LISTEN.
THINK.
SOLVE.

Summer Days 2018

Kinetix Platform Overview

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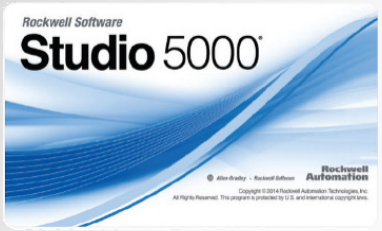
5. a 6. září 2018

Rockwell Automation

Integrated Architecture® Portfolio

Design Software



Studio 5000® Design Software, Connected Components Workbench™, Arena® Software

Distributed Control System

PlantPAx® Distributed Control System

Visualization & Information Software

FactoryTalk® Software

ThinManager® Software

Programmable Automation Controllers

CompactLogix™, ControlLogix®, GuardLogix®, and Armor™ GuardLogix® Controllers

Industrial Network Infrastructure & Media

Stratix® Switches

Operator Interfaces & Industrial Computers

PanelView™ and MobileView™ Graphic Terminals

Smart Sensing Devices

RightSight™, VisiSight™, RFID Pressure

Input / Output Devices

Compact I/O™, FLEX™ I/O, POINT I/O™, ArmorBlock®, and ArmorPOINT® Input/Output Devices

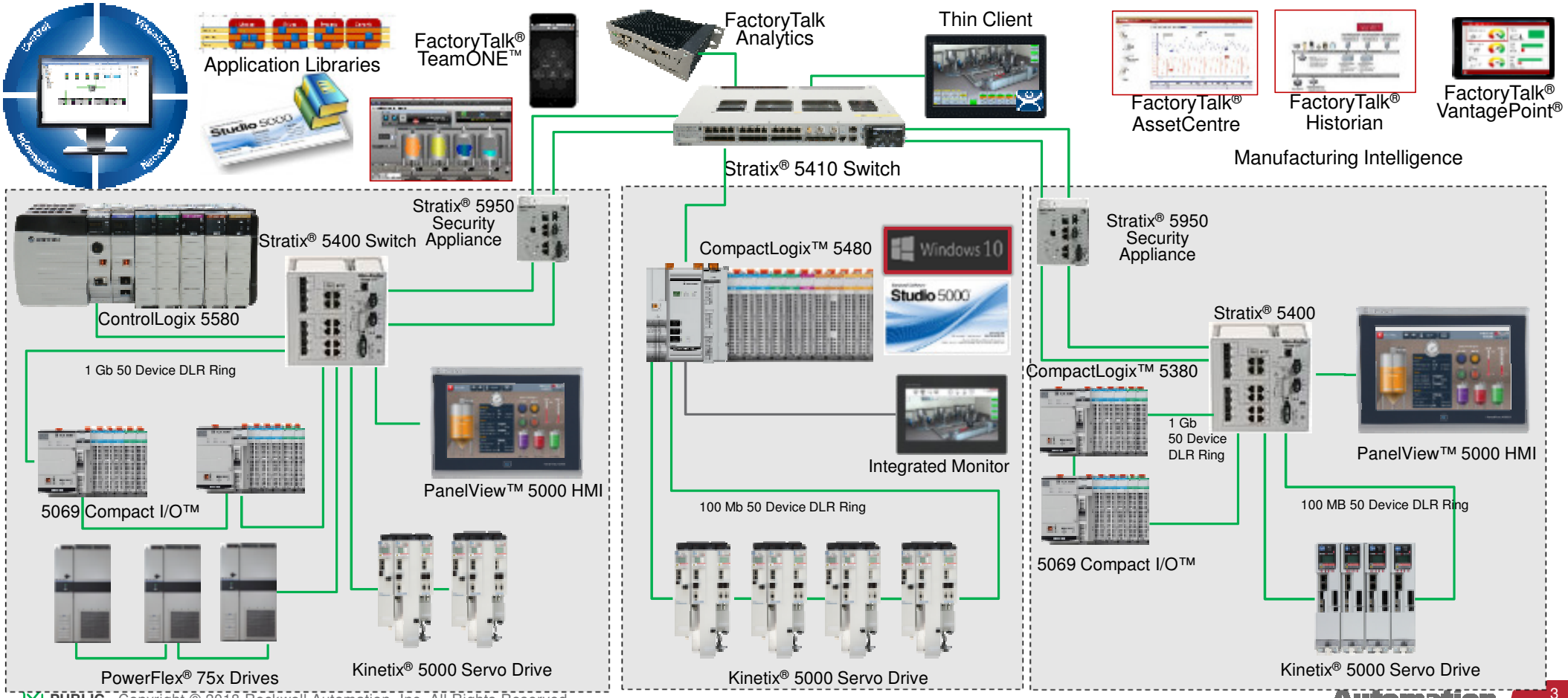
Motor Control Devices

PowerFlex® drives and IntelliCENTER® MCCs

Motion Control

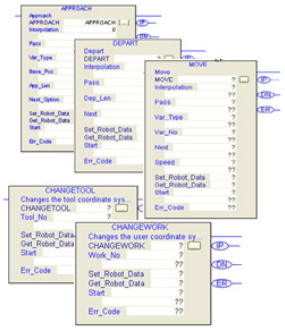
Kinetix® drives, iTRAK® and MagneMotion® Independent Cart Technology

This Is The Integrated Architecture



Logix Robot Interface Options

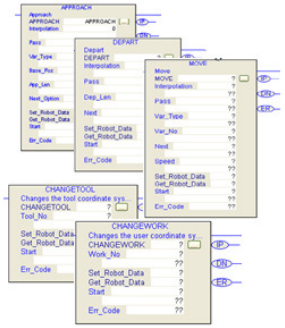
Studio 5000®
AOP, AOI, EOI screens

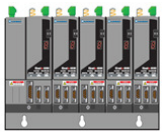


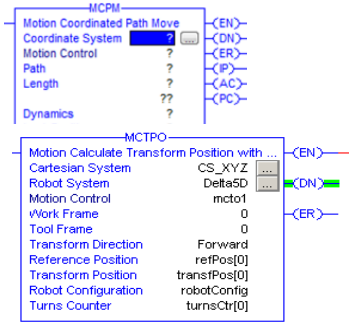
EtherNet/IP

Integrated Motion on EtherNet/IP

Studio 5000®
Kinematics, Motion Instructions
AOP, AOI, EOI Screens







EtherNet/IP Connected

- Robot vendor's controller
