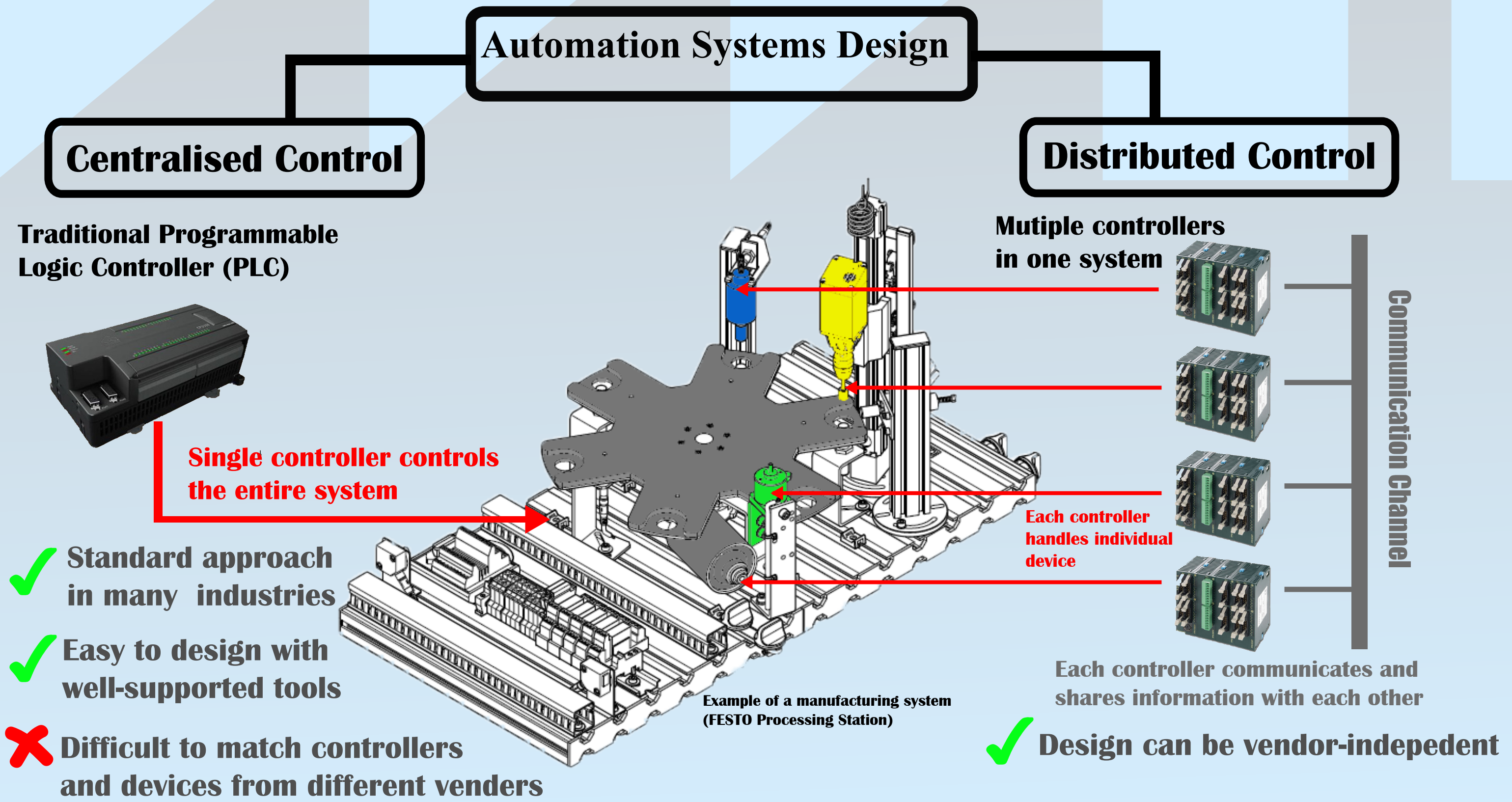


A Design and Simulation Environment for IEC61499 Function Blocks

