

PLCopen[®]

for efficiency in automation

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Get Together for Robotics 2025 - Erlangen

Agenda

Brief History of PLCopen

...and why standards are vital

The Power of Motion Control

...and how it impacted industrial automation

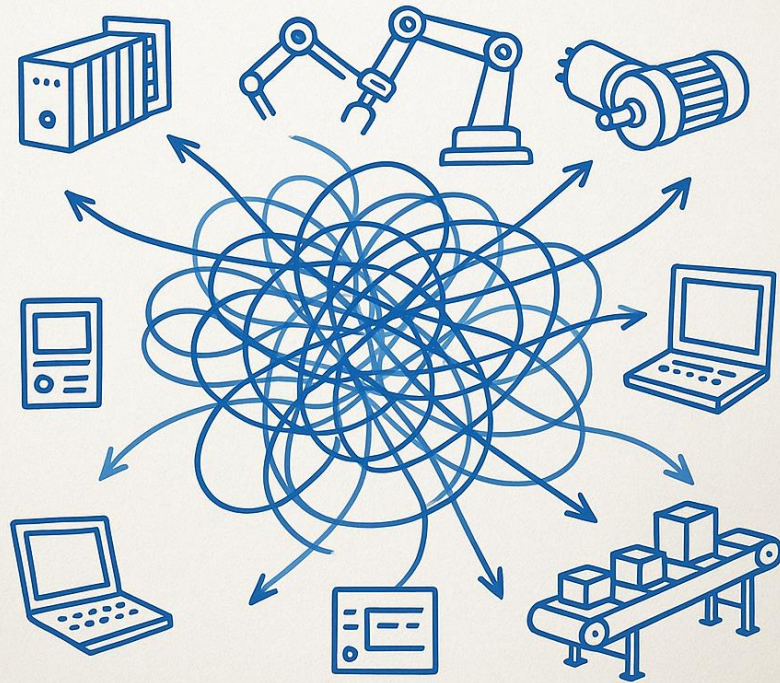
Integrating SRCI functionality

...into PLCopen Motion Control

Brief History of PLCopen

...and why standards are vital

INNOVATION STARTS WITH CHAOS



Focus on being unique!

- ▶ Different Vendors
- ▶ Different Interpretations
- ▶ Different programming methods

- ▶ System Integrators / Users
 - ▶ Hardware dependent
 - ▶ Software dependent
 - ▶ Vendor lock-in!

That's where PLCopen was born!

Highlights & Milestones

PLCopen Japan
Supporting office in Japan.

PLCopen North America
Supporting office in NA.

PLCopen Compliance Testing & Certification
PLCopen promoted acceptance of IEC 61131-3 by certifying vendor systems for compliance.

Foundation of PLCopen
PLCopen was founded just before the programming standard IEC 1131 (part 1 General Information) was published.

1st PLCopen Motion Control Specification, Part 1 - Basic document
merging logic and motion control to cut costs and risks. The first Motion Control specification, an independent function block library.

1992 / 1993

1994

1998

2001

2004

.....up to 2024

IEC 61131-3 Standard
First release of IEC 1131-3 standard on programming languages.
LD/FBD/ST/IL/SFC

PLCopen China
Supporting office in China.

PLCopen Training Guidelines
Standard training requirements to teach IEC 61131-3 programming.

Several relevant specifications
Motion Specifications
Safety Specifications
User Guidelines
Several updates of IEC61131-3

