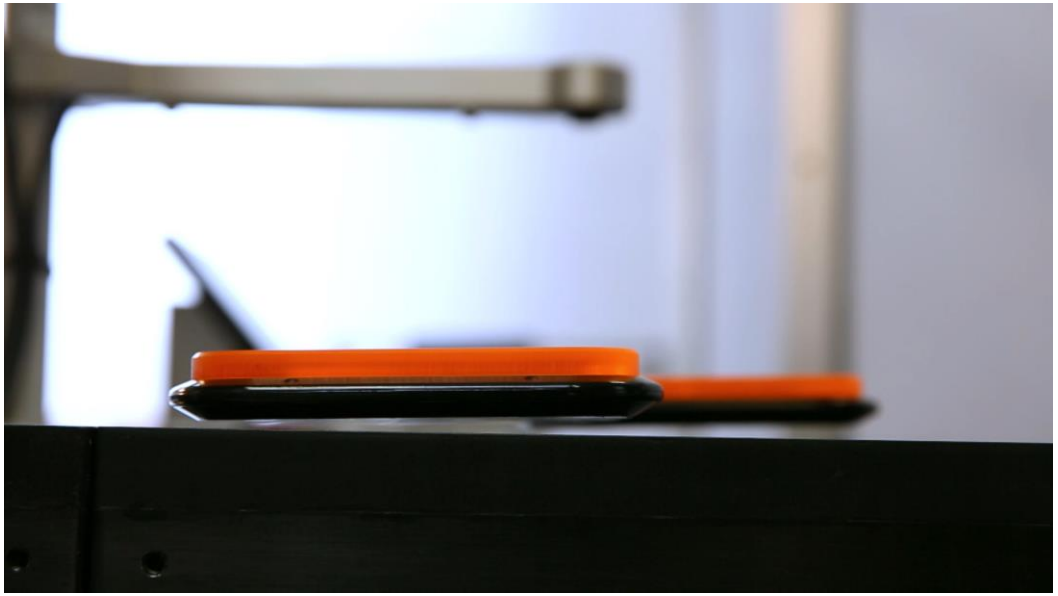
Z axis movement

- Levitation up to 4mm
- Force control

Smart movements

6 degree of freedom movements

- X, Y
- Z
- RX (pitch), RY (roll)



Smart movements

6 degree of freedom movements

- X, Y
- Z
- RX (pitch), RY (roll)
- RZ (yaw)

