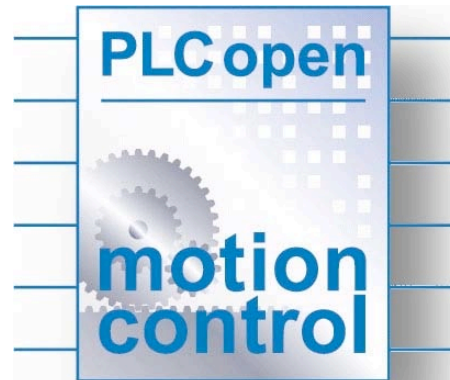


Welcome to PHOENIX CONTACT

IEC 61131-3, motion control and safety



Logic and motion united for ease of use



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End-user market trends:

- Reduced lifetime of products
- Increased product-variants
- Customized products
- High availability of products
- ...



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...results into machine requirements:

- Reuse and retrofit of existing machines.
- Modular machine design for flexible solutions.
- Mechanical motion control is replaced by servo-based motion control.
- High flexibility and shorter delivery schedule require software based motion functionality.



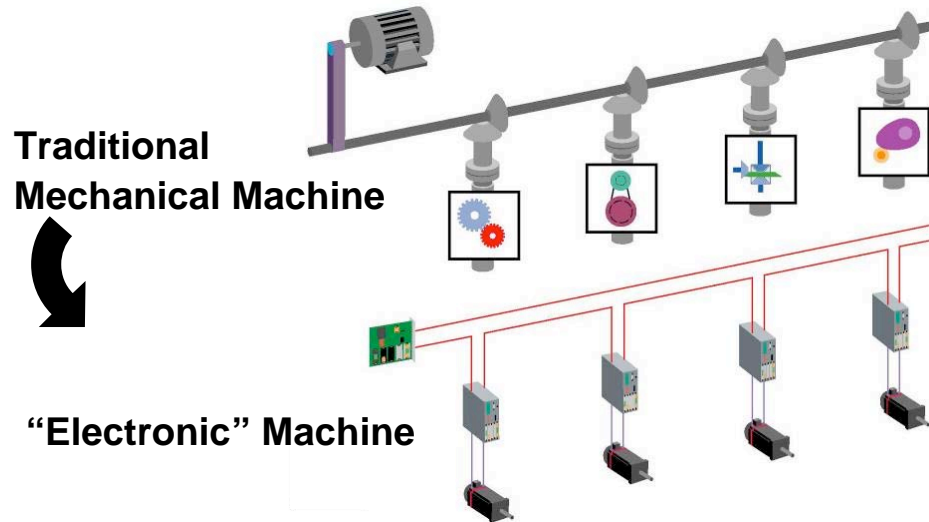
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1. Step:

The changeover from the mechanical solution...



...to Servo-based machines



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Servo based motion control...

- Use of drive based motion functionality
- Use of PLCs for programmable logic
- Interfacing between logic and motion via bus specific profiles (DRIVECOM, PROFIdrive, SERCOS, CANopen...)

...but this means:

- Use of different tools
- Different implementations according to technology provider
- ...