Brief History of PLCopen

...and why standards are vital



Brief History of PLCopen

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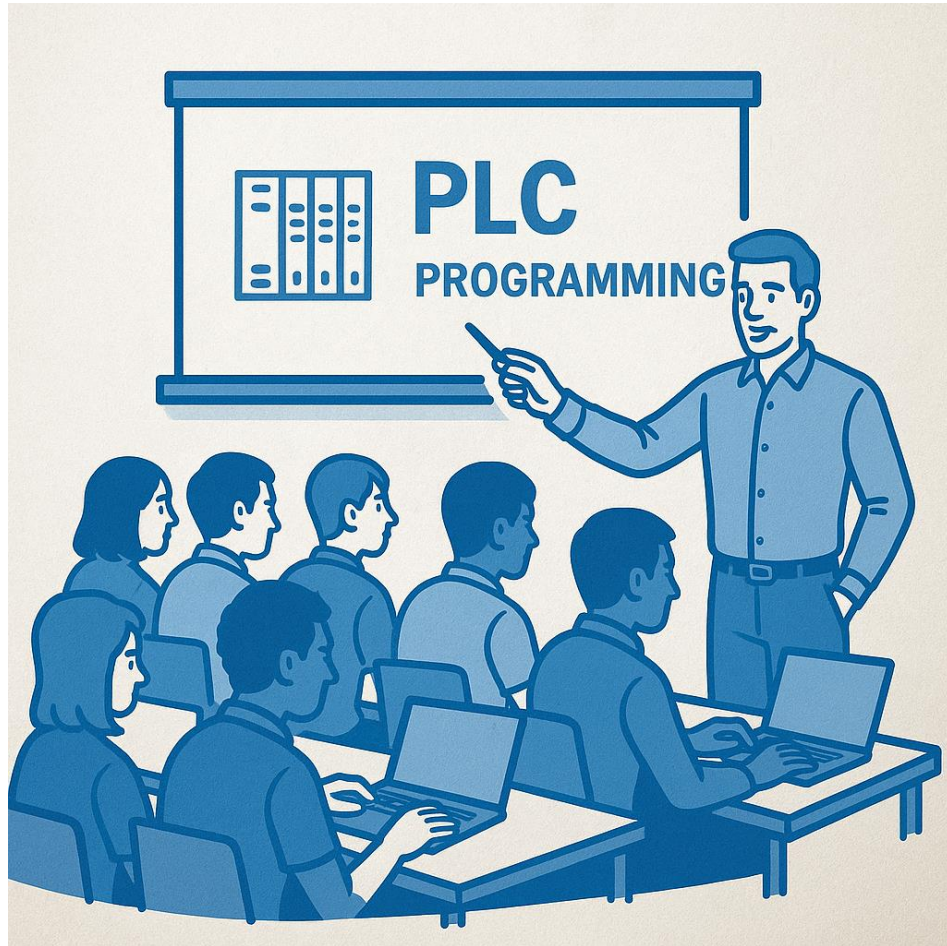
PLCopen is the leading vendor and product independent worldwide association for topics related to industrial control programming.



PLCopen is an independent worldwide organization providing efficiency in industrial automation based on the needs of users. It was founded in 1992 and has its headquarters in The Netherlands with supporting offices in the USA, Japan, and China.

We work to simplify and optimize automation processes by enabling faster application development, reducing commissioning times, and lowering life cycle costs. Through collaboration with our diverse member network, spanning all areas of the industry, we bring together expertise to shape a more efficient and sustainable future for automation.

Updated PLCopen Training Guidelines



- ▶ 1993: 1st Edition of IEC61131-3
- ▶ 2008: 1st Edition of PLCopen Training Guidelines
- ▶ 2025: 4th Edition of IEC61131-3 will be released
 - ▶ Object Oriented Programming
 - ▶ Instruction List (IL) was demoted
 - ▶ Many other smaller changes...
- ▶ 2025: 2nd Edition of PLCopen Training Guideline
 - ▶ Basic Training
 - ▶ Motion Training
 - ▶ Safety Training
 - ▶ Advanced Programming

Become a PLCopen Certified Training Center

"Who is this relevant for, why should we do it, and how should we do it?"

WHO

- ▶ Universities
- ▶ Companies Training
- ▶ Educational Institutes
- ▶ Private trainers

"Following a PLCopen Certified Training is vital for anyone wanting to start working in automation, or further develop their automation skills"

WHY

- ▶ IEC61131-3 is widely adopted
- ▶ PLCopen specification is accepted and adopted worldwide
- ▶ Guaranteed to follow the correct standards

"It's mainly a marketing tool for us, as everyone in the industry recognizes PLCopen"

HOW

- ▶ Self-certification process
- ▶ Determine which level(s) your trainings are at
- ▶ Apply through our website or e-mail by filling in the Compliance Lists

"Knowing it's been created by industry leaders gives both the teacher and the trainee a lot of confidence."

