

Sysmac Automation Platform

One Machine Control



One Machine Control

Motion, Logic and Vision in one

Complete machine control through one connection and one software is how we define the new Sysmac machine control. Our new machine automation controller - NJ - integrates motion, sequencing and network. A new software - Sysmac Studio - includes configuration, programming, simulation and monitoring. A fast machine network - EtherCAT - controls motion, vision, sensors and actuators. Sysmac is the powerful and robust ONE automation platform.



One machine controller: NJ-Series

For complete control and management of your machine:
Logic and advanced motion control in one

One connection: EtherNet/IP

For local or remote access to the complete machine



One machine network: EtherCAT

For real time control of servo drive, inverter, vision system and I/O



One software: Sysmac Studio

For configuration, programming, simulation and monitoring

One connection

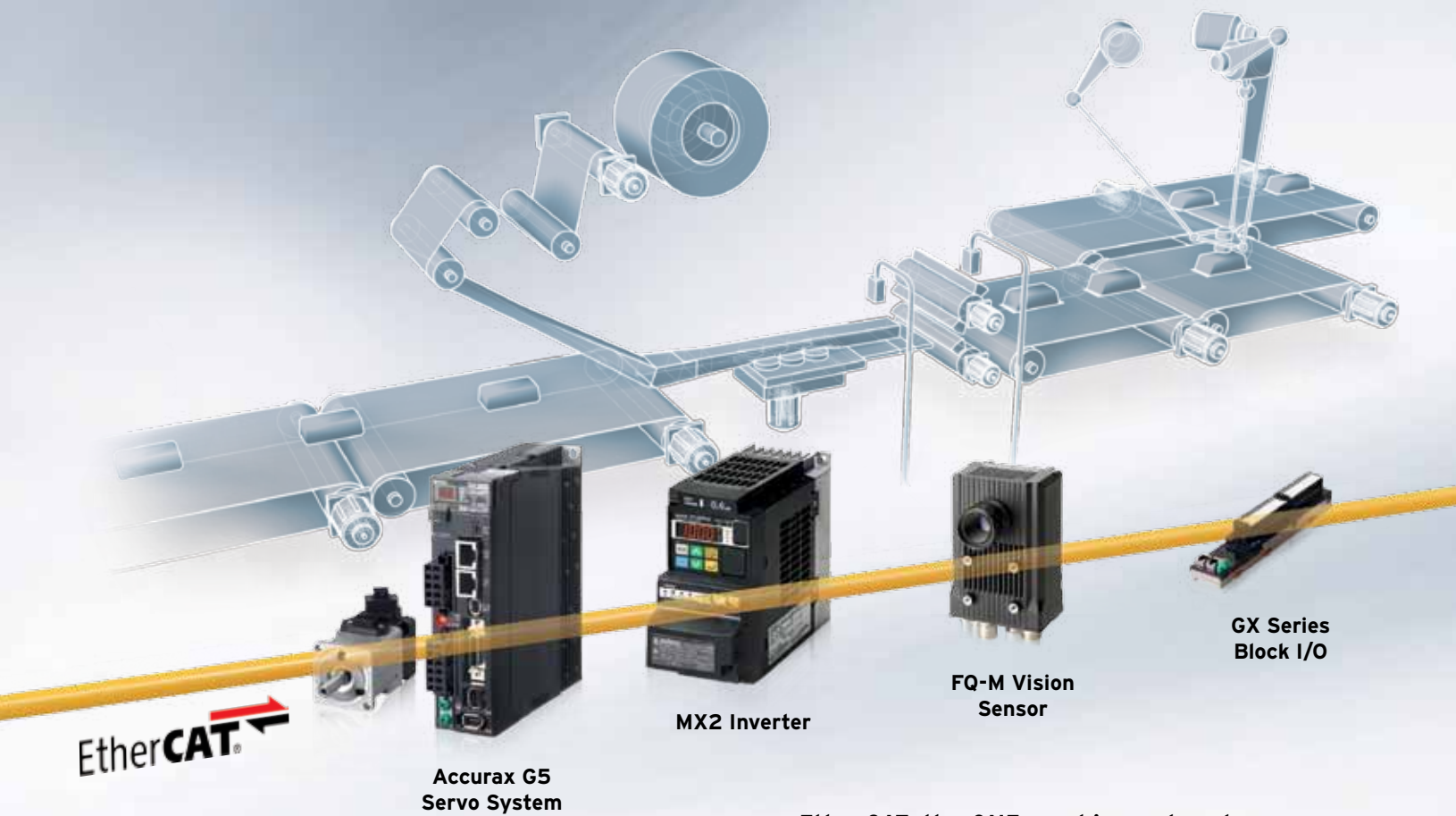
One machine network