  - Kinematics
  - Programming/local program
  - Joint axis drives & motors
  - Handheld/EOI
- Various Logix integration features

Logix Kinematics, Kinetix® Drives

- Robot controller eliminated
- Integrated motion on EtherNet/IP joint axis drives (Kinetix)
- Logix management of the kinematics/trajectory planning

Logix EtherNet/IP Connected

Encompass Product	Manufacturer	Robot Type	Configuration Profile			AOI Library	HMI FacePlates	No Teach Pendent Required	Device Level Ring	CIP Safety Slave	SSA Capable
			Generic	EDS Profile	Custom AOP						
N	ABB	Articulated Arm	✓							✓	
		Delta	✓								
		Palletizing	✓								
N	Adept Technology Omron	Articulated Arm	✓					✓			
		SCARA	✓					✓			
		Delta	✓					✓			
		Cartesian	✓					✓			
N	Comau	Articulated Arm	✓								
		Palletizer	✓								
Y	DENSO robotics	Articulated Arm (Up to 6 axis)	✓			✓	✓	✓			
		SCARA (4 axis)	✓			✓	✓	✓			
N	Epson Robots	Articulated Arm	✓								
		SCARA	✓								
Y	FANUC Robotics	Articulated Arm			✓	✓	✓			✓	✓
		Delta			✓	✓	✓			✓	✓
		SCARA			✓	✓	✓			✓	✓
		Palletizing			✓	✓	✓			✓	✓
N	Kawasaki Heavy Ind.	Articulated Arm	✓							✓	
		Delta	✓							✓	
		Palletizing	✓							✓	
Y	KUKA Robotics	Articulated Arm			✓	✓		✓		✓	
		Palletizer			✓	✓		✓		✓	
		Cartesian/Gantry			✓	✓		✓		✓	
N	Nachi Robotic Sys.	Articulated Arm	✓							✓	
		SCARA	✓							✓	
N	Staubli	Articualted Arm	✓								
		SCARA	✓								
N	Yamaha	SCARA	✓			✓	✓	✓	✓		
		Cartesian	✓			✓	✓	✓	✓		
Y	Yaskawa-Motoman	MLX200 Controller Articulated/Pallet/Delta	✓			✓	✓	✓			
		DX200 Controller Articulated/Palletizer		✓						✓	