Convoy

Virtual linking

- One virtual shuttles for controlling multiple shuttles
- Convoy of shuttles

Shuttles interaction

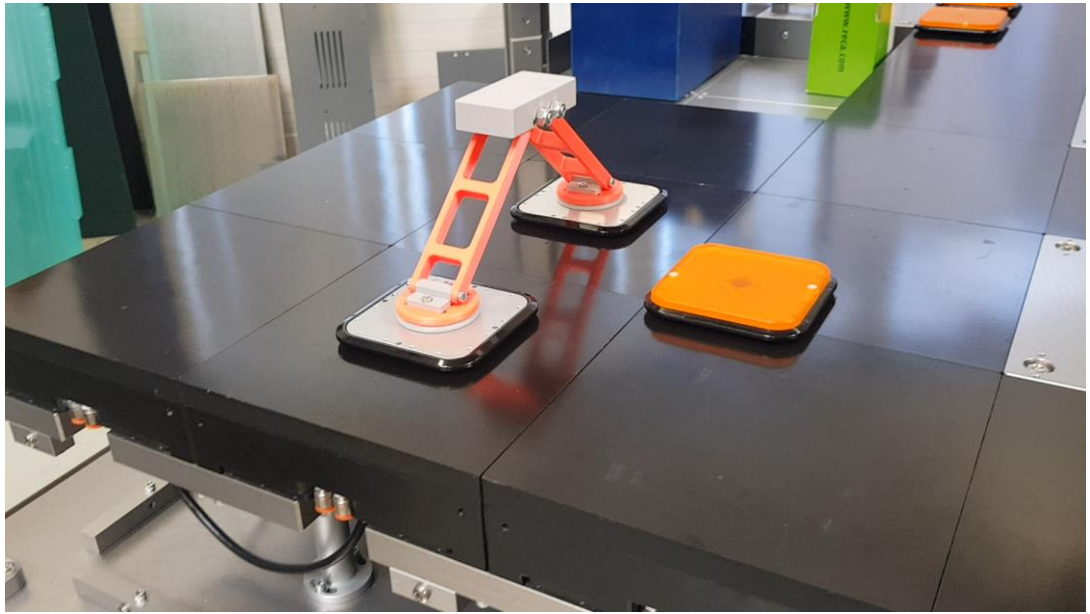
Relative movement between shuttle

Additional flexibility

Shuttles interaction

Optimized working space

Multiple parallel processes



System components

Segment

- Coils and electronic
- Complete design freedom for planar motor layout
- Dimensions: 240 x 240 x 70 mm
- Natural cooling / water cooling
- Daisy chain connection to other segments for power and fieldbus
- 48Vdc – 60Vdc power supply

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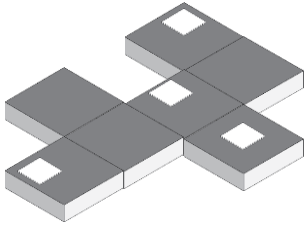
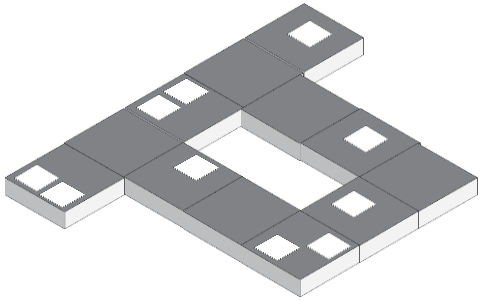
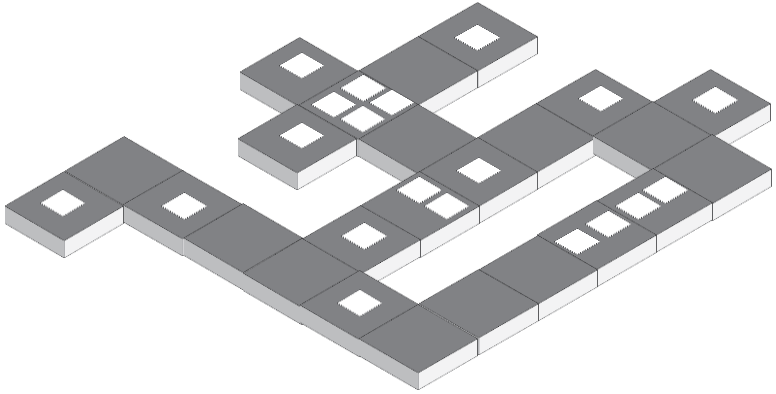
Unlimited layout possibility







System components

Shuttle

- Equipped with permanent magnets (no electronic on board)
- Movement on segment surface
- Controlled independently

Contactless motion

- No mechanical guides
- Maintenance free
- No friction, no wear

Position sensors included

- Absolut position for each shuttle
- No homing needed
- Unique identifiable shuttle, no additional hardware needed

System components

Shuttle

Scalable system

Differents payload, force and torque

Dimension [mm]	Payload [kg]*	Fx-y-z [N]	Tx-y-z [Nm]
120 x 120 x 10	0.6	12	0.3
120 x 180 x 10	1.0	20	0.5
120 x 240 x 10	1.5	30	1.0
180 x 180 x 10	1.8	36	1.25
180 x 210 x 10	2.0	40	1.5
210 x 210 x 10	2.4	48	2
240 x 240 x 10	3.6	72	3.5
210 x 330 x 12	4.2	84	4.5
300 x 300 x 12	6.0	120	8
330 x 330 x 12	7.2	144	10
450 x 450 x 16	14.4	288	30

* 1mm levitation, payload center of gravity alligned with the center of the shuttle