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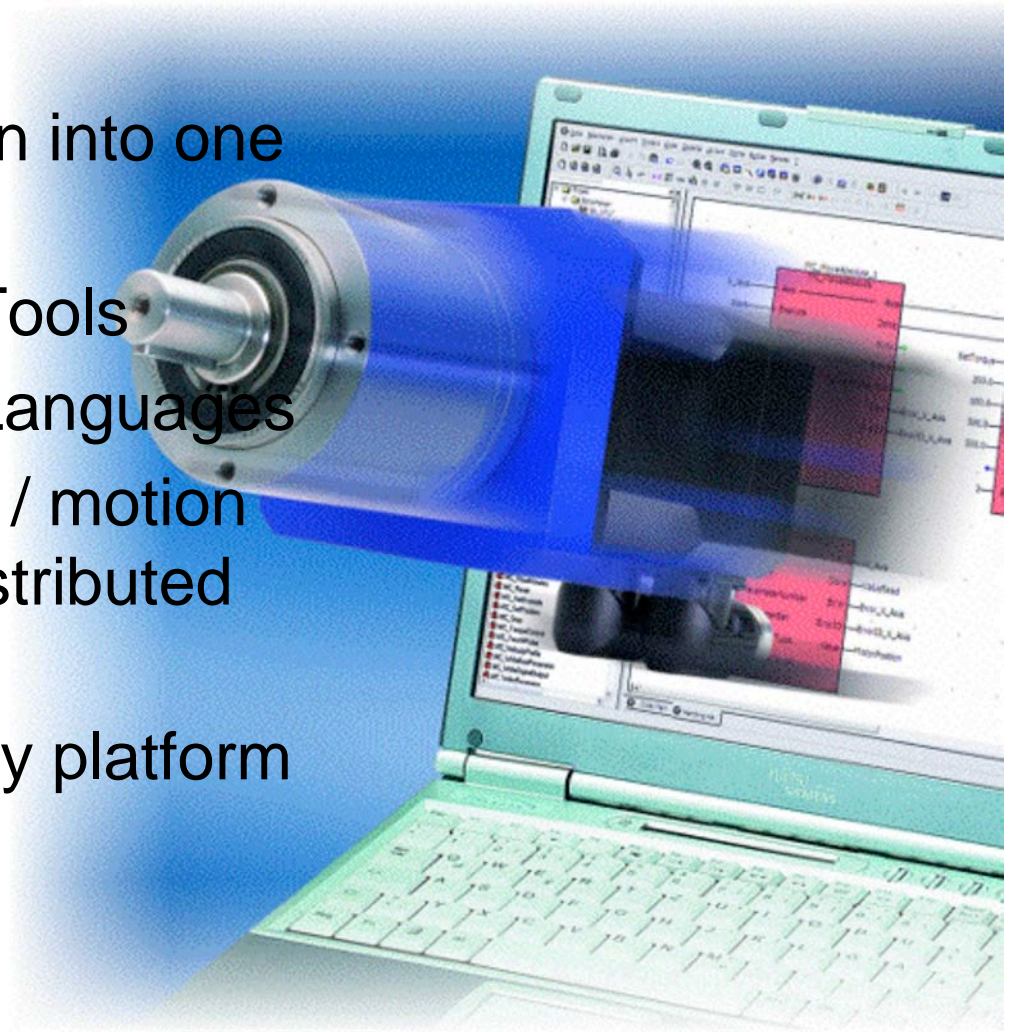
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2. Step:

Integration of logic and motion into one System

- Standardized Programming Tools
- Standardized Programming Languages
- Standardized access to drive / motion specifics for centralized or distributed control
- IEC 61131-3 provides the only platform for this !



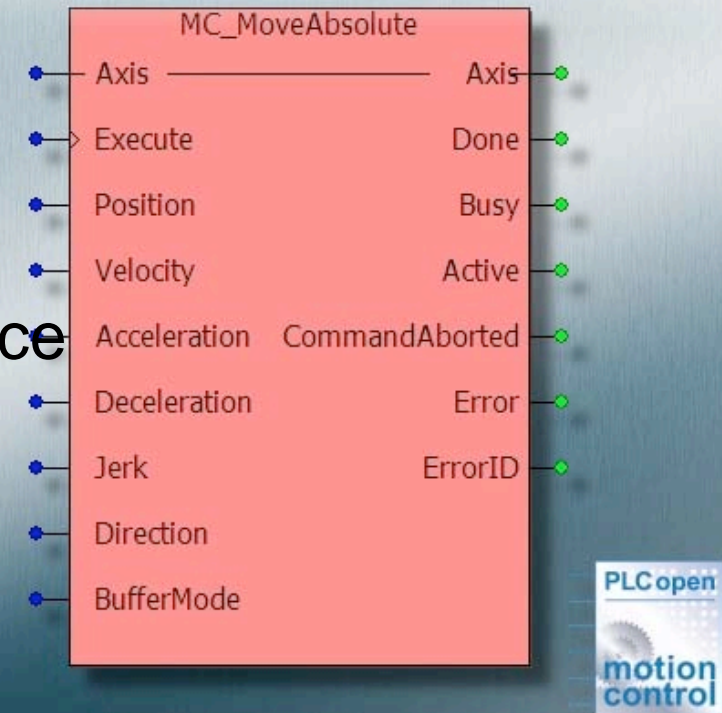
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Hardware independence via function blocks

- Definition of standardized motion functions blocks for different motion functionalities.
- Supplier and technology independence allows for reuse of existing projects.