The Power of Motion Control

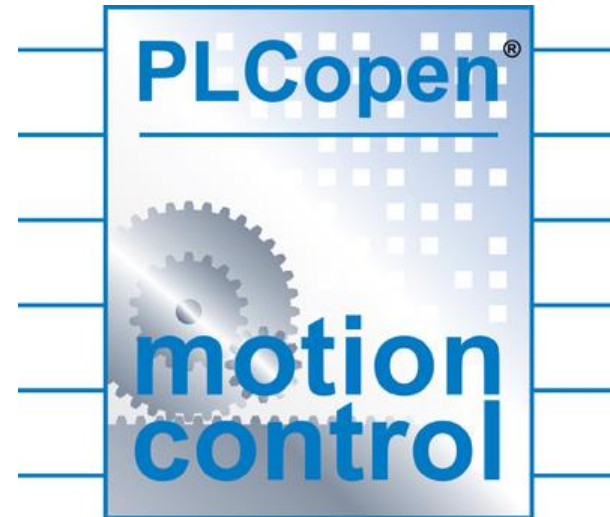
...and how it impacted industrial automation



The Power of Motion Control

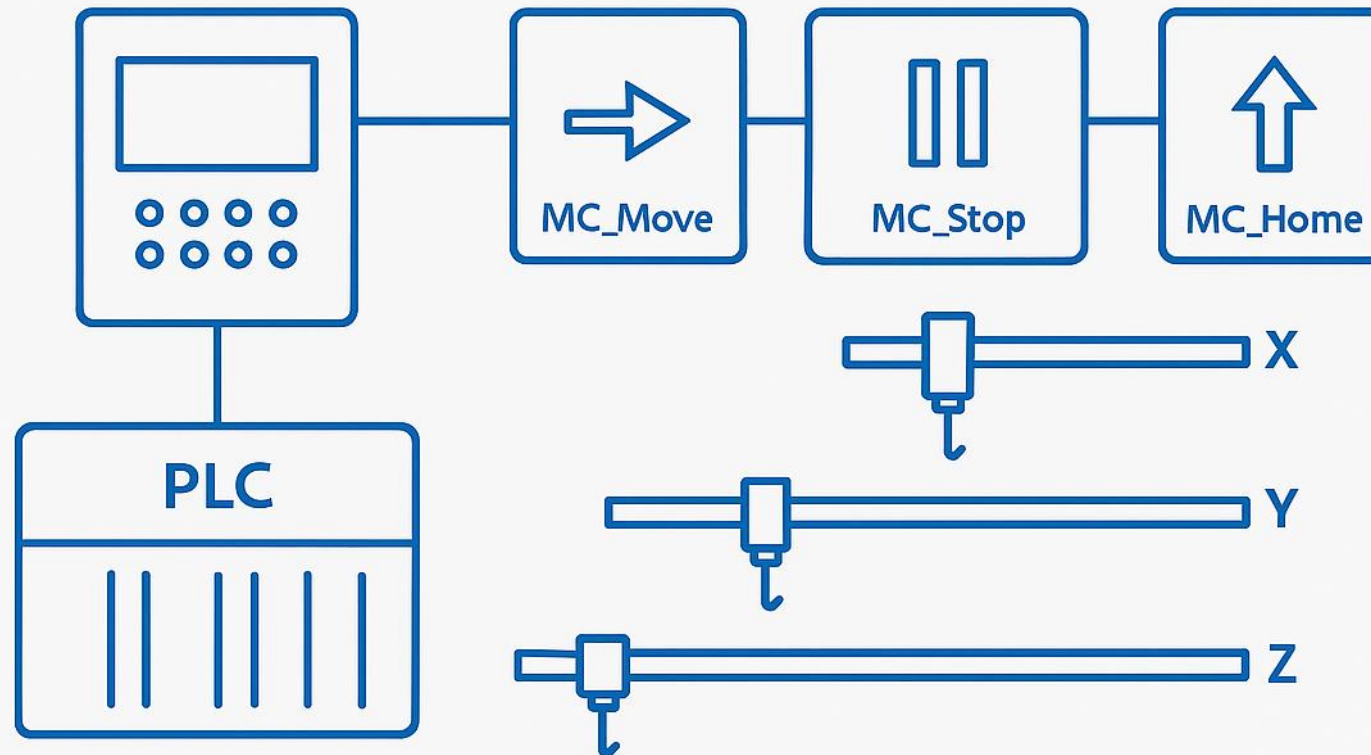
...and how it impacted industrial automation