Speed	2m/s
Acceleration	20m/s²
Repeatability	+/- 5µm
Flying height	0,5 – 4 mm
Rotation X, Y	< 20mrad
Rotation Z	< 20°

System components

Shuttle

- Scalable system
- Unlimited possibility to mix shuttles type

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System components

ACOPOS 6D Controller

- Shuttle path generation
- Collision avoidance
- Boundary checks
- Integrated segments & shuttles simulation
- Powerlink controlled node

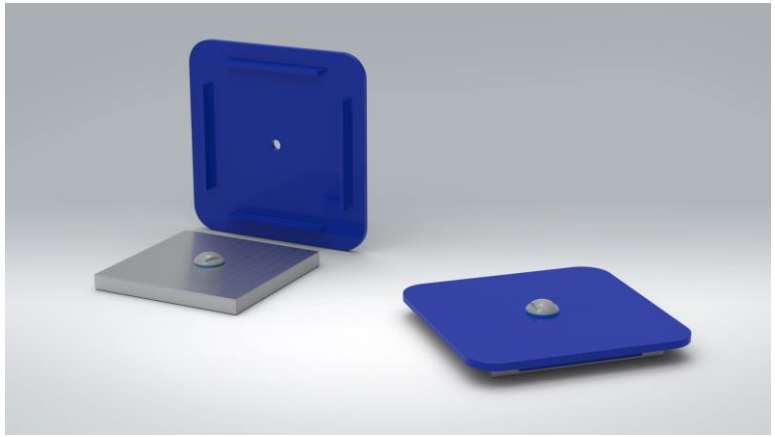
- Up to 200 segments & 50 shuttles (@ 800µs)
- Synchronization between multiple ACOPOS 6D Controllers

- Dimensions: 152 x 207 x 36 mm

Works everywhere

Hygienic design

- Stainless steel cover of standard segments
- Stainless steel shuttle, without holes



Robust

- Maintenance free
- Fanless
- Contactless motion

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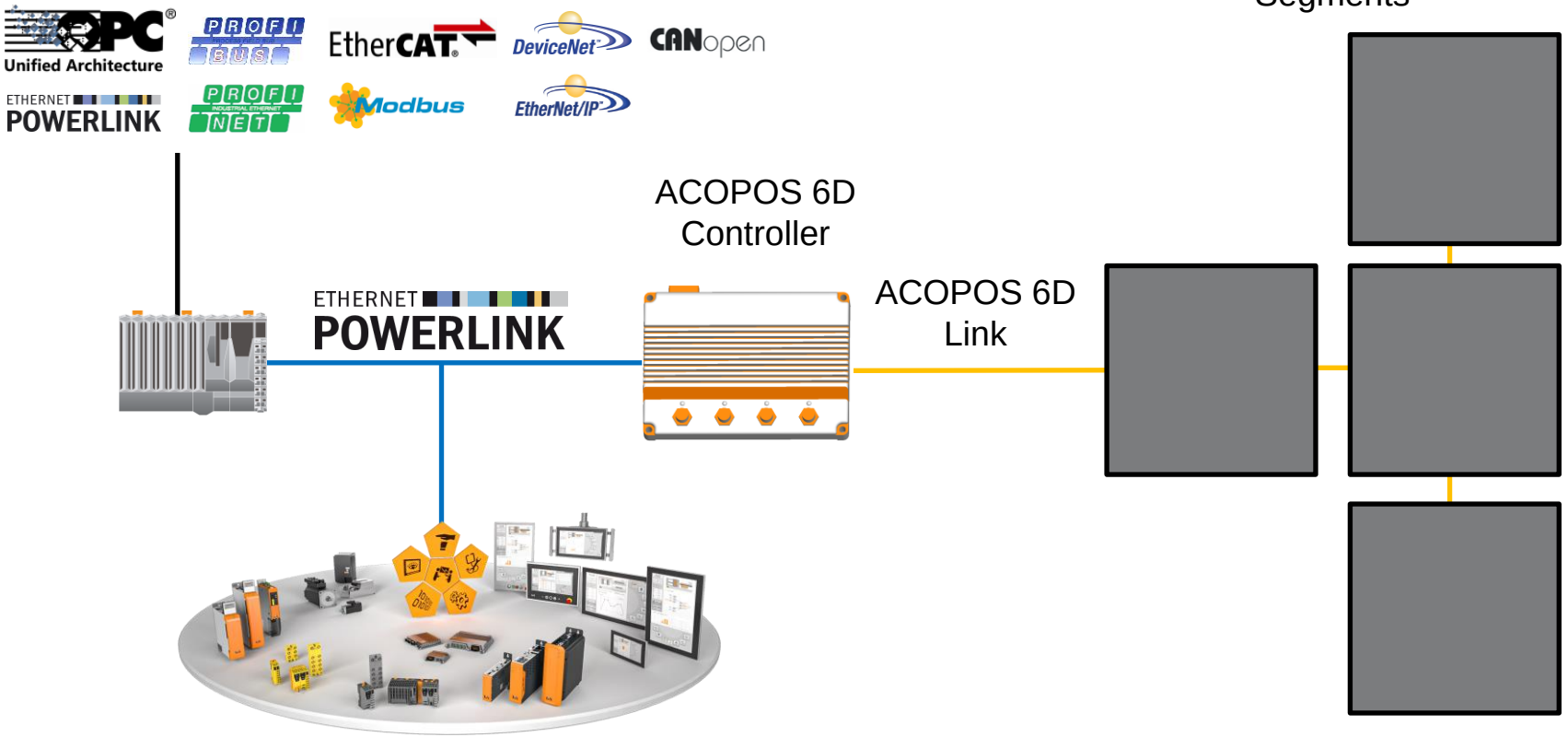
Network topology