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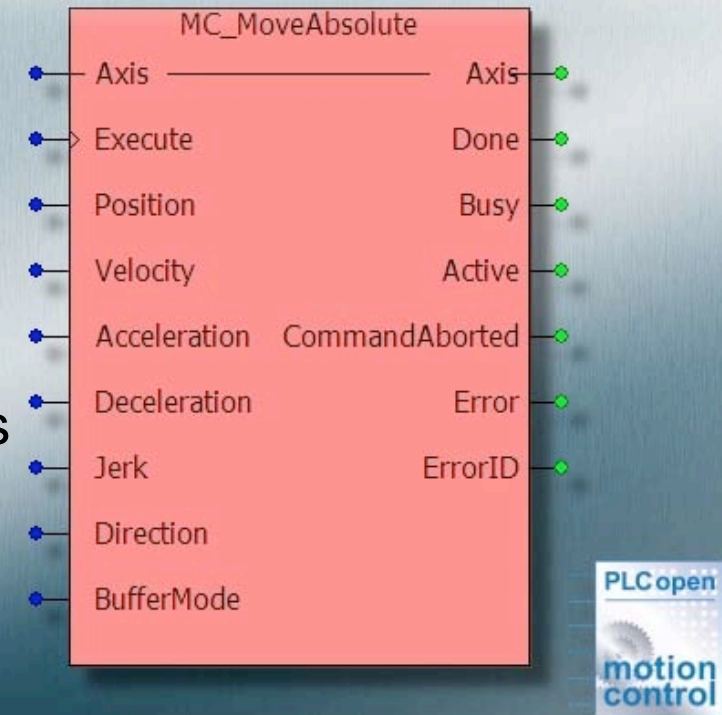
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TC2 – Function Blocks Task Force Motion Control

The complete set functions for a world of machine applications.

- **Part 1** – Basics, implemented in over 30 products.
- **Part 2** – Extensions, containing additional function blocks.
- **Part 3** - User Guidelines, showing guidelines and examples for users.
- **Part 4** – Coordinated Motion, focused to the coordinated multi-axes motion in 3D space.
- **Part 5** - Homing, extension of the homing function block as defined in Part 1



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Implementation independent:

- PC based
- Controller based
- Drive based

Different architectures but the same programming tool and languages



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The complete set of Motion Control Functions (overview)

- Velocity commands
- Absolute, relative, additive and superimposed positioning commands
- Position- Velocity- and Acceleration-profile commands
- Electronic Cam function
- Electronic Gear function / with synchronized start
- Linear and circular interpolation
- Override function
- Homing function
- Scale offset function
- ...



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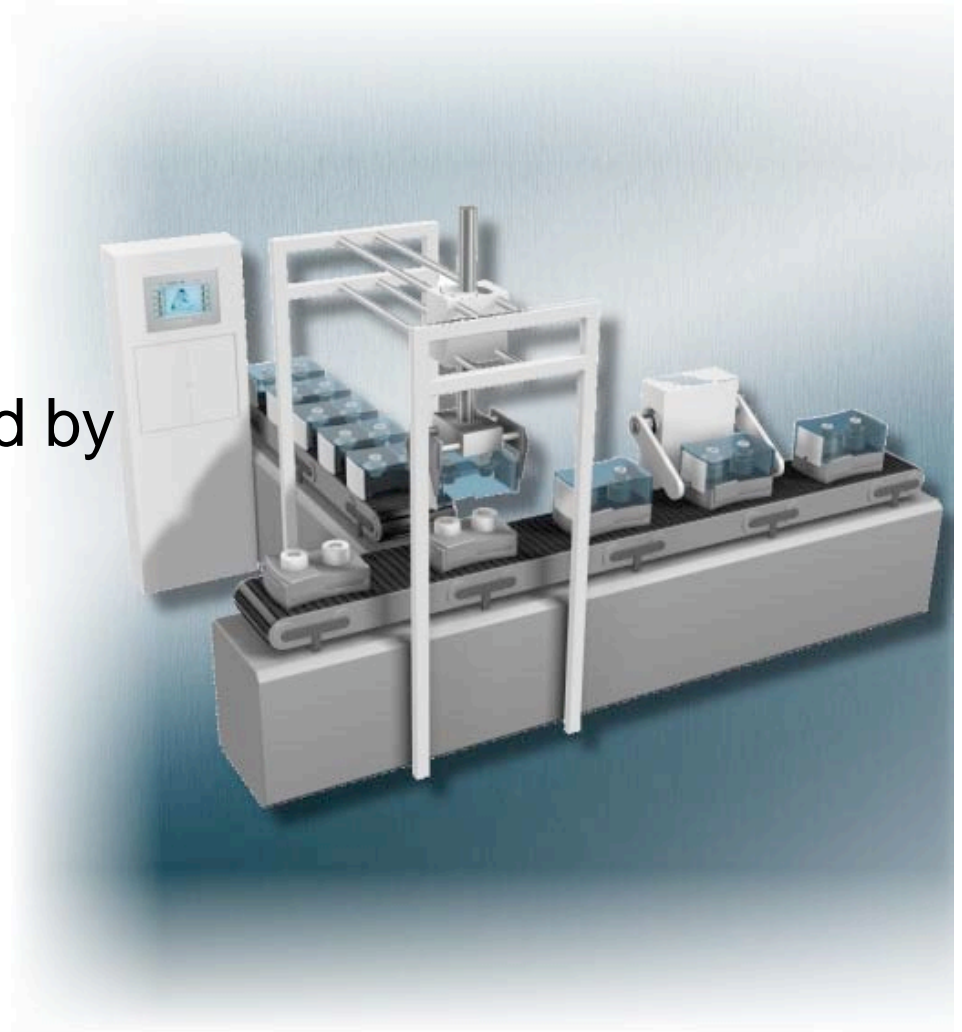