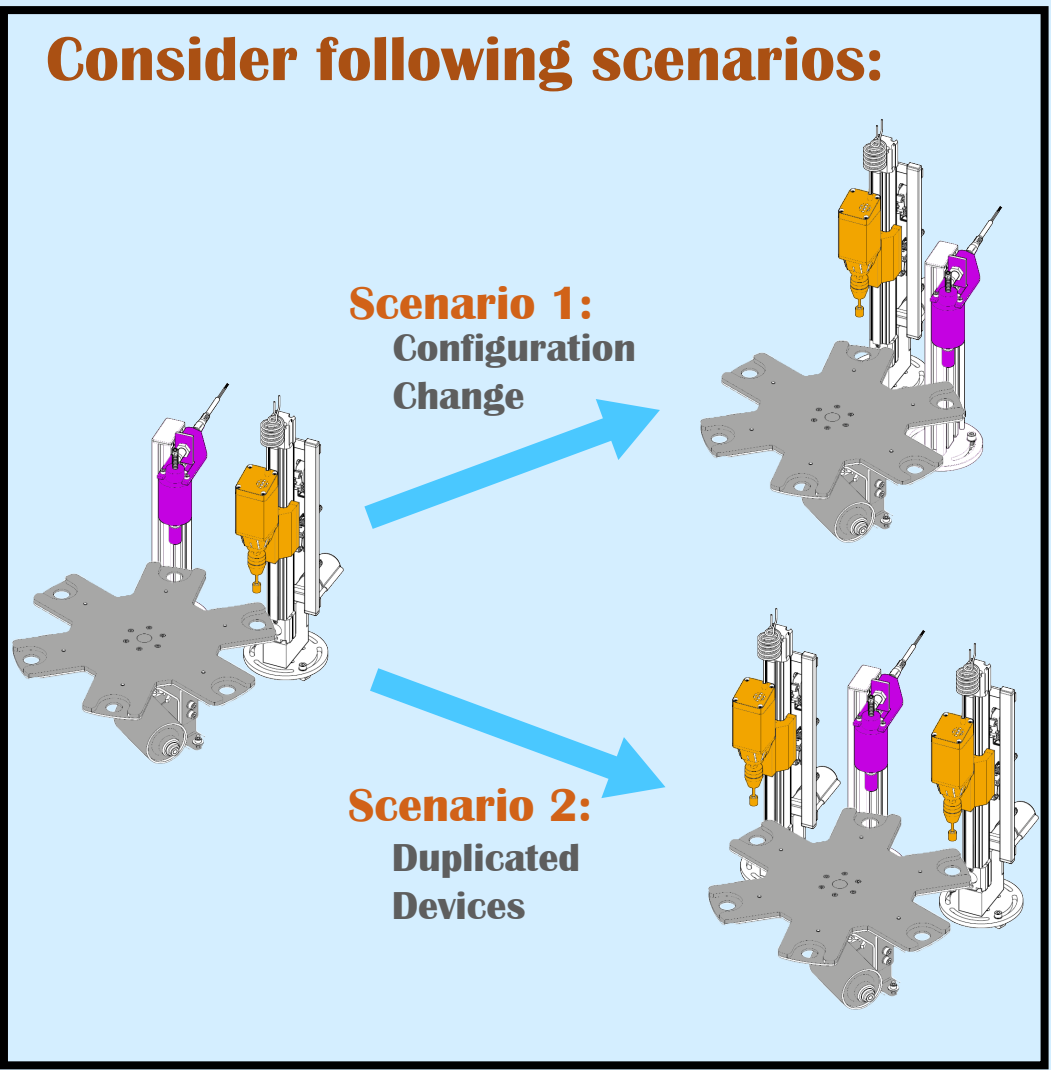
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Department of Electrical and Computer Engineering