- ▶ Part 1 – Function Blocks for Motion Control
- ▶ Part 2 – Extensions
- ▶ Part 3 – User Guidelines
- ▶ Part 4 – Coordinated Motion
- ▶ Part 5 – Homing procedures
- ▶ Part 6 – Fluid Power (hydraulics)
- ▶ Around 30 companies certified with over 50 products (check website for full list)



The Power of Motion Control

...and how it impacted industrial automation



The Power of Motion Control

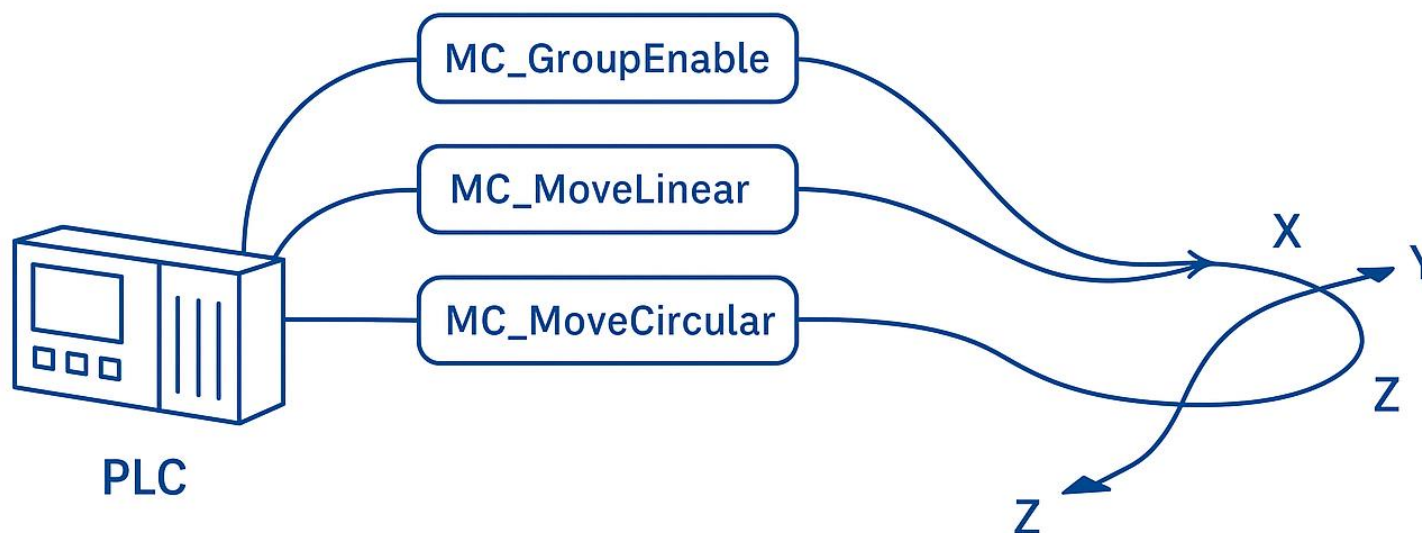
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The Power of Motion Control

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MOTION CONTROL PART 4 – COORDINATED MOTION



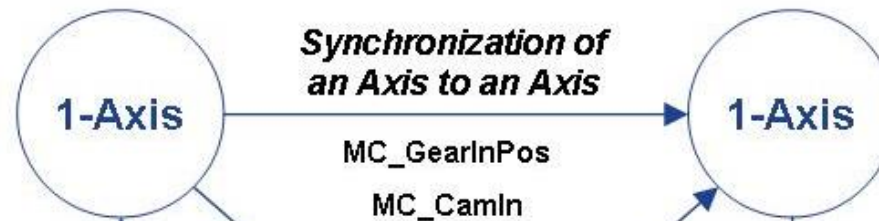
Part 4 enables synchronized multi-axis movement –
coordinated motion within one control environment