One connection via the NJ-Series controller allows seamless control and communication with both the machine and the factory. The new NJ-Series controllers join the world standard factory automation network, EtherNet/IP, with the best Ethernet-based machine control network, EtherCAT.



EtherNet/IP: the ONE factory automation network

- » Peer-to-Peer controller communication
- » Interface with NS HMI series or SCADA software
- » Interface to Sysmac Studio



EtherCAT

**Accurax G5
Servo System**

MX2 Inverter

**FQ-M Vision
Sensor**

**GX Series
Block I/O**

EtherCAT: the ONE machine network

- » Up to 192 slaves
- » Fastest machine network on the market
- » Noise immunity to stringent Omron standards
- » Embedded in Omron servo drive, inverter, vision sensor and I/O
- » Uses standard STP Ethernet cable with RJ45 connectors

DATA

PROGRAM

One connection

EtherCAT the optimal machine network

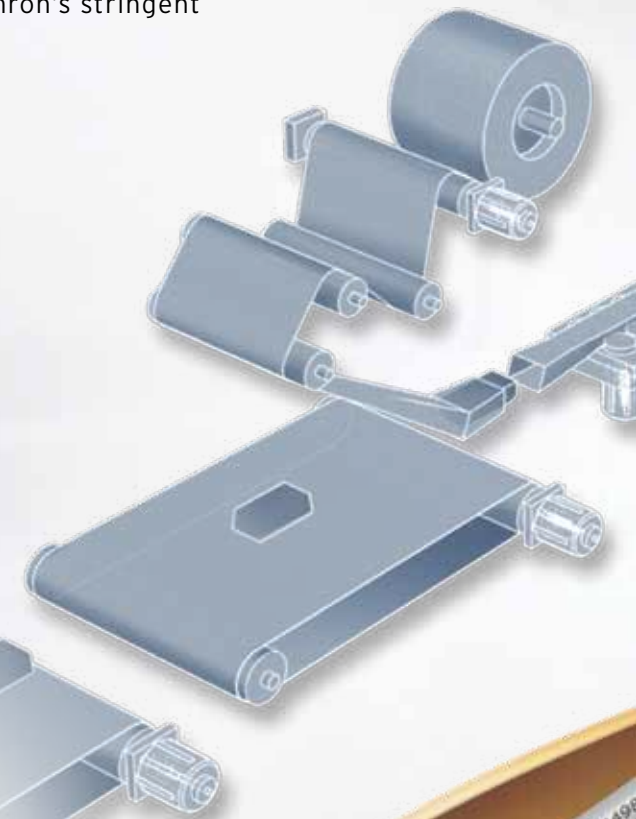
EtherCAT is the fastest emerging network for machine automation. It is Omron's de-facto machine network for our wide range of field and motion devices. It is Ethernet based, fast, accurate and highly efficient in terms of data transmission. All our EtherCAT devices have been designed and tested to meet Omron's stringent requirements on noise immunity.