1. Introduction



- At Scenario 1:**
- ✗ Need to modify or rewrite the entire control program
- At Scenario 2:**
- ✗ Difficult to reuse or duplicate previously written software



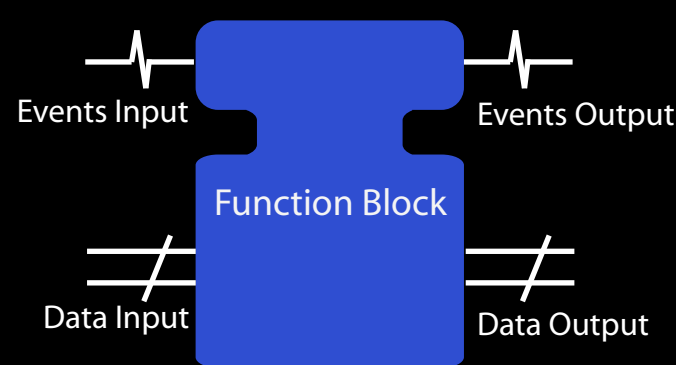
- Under both scenarios:**
- ✓ No need to modify the entire program
 - ✓ Software reusable
- These can be achieved by using IEC61499 Function Blocks.**

2. Objectives

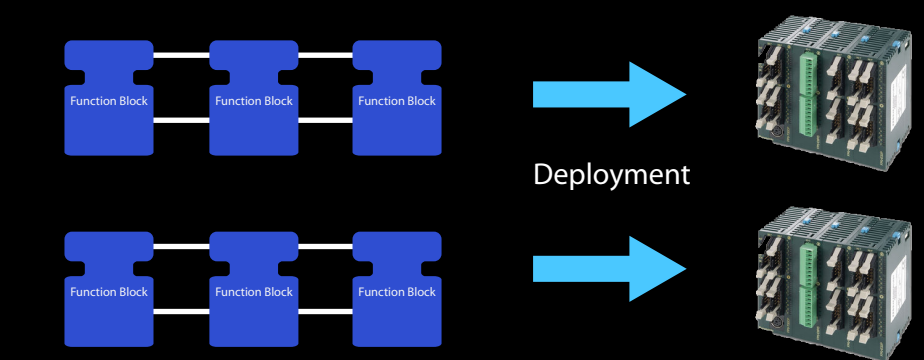
The objective is to create a design and simulation software environment, which aims to simplify the design process of distributed control systems based on IEC61499 Function Blocks.

3. IEC61499 Function Blocks

The International Electrotechnical Commission (IEC) established a new standard, IEC61499, introducing the “Function Blocks” concept.



The controller programs are now stored as a network of Function Block modules, which can be directly compiled and loaded into controllers.