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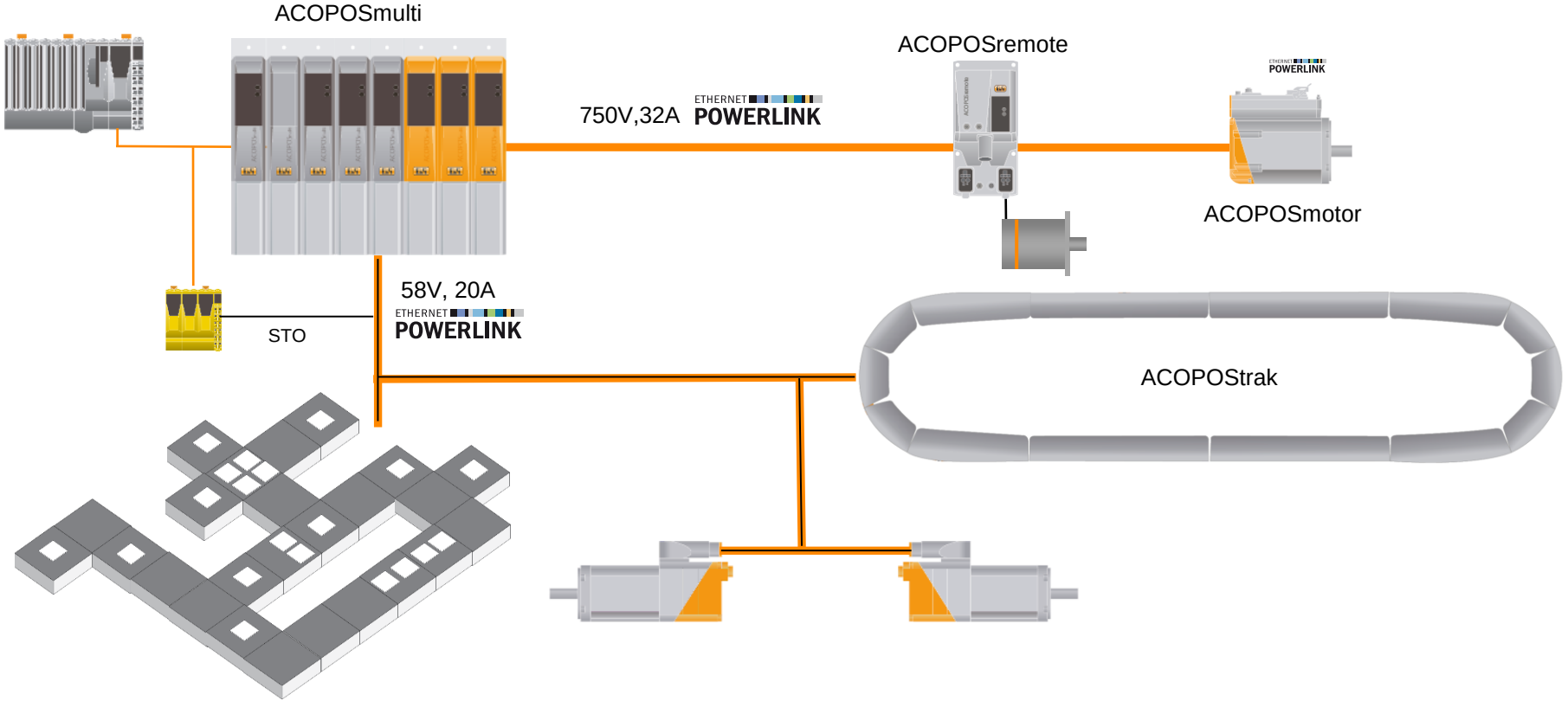
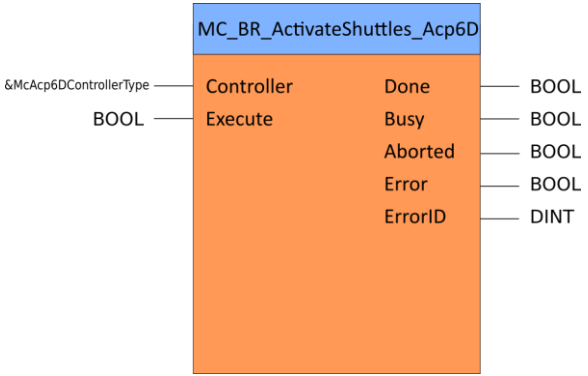
Power supply topology