Delta Robot Geometry Examples

- New Kinematics features/Instructions for support of up to 6 axis robot geometries.
  - Delta 3,4,5 axis supported in the first release
  - SCARA, Articulated, Custom geometries in a future release

Codian – 4 Axis Delta

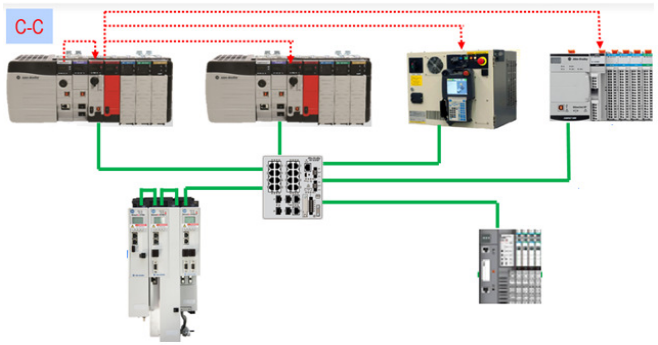
autonox24 - 4 Axis Delta

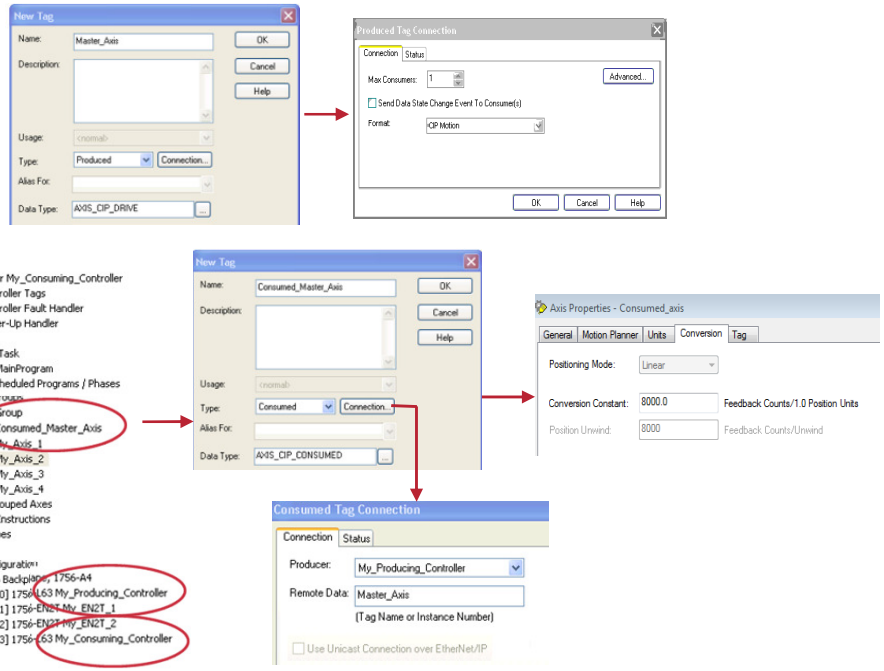
Codian - 5 Axis Delta

autonox24 - 5 Axis Delta

EtherNet/IP Produced/Consumed Axis

- Produced/consumed axis between controllers in a 1756 chassis or on EtherNet/IP
- CompactLogix™ and ControlLogix® 5570, 5580, 5380, 5480 controllers
- Synchronized motion functions across multiple controllers
  - PCAM
  - GEAR
  - MDSC movers
  - Scheduled outputs
  - Registration events
  - Position based interlocks/handshaking





Q4
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Motion Drive/Motor/Actuator Portfolio

Rotary Motors & Actuators

VP and MP-series

- Designed to meet the unique needs of many industries including wash down applications
- Single or dual cable motor options available
- SIL 2/Pld encoder options