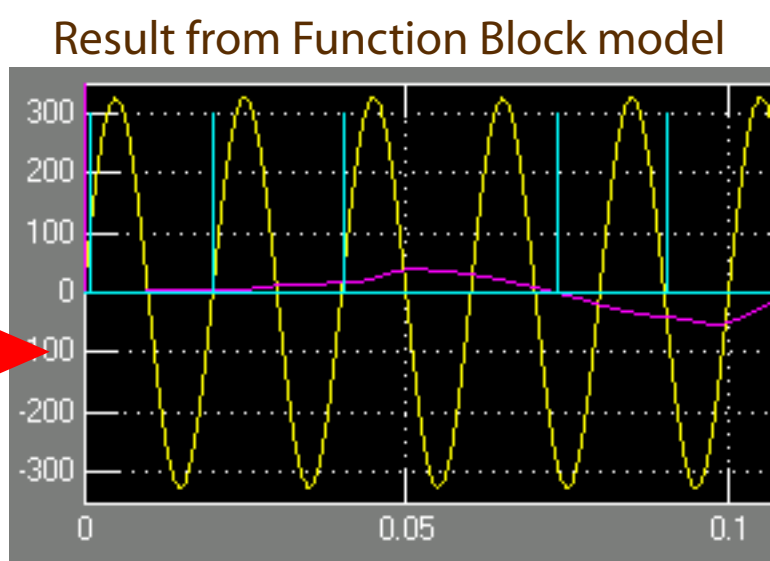
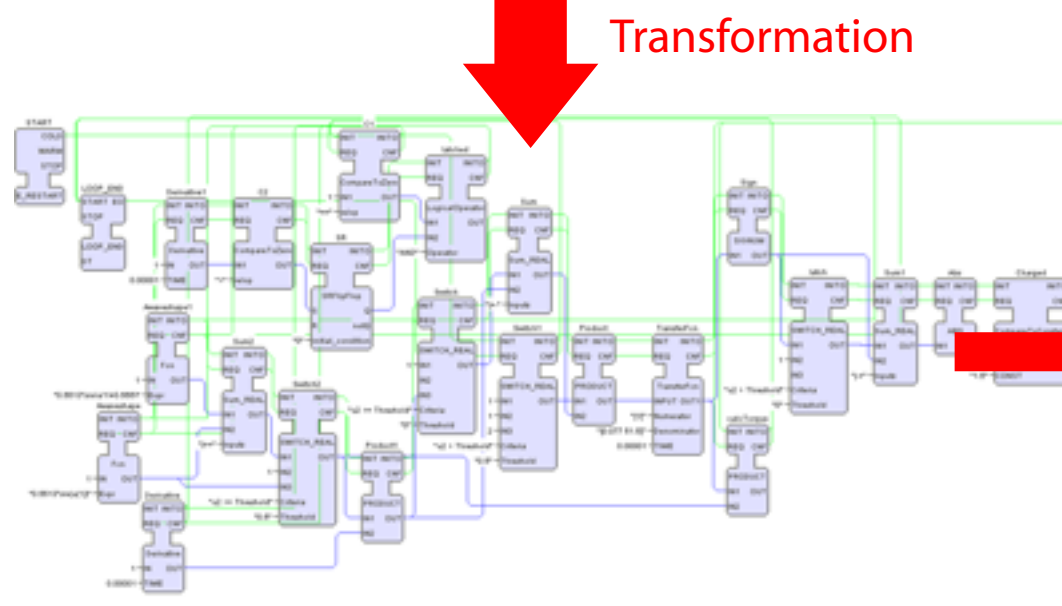
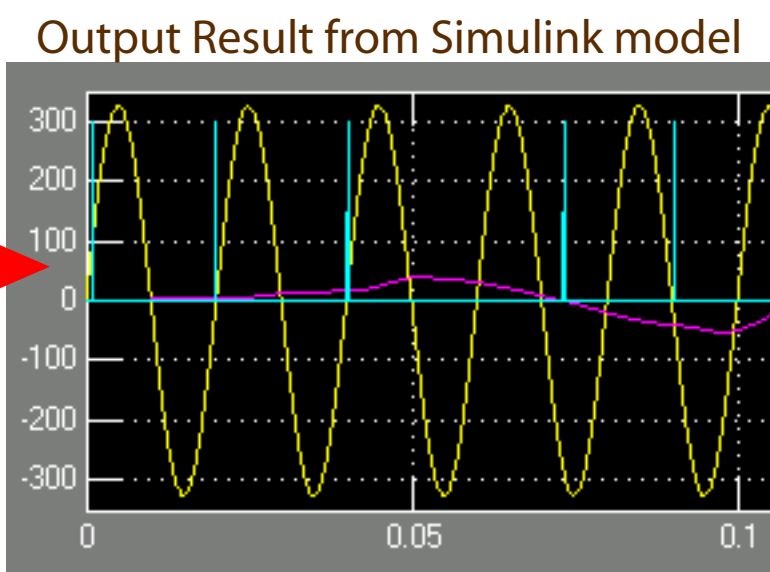