Key features

- It is industrial Ethernet and uses standard IEEE 802.3 frames.
- It achieves high synchronization accuracy by using a distributed clock mechanism.
- It is the fastest network on the market with 100 μ s refresh time and less than 1 μ s jitter
- It is simple to set up with automatic address assignment for nodes
- It uses standard Ethernet cables and connectors



Master clock

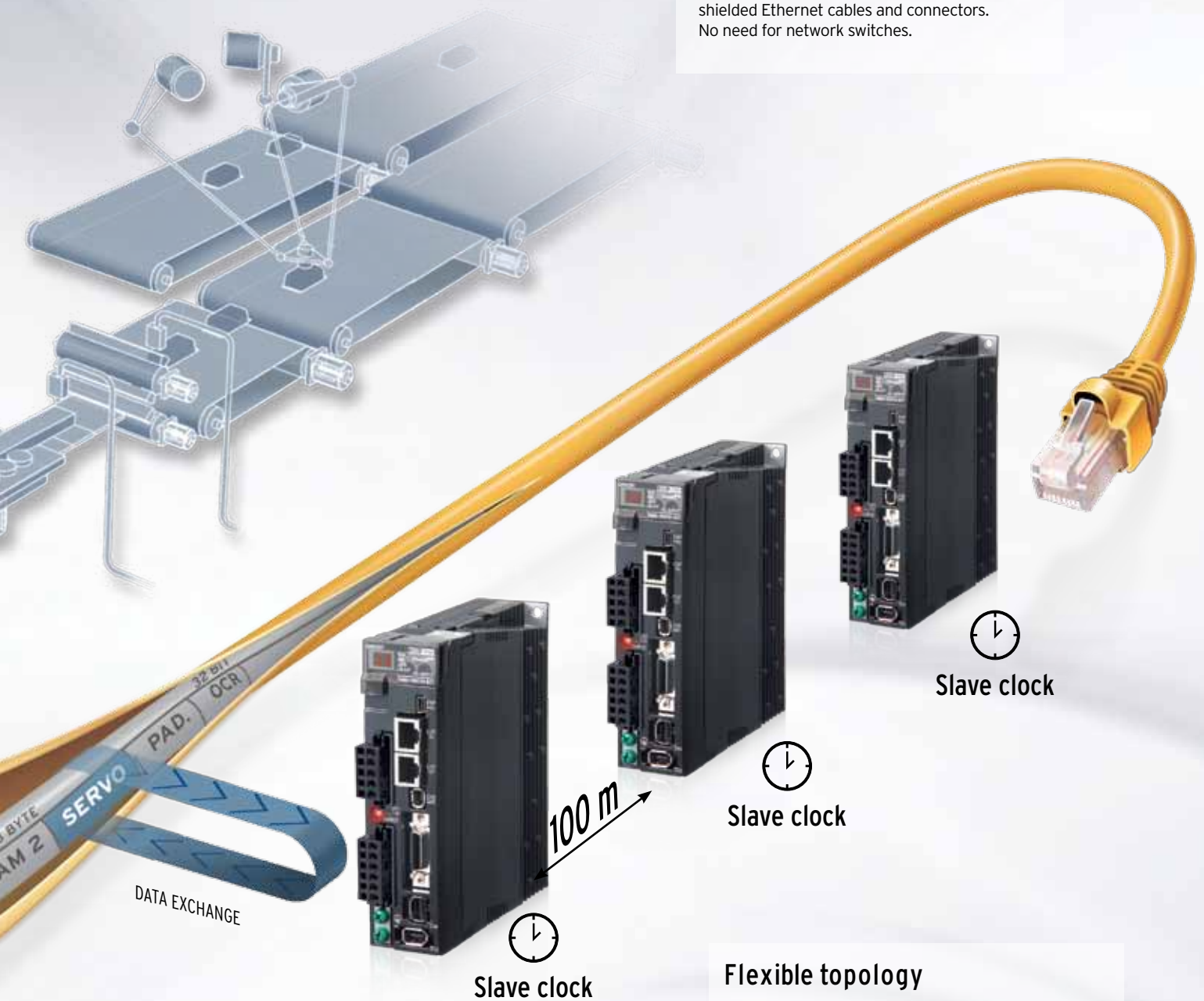


EtherCAT is Industrial Ethernet

The EtherCAT Telegram is contained in the Ethernet Data section of the IEEE 802.3 Ethernet frame. The frame travels through the media at 100 Mbps in full duplex mode.