Servo Drives

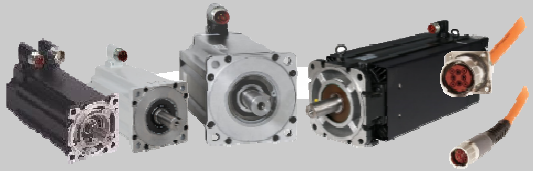
Kinetix®

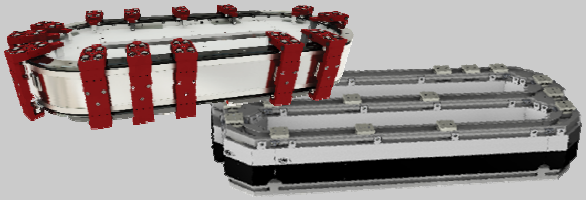
- Broad range of drives from low power indexing drives to high power, multi-axes drives
- Integrated motion on EtherNet/IP
- Integrated safety on EtherNet/IP

Intelligent Track Systems

iTRAK®- MagneMotion®

- Modular, scalable linear motor system that allows independent control of multiple movers
- Ideal for packaging, automotive, life sciences, logistics industries





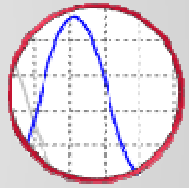
Kinetix 5700 Servo System

200 A common DC bus for shared energy usage and savings

Combined safety technology. Integrated or hardwired Safety - Safe Torque Off SIL3/PLe

Multiple motor types supported, including DSL single cable technology

Advanced tuning technologies that help improve performance and reduce tuning

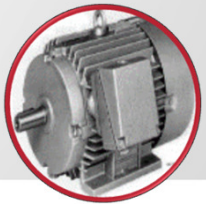


Power dense design saves cabinet space

DC Bus Supplies

Single-axis Servos

Dual-axis Servos



Advanced motor control technology

Kinetix 5700 Safe Monitoring Servos

new

Kinetix VP motors with SIL2/PLd rated encoders

MP motors with Hiperface sin/cos encoders

Support for 842HR sin/cos encoders

"ERS4" Single-axis Modules

"ERS4" Dual-axis Modules

Seamless and inherently safe communications

EtherNet/IP

Ability to safety monitor speed, direction, and position

Emergency safety stop functions and zero speed monitoring

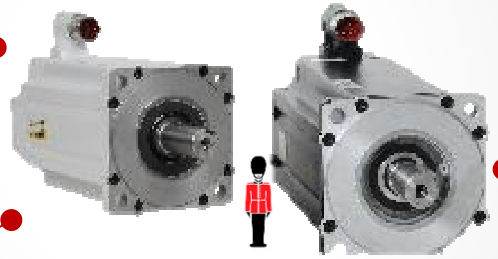
STOP

SIL 2 Rated Kinetix® VP Motors:

new

Supports advanced safety functions *via Kinetix® 5700 "**ERS4 Advanced Safety**" Safe Speed Monitoring drives*

23-bit primary channel feedback on "Q" *encoder option provides application flexibility (Frame 100 - Frame 165)*