Applications:

- Assembly
- Material Handling
- Logistics

These applications are described by

- Point to point positioning
- Pick and place movements



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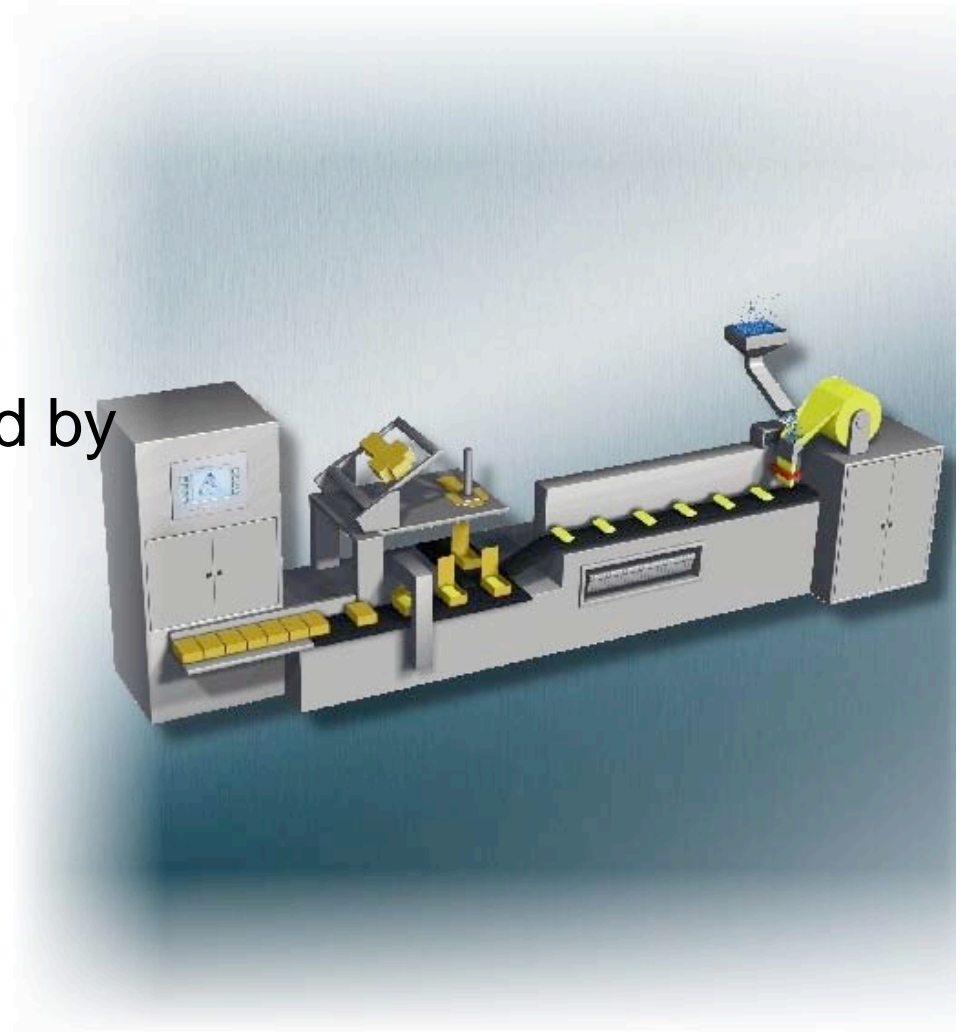