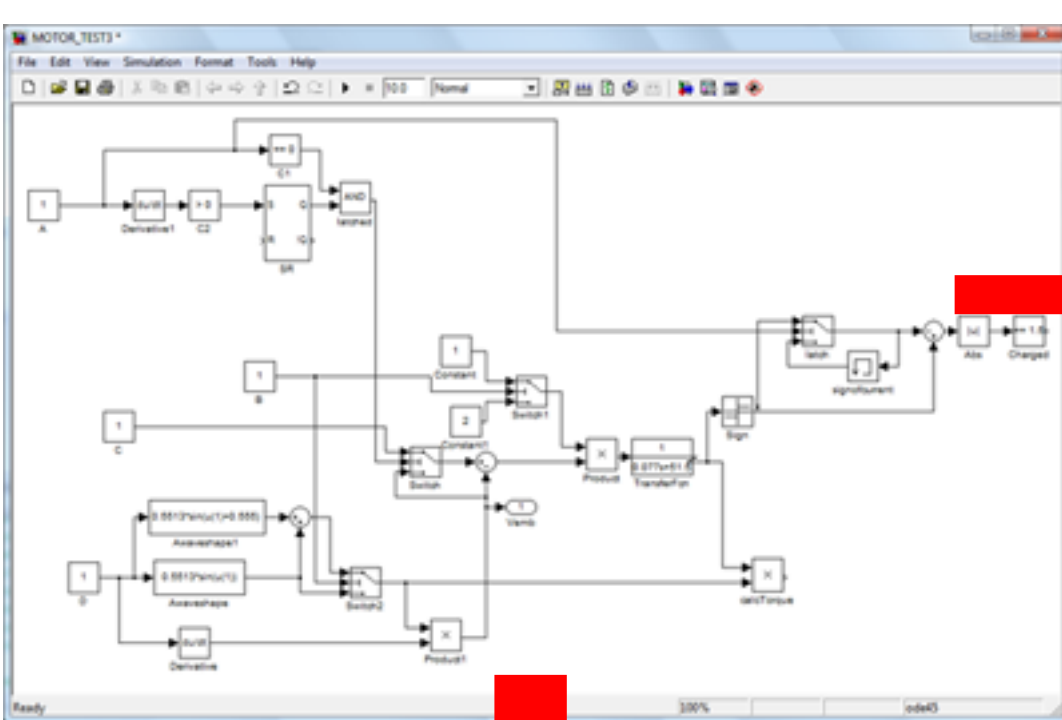
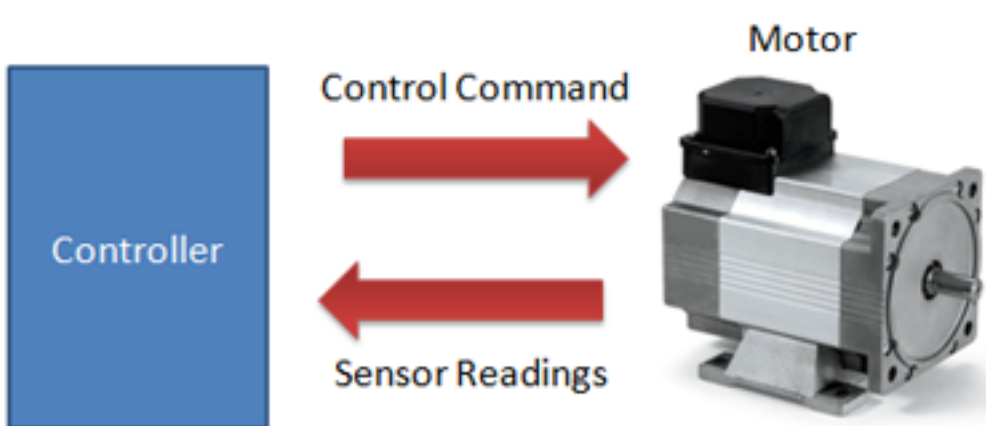
4. Solution