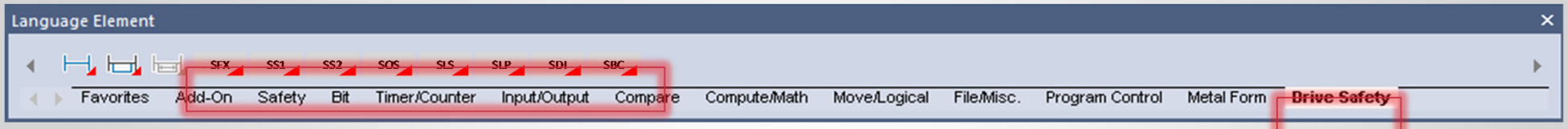


SIL 2 TÜV Certification *on optical encoder*

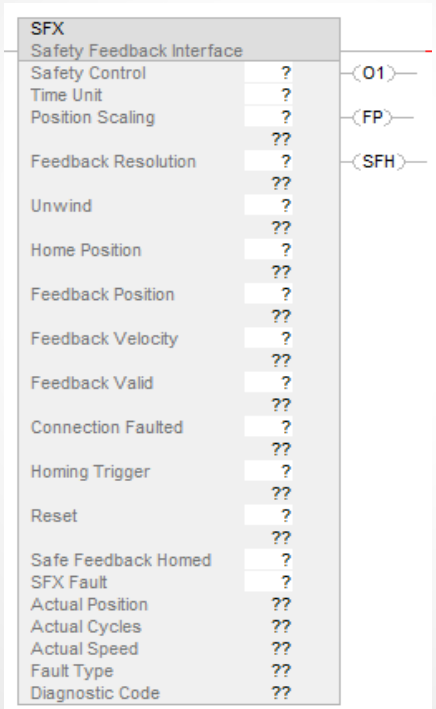
9-12 bit safety channel feedback on "W" or "Q" *encoder option when used within integrated safety systems*

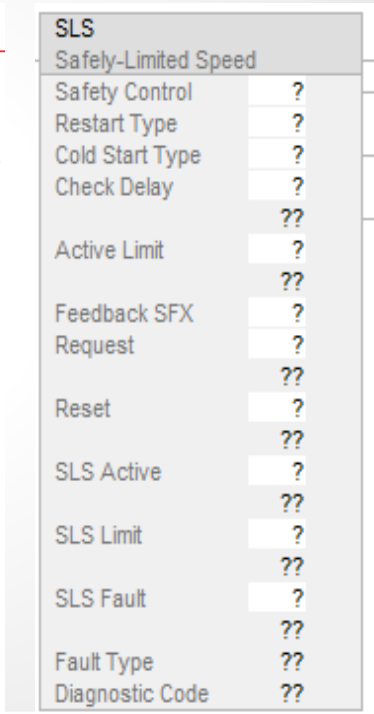
Current "C, P" encoder options remain active *for ease of ordering*

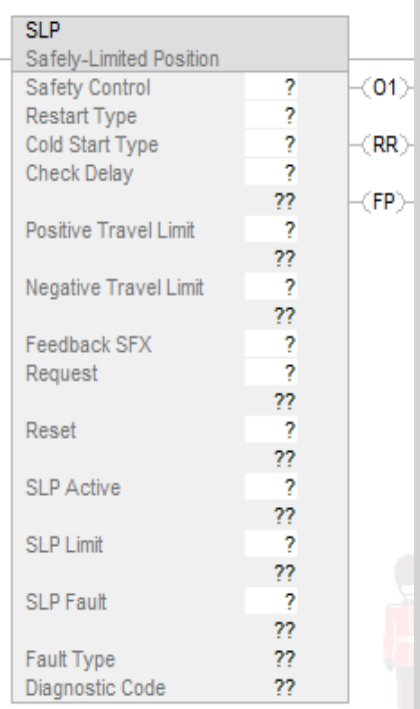
Drive Advanced Safety Instructions in V31



- Advanced drive safety for Kinetix® 5700 and PowerFlex® 755/755T
- Suite of drive safety instructions for use in the 5580 and 5380 GuardLogix® safety task
  - SFX (Safe Feedback Scaling)
  - SS1 (Safe Stop 1)
  - SS2 (Safe Stop 2)
  - SOS (Safe Operating Stop)
  - SLS (Safely-limited Speed)
  - SLP (Safely-limited Position)
  - SDI (Safe Direction)
  - SBC (Safe Brake Control - external brake)