Simple cabling: 100Base-TX

EtherCAT uses standard 100BASE-TX Ethernet communication very efficiently, over standard shielded Ethernet cables and connectors. No need for network switches.



Flexible topology

With two EtherCAT ports on all devices, no additional switches are required to create a linear network. EtherCAT junctions can be used to build tree and star topologies, which can reduce the amount of cabling.

"On-the-fly" data exchange

The slave devices extract and/or insert data on the fly. This method assures the highest possible throughput.

Distributed clocks

The EtherCAT node slave measures the time difference between incoming and returning frame - timestamp. With these timestamps the master can determine the propagation delay offset to the individual slave accurately. This mechanism ensures accurate synchronization between devices with less than 1 μ s jitter.

One software

Sysmac Studio for machine creators

Turning machine programmers into machine creators is the driving vision behind Sysmac Studio. Cutting programming, debugging and set-up time while maximizing the functionality and performance of your machine is our ultimate goal. Sysmac Studio delivers machine creators ONE software for the complete machine: Learn to use the tool once, then program, test and tune as one, and secure machine functionality as a whole.

Learn it ONCE
Develop it FAST
Test it in ONE
Secure it ALL



Learn it ONCE

- » One software for sequencing, motion, drives and vision
- » Fully compliant with open standard IEC 61131-3
- » One design and operation environment for configuration, programming and monitoring

Develop it FAST

- » Supports Ladder, Structured Text and Function Block programming with a rich instruction set
- » CAM editor for easy programming of complex motion profiles
- » Intuitive editor with auto-complete assistance for Ladder and Structured Text programming

Test it in ONE

- » One simulation tool for sequence and motion in a 3D environment
- » Complete or partial program can be simulated and debugged
- » Data trending for tuning and debugging

Secure it ALL

- » Advanced security function with 32 digit security password.
- » Complete project or single Function Block* can be protected
- » Machine cloning prevention



One Software

Sysmac Studio - Learn Quickly, Develop Efficiently, Test Continuously, Secure Instantly

Created to give you complete control over your automation system, Sysmac Studio integrates configuration, programming and monitoring. Graphics-oriented configuration allows quick set-up of the controller, field devices and networks while machine and motion programming based on IEC standard and PLCopen Function Blocks for Motion Control cuts programming time. Smart Editor with on-line debugging helps support quick, error-free programming. Advanced simulation of sequence and motion control, and data trace reduce machine tuning and set-up.

Design and operability

Unified design environment is provided for programming, configuration and monitoring. It also offers intuitive navigation between control modes.

Motion control

The graphical CAM editor allows quick implementation of complex motion profiles. CAM tables can be modified on the fly. A library of PLCopen Function Blocks for Motion Control is available to implement general purpose motion control.

Simulation

Motion trajectories in 3D can be pre-tested with advanced simulation of sequence and motion control. Simulation of single Function Blocks, POU's (Program Organisation Unit) or the entire program can be performed. In addition, all standard features such as Break & Step are available.

Data logging* and tracing

System tuning is made easy thanks to integrated and synchronized data tracing of motion commands, position and speed feedback and I/O status and values.



Configuration

Simple drag and drop configuration for controller, network, servo-axis and other field devices.

Programming

Multi-tasking and fully compliant with IEC61131-3 standard. The program editor includes smart support functions such as syntax error check and clear color segregation of variables and symbols. ST instructions can be directly written in Ladder programs thanks to in-line ST function.