Even though the distributed control approach improves the flexibility and reconfigurability of the automation systems, it has some drawbacks.

One solution to these problems is an **integrated software development and validation environment** that allows design and simulation of the systems based on Function Blocks. This environment can be used to check the correctness of the system design.

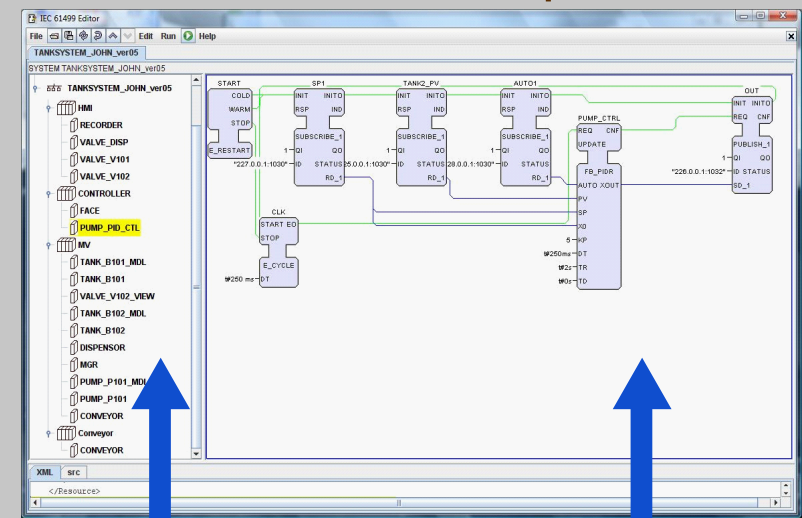
5. Results

A motor model has been tested with the model transformation approach. By using UDP socket communication with the same controller, the output from the transformed Function Block model produces the same outputs as the original Simulink model.



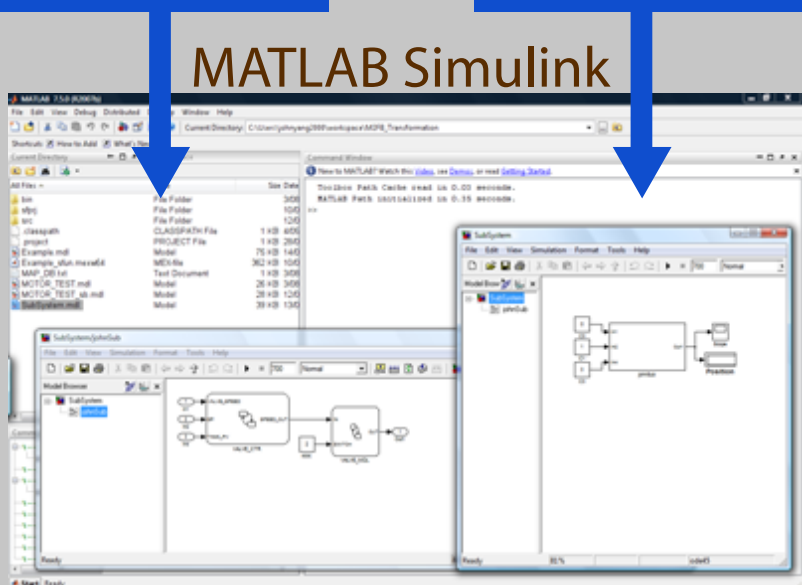
Integrated Software Development and Validation Environment

Function Block Development Tools



There are various different Function Block development tools, but none of them has full support of Simulation and Analysis yet.

These software packages can be used together in design through socket communication or a complete model transformation.



MATLAB Simulink is a well-known tool for modelling, simulation and analysis of control systems. It can assist in validating the controller design built in Function Blocks tools.

Including MATLAB Simulink may increase the industrial acceptance to Function Blocks.

6. Conclusion

A software environment is established, which allows design and simulation of control systems based on Function Blocks. This environment eases the design process and potentially improves the industrial acceptance.