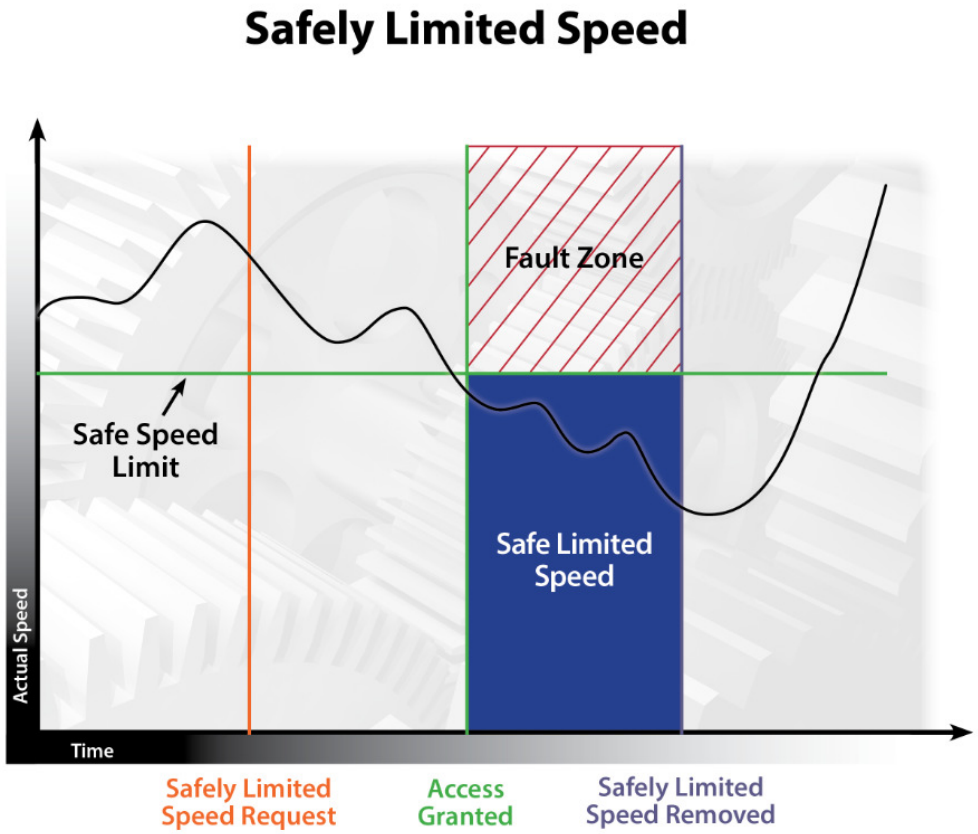


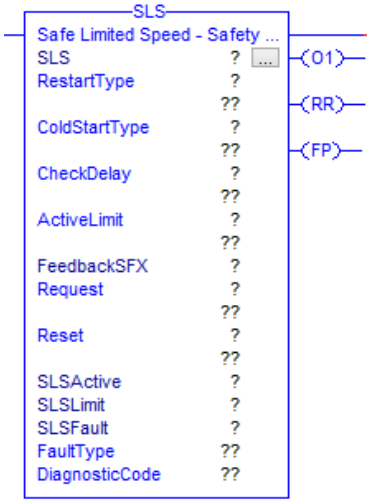




Safely Limited Speed (SLS)

- SLS instruction initiates and monitors the motor speed to verify it does not exceed the specified “active speed” limit
- “Active speed” limit is dynamically changeable
- If the specified speed limit is exceeded, the SLS Limit output is signaled
- The output is used to initiate a user defined Safe Stop Function (STO, SS1, SS2 or SOS).

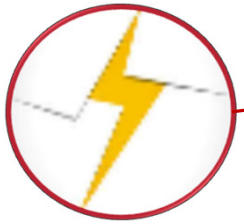




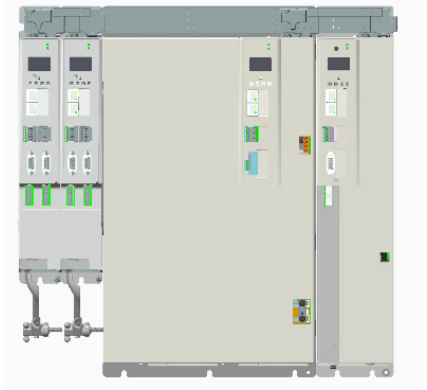
Kinetix 5700 AFE (Active Front End)

Mounting Flexibility
Mount inverters to right and left of the regenerative bus supply

Right Sized
Wide power range in bookshelf zero stack format

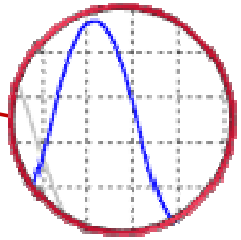


Reduced Footprint
Power dense design supporting Kinetix® 5700 in complex machine space



Three frame sizes:
Frame 7, 9, and 12:
4 ratings:
(35 – 207A)

Consistent UX
Studio 5000® integration and configuration



Global Performance
DC bus regulation across wide input voltage and low harmonic operation

Easier Installation
Reduced wiring and less components required for complete solution