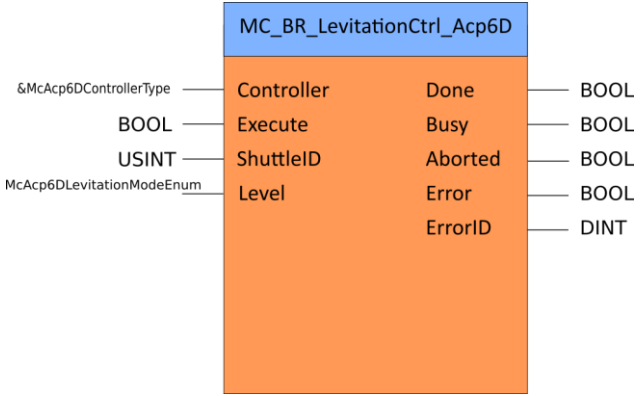


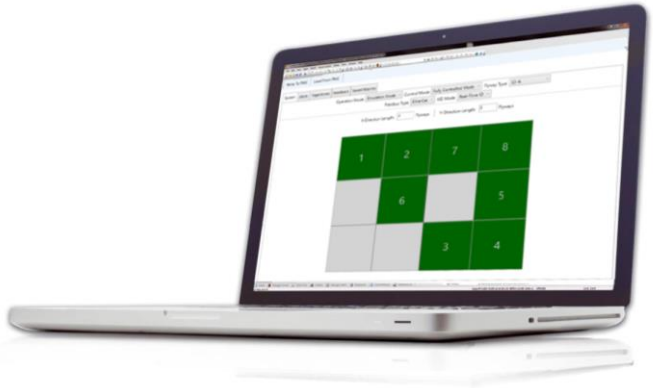
Software

ACOPOS 6D controller

- Powerlink slave
- Hardware configuration
- Automation Studio library
- PLCopen / mapp6D







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