The screenshot displays the Sysmac Studio software interface, which is used for configuring and programming industrial controllers. The interface is divided into several main sections:

- Configuration:** This window shows a list of devices and their parameters. A table lists items with their names and values:

Item Name	Value
Device name	ED08
Model name	GX-D10
Node address	8
Start effective	Setting
Serial number	0a0000...
POD mapping	0a5111...
OC effective	Exist
Presence of the Reference Clock	Setting
Initialization parameter setting	Edit initial setting
Nonvolatile parameter setting	Edit nonv

Below this table, there are fields for "Device name" and "The name on slave is set."

- Programming:** This window shows a ladder logic program. It includes a table of variables and their data types:

Name	Data Type	Initial Value	Access	AutoLen	ConstLen	Comment
ok	BOOL					
CC	BOOL					
dis	LREAL					
we	LREAL					
ACC	LREAL					

The ladder logic diagram shows a network of contacts and coils. A coil is labeled "MoveFB" and is connected to a network of contacts. The contacts are labeled with variables like "P_inStates", "MoveDone", and "MC_Axis000".

- Data Trace:** This window shows a 3D visualization of a mechanical system (a robotic arm) and a graph of its position over time. The graph shows a red curve representing the position of the arm, with the x-axis labeled "Deg" and the y-axis labeled "Position".

Service and Support



PRESENCE

OMRON Automation Competence Centers and technical offices across the World

- Automation Competence Center
- Channel Partner
- Application Engineer
- TS Tsunagi laboratory

COMPETENCE

OMRON

Design



Our wide network of machine automation specialists will help you select the right automation architecture and products to meet your requirements. Our flat structure based on expert-to-expert contact ensures that you will have ONE accountable and responsible expert to deal with on your complete project.

Proof of concept



As your project matures make use of our Automation centers to test and catch-up with technology trends in motion, robotics, networking, safety, quality control, etc. Make use of our Tsunagi (connectivity) laboratory to interface, test and validate your complete system with our new machine network (EtherCAT) and factory network (EtherNet/IP).

We will assign a dedicated application engineer to assist with initial programming and proof testing of the critical aspects of your automation system. Our application engineers have in-depth expertise in and knowledge of networks, PLCs, motion, safety and HMIs when applied to machine automation.



CONFIDENCE

ASSURANCE

Development



As your development begins, our Customer Service support ensures accurate ordering and delivery coordination, offering you peace of mind.

Commissioning



Our worldwide service and support network makes the export of your product simple. All our products are global products, meeting global standards - CE, cULus, NK, LR. We will support you on-site with your customer anywhere in the world.

Full scale production



Our support extends to a comprehensive set of post-sale support services, including:

- Commissioning/Startup
- Field maintenance & troubleshooting
- Telephone technical support - Free
- Warranty repair
- Replacement parts
- Training
- Product operation/automation optimization

Product overview

Controller



NJ-Series

- Integration of Logic and Motion in one Intel® Atom™ Processor
- Up to 64 axes motion control
- New PLC Logic and Motion cores, 100% Omron quality
- IEC 61131-3 programming languages
- EtherCAT and EtherNet/IP ports embedded
- Certified PLCopen Function Blocks for Motion Control
- Reuse with most of the CJ-Series I/O units



Servos



G5 servo motor

- Power range from 50 W to 15 kW
- IP67 protection
- Low cogging torque
- High accuracy provided by 20 bit encoder



G5 servo drive

- High-response frequency of 2 kHz
- Built-in safety conforming ISO13849-1 Performance Level d
- Advanced vibration suppression functions

Inverters



MX2

- Torque control in open loop
- 200% starting torque
- Double rating VT 120%/1 min and CT 150%/1 min