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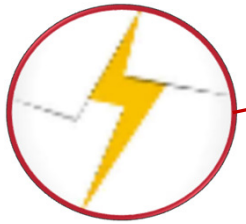
Kinetix 5700 Large Frame Inverter

Kinetix® 5700 Common Bus Capability
Leverage Kinetix® 5700 AFE and DFE

Common Format
Bookshelf zero stack format

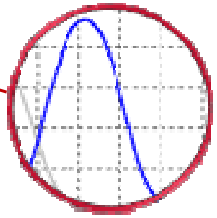


Reduced Footprint
Power dense design supporting Kinetix 5700 in complex machine space

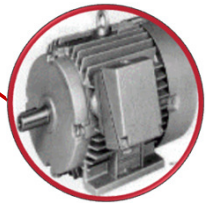
1 frame size:
Frame 8:
2 ratings:
150 A and 192 A

Advanced Safety Capable
Leverage SSM control hardware

Advanced Tuning
Improve performance and eliminate tuning



Use Kinetix 5700 Motor Control Core
Native application capabilities for converting, print, and web



Q4
CY2018

Kinetix 5700 Large Frame Inverter
Overview

Product Highlights:

- Single-axis inverter : two models: (263A, 312A peak)
- Basic (ERS3) and advanced (ERS4) safety options
- Advanced tuning and Kinetix® 5700 family feature set
- Feedback and motor control identical to Kinetix 5700

1.6kW – 60kW

90 KW

Large Frame

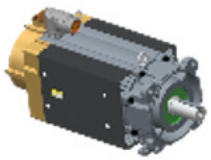
112 KW

Large Frame

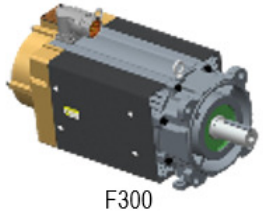
Kinetix 5700

Kinetix VPC

F165



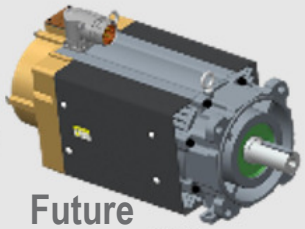
F215



F300

3.7kW – 37kW
(20 base offerings)

Future F350



Future F400

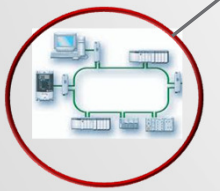
2198-ABQE Encoder Output Module

new

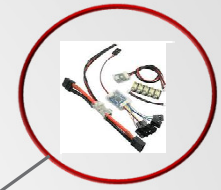
Simplified Installation
Eliminates need to mount external encoders on the machine

Ease of use
Configure with Studio 5000 Logix Designer® Programming interface with Logix Add On Instruction

EtherNet/IP DLR
Supports standard network topologies

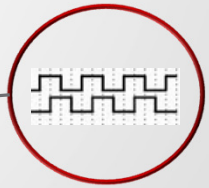


Reduce wiring
Eliminate the need to split encoder signals between the motor and drive