The Power of Motion Control

...and how it impacted industrial automation

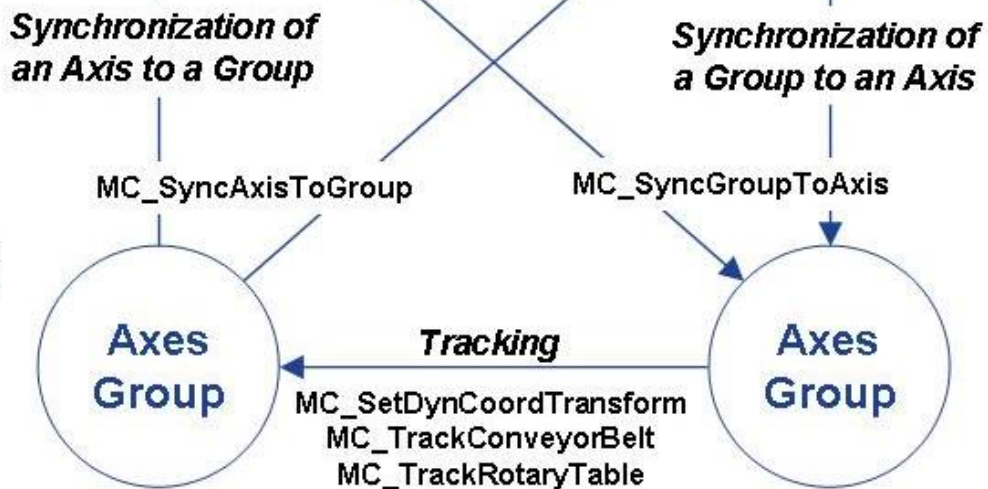
Part 1 –

Multi-Axis Functions Blocks



Part 4 –

Axes-Group synchronized Motion



The Power of Motion Control

...and how it impacted industrial automation

Create Group

- MC_AddAxisToGroup
- MC_RemoveAxisFromGroup
- MC_UngroupAllAxes
- MC_GroupReadConfiguration
- MC_GroupEnable
- MC_GroupDisable

Link to transformation

- MC_SetKinTransform
- MC_SetCartesianTransform
- MC_SetCoordinateTransform
- MC_ReadKinTransform
- MC_ReadCartesianTransform
- MC_ReadCoordinateTransform
- MC_SetDynCoordTransform