Vision sensor



FQ-M series*

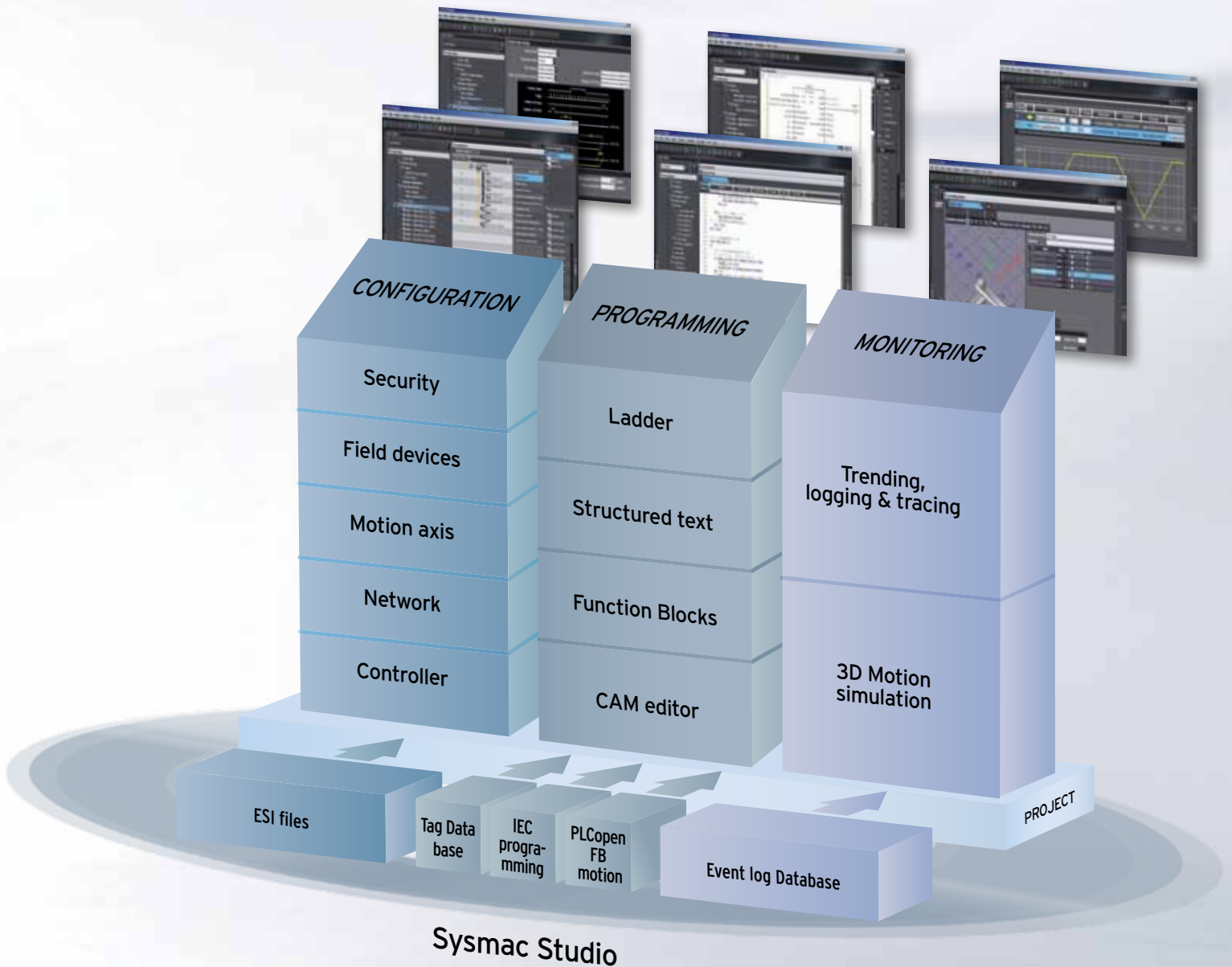
- Camera, vision and connectivity in one
- Compact vision sensor
- Designed for high speed Pick & Place
- Encoder tracking and smart calibration function
- Fast and powerful object recognition

Distributed I/O



GX series

- Wide variety of Block I/O: digital, analog and encoder I/O units
- High-speed input
- Removable I/O terminal for easy maintenance
- Easy set-up: automatic and manual address setting



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