Applications:

- Packaging
- Labeling
- Printing

These applications are described by

- Master-slave motion
- Caming
- Gearing



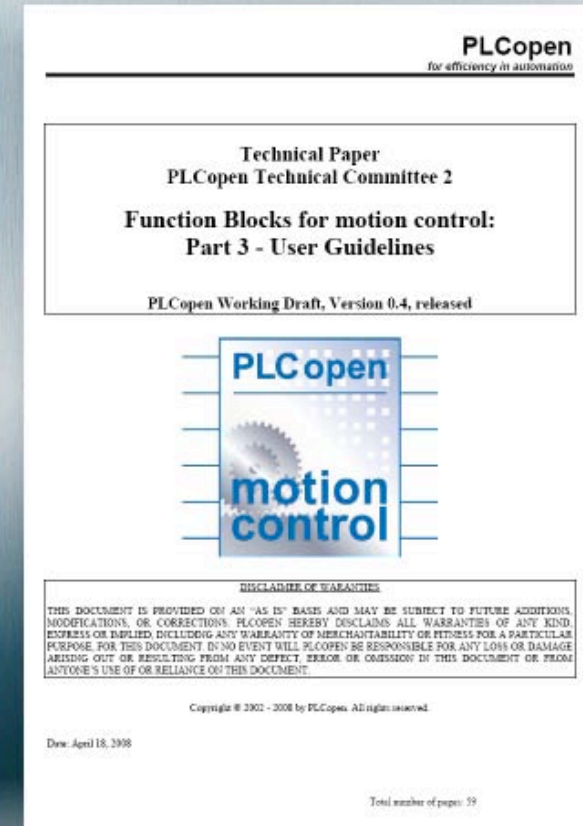
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Applications - User guidelines

- Examples for different applications flying sheer or registration
- OMAC PackAL function library programming examples



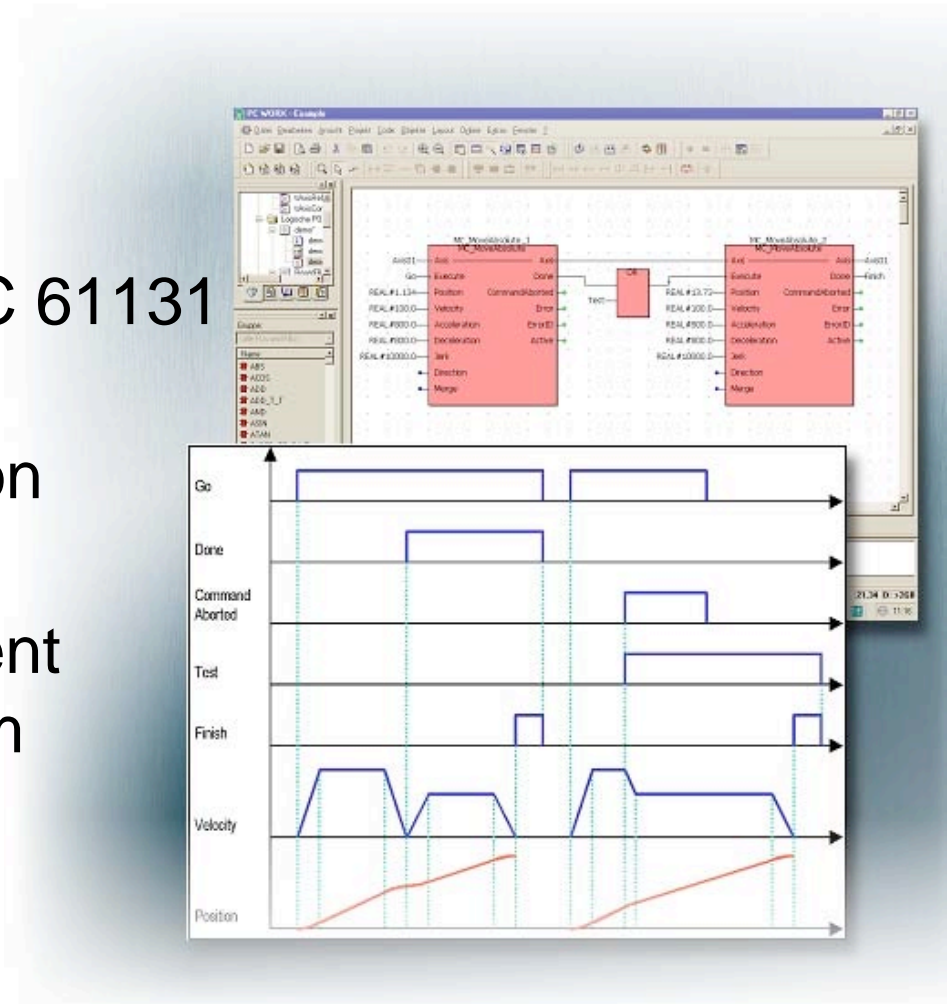
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User benefits:

- One tool for logic and motion programming
- Worldwide acceptance with IEC 61131 programming languages
- Totally drive independent motion description
- Same look and feel from different vendors allow for simple system changes



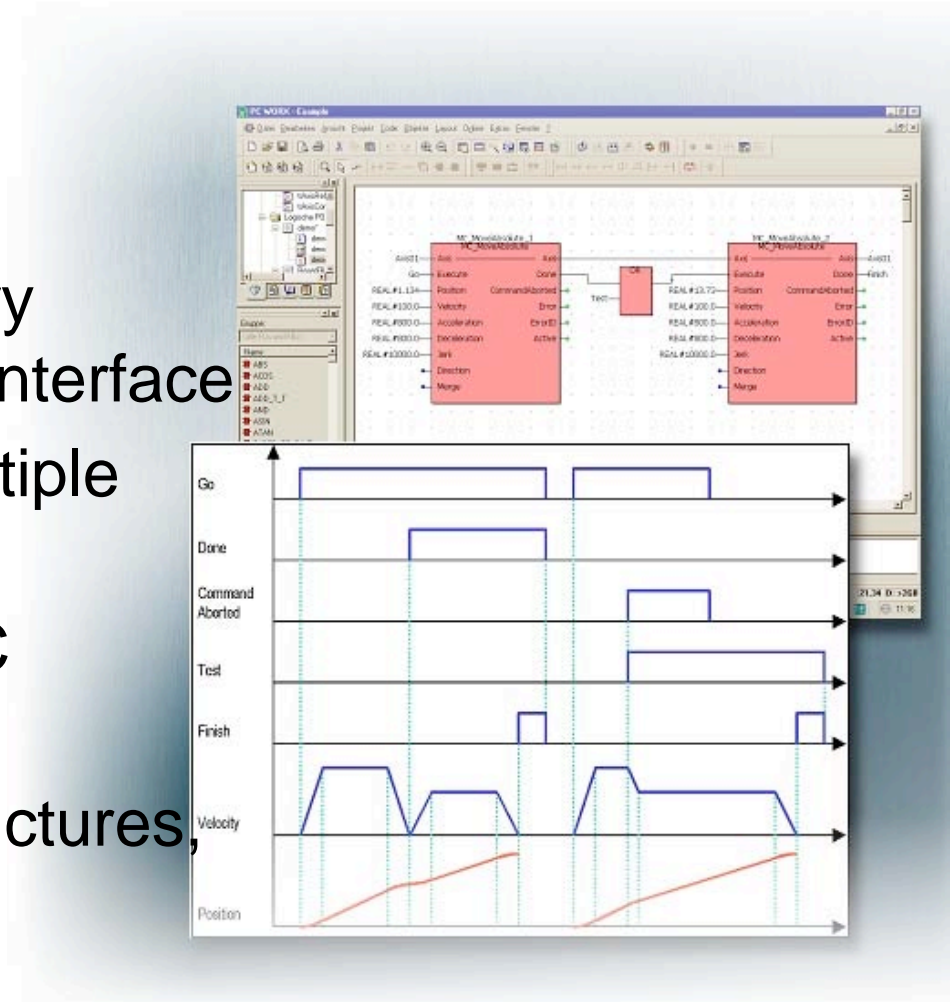
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Conclusion:

- IEC 61131-3 provides a good framework for Motion Apps
- PLCopen Motion Control Library provides an independent user interface
- Support for single axis and multiple axes / motion control
- IEC 61131-3 with PLCopen MC provides mechatronic solutions
- User derived FBs and data structures, and multi-tasking are crucial



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Questions ?