Move the Group

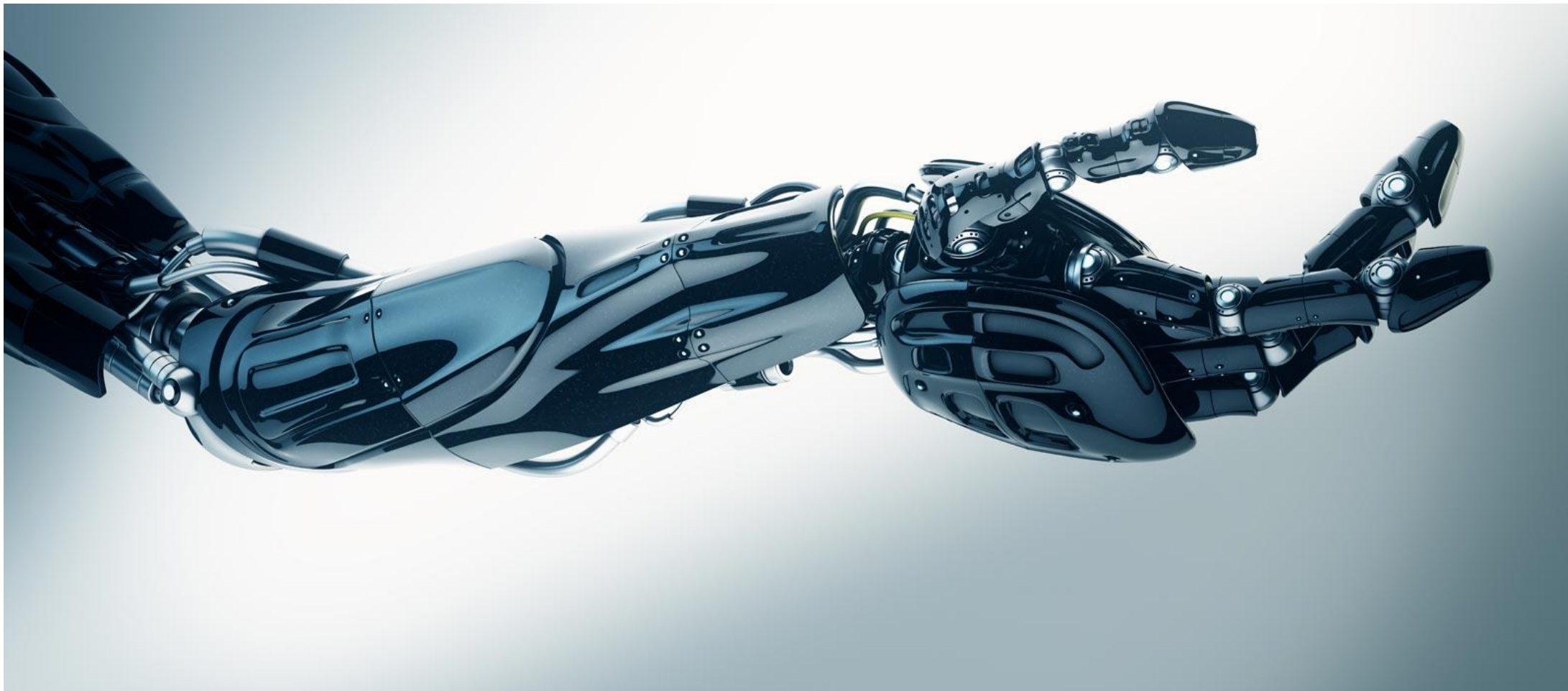
- MC_GroupHome
- MC_GroupStop
- MC_GroupHalt
- MC_GroupInterrupt
- MC_GroupContinue
- MC_MoveLinearAbsolute
- MC_MoveLinearRelative
- MC_MoveCircularAbsolute
- MC_MoveCircularRelative
- MC_MoveDirectAbsolute
- MC_MoveDirectRelative
- MC_MovePath

Other actions

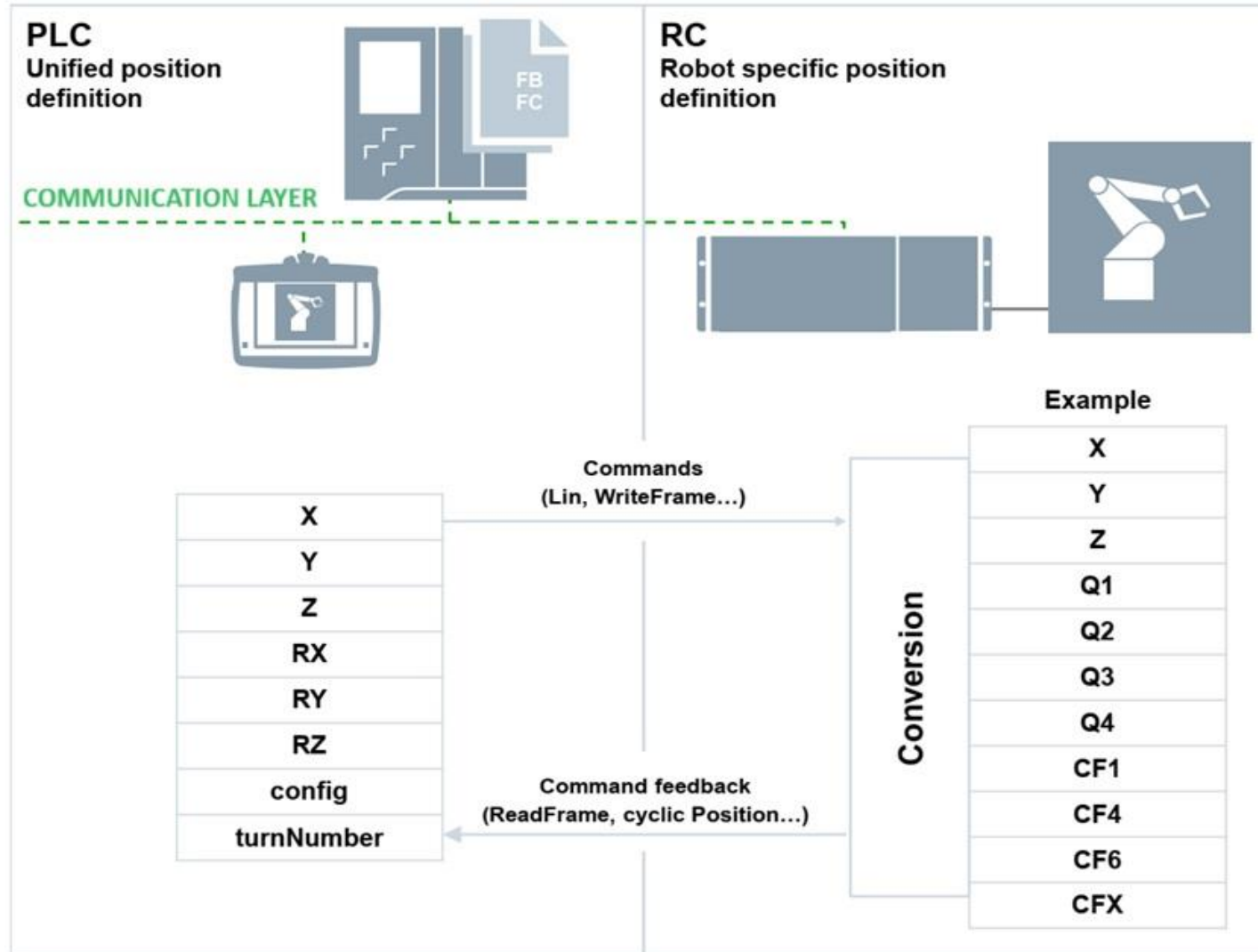
- MC_GroupSetPosition
- MC_GroupReadActualPosition
- MC_GroupReadActualVelocity
- MC_GroupReadActualAcceleration
- MC_GroupReadStatus
- MC_GroupReadError
- MC_GroupReset
- MC_PathSelect
- MC_GroupSetOverride

Integrating SRCI functionality

...into PLCopen Motion Control



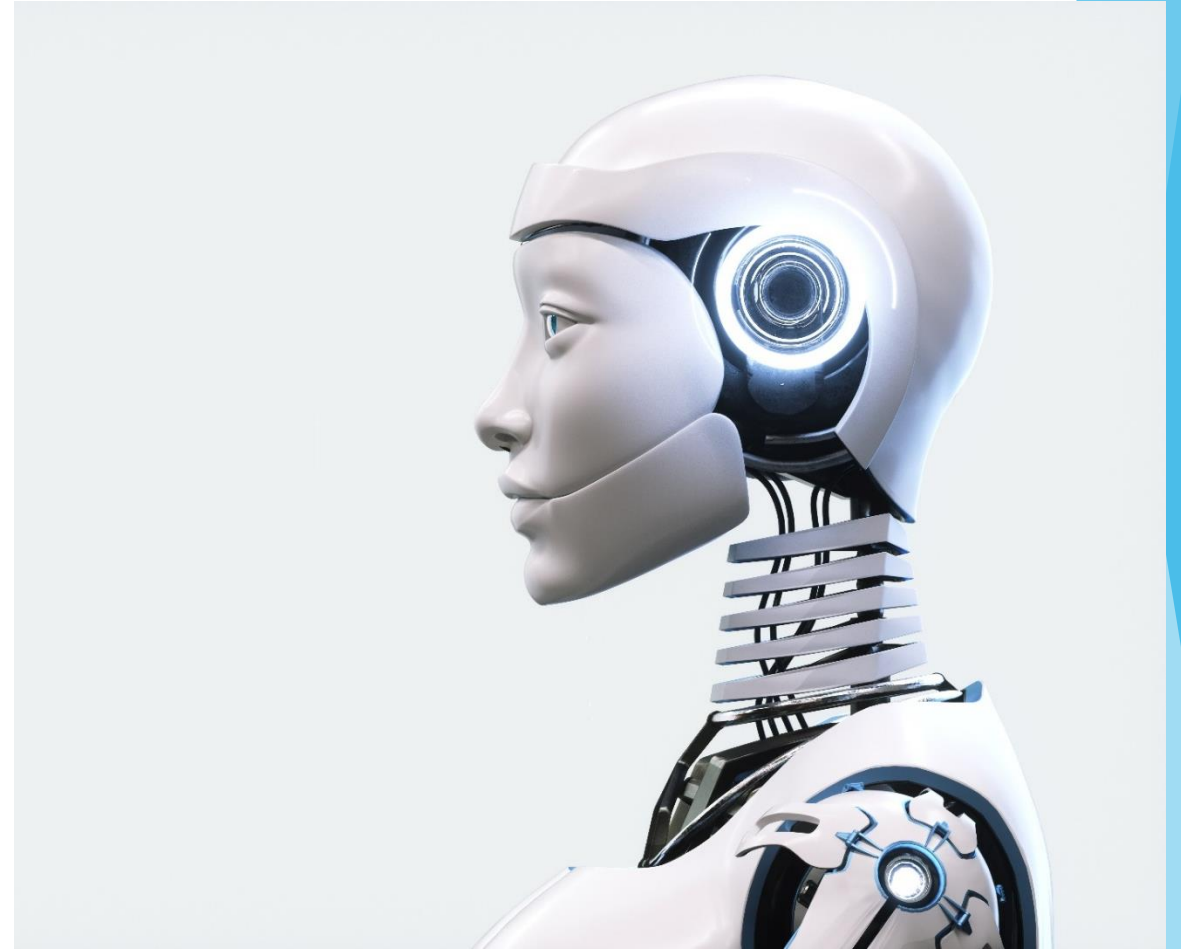
Integrating SRCI functionality ...into PLCopen Motion Control



Integrating SRCI functionality

...into PLCopen Motion Control

- ▶ Plc programmer as basis
- ▶ More PLC programmers than Robot programmers
- ▶ Robot control (kinematic model) can be integrated in PLC
- ▶ Support for many different kinematic models
- ▶ One document – Part 4



The Power of Motion Control

...and how it impacted industrial automation

Major Changes in Part 4 V2.0

- The general outputs **CommandAccepted** and **CommandID** have been added, which mainly address the needs of distributed systems for communication handshakes.
- New approach for **buffering** and **blending** commands
This change was caused to support the way industrial robot controllers do blending, mainly based on the end point of a movement, not the start point.
- Support for **Jogging** has been added
- Support for **Blending** has been added

Integrating SRCI functionality

...into PLCopen Motion Control

A number of new and amended Pre-Defined Function Blocks have been added to extend functionality toward coordinated and robotic motion.

MC_GroupJog	MC_GroupReadRigidBodyDynamic
MC_GroupJogVector	MC_GroupReadSWLimits
MC_GroupPower	MC_GroupWaitTime
MC_GroupReadCommandInfo	MC_GroupWriteDefaultDynamics
MC_GroupReadDefaultDynamics	MC_GroupWriteJoggingDynamics
MC_GroupReadJoggingDynamics	MC_GroupWriteParameter
MC_GroupReadMotionState	MC_GroupWriteReferenceDynamics
MC_GroupReadParameter	MC_GroupWriteRigidBodyDynamic
MC_GroupReadReferenceDynamics	MC_GroupWriteSWLimits
MC_ReadAxisGroupInfo	MC_SelectTool
MC_ReadDHPParameters	MC_TransformPosition
MC_ReadJointInfo	MC_WritePayloadData
MC_ReadPayloadData	MC_WriteToolData
MC_ReadToolData	

Who uses PLCopen Motion Control



Integrating SRCI functionality

...into PLCopen Motion Control

Multiple Control suppliers



Multiple Robot suppliers

Integrating SRCI functionality **...into PLCopen Motion Control**

Release for Comments **November 17th**

<https://www.plcopen.org/downloads/>

Thank you!



Questions

PLCopen[®]

for efficiency in automation

"Turning innovation into practical, scalable, and reliable solutions
- that's the power of standardization and collaboration."