Flexibility *Synchronize two axes of motion within the system*

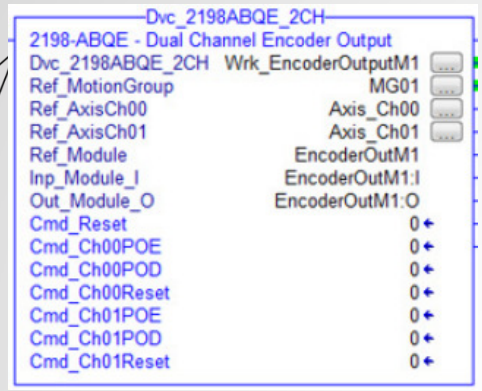
Configurable Outputs
AQB or Pulse Train



Synchronize 3rd party devices to your integrated motion system

2198-AQBE System Configuration

Fully programmable using AOI instructions, link to CIP Motion or Virtual axes,

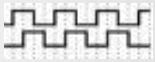


Logix Controller

2198-AQBE

Printers

Glue Dispensers



Vision Systems

Kinetix Drives

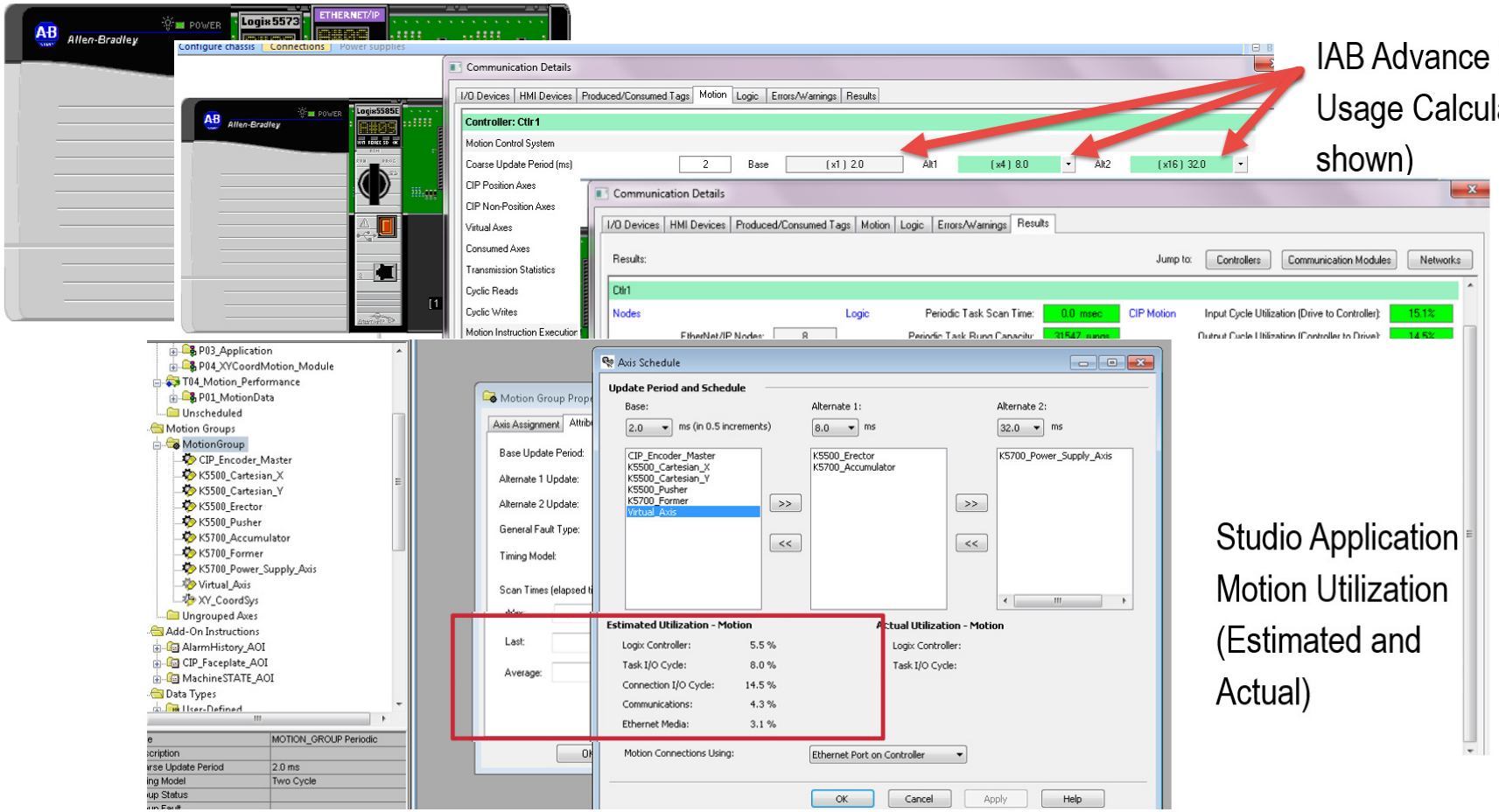
PowerFlex Drives

Robots

Print Registration Systems

IAB and Studio 5000

Design Tools



IAB Advance Performance Motion Usage Calculator (Multiplexing shown)

IAB Motion Performance Results & Summary

Studio Application Motion Utilization (Estimated and Actual)

IAB – Integrated Architecture Builder

Predict and Refine Controller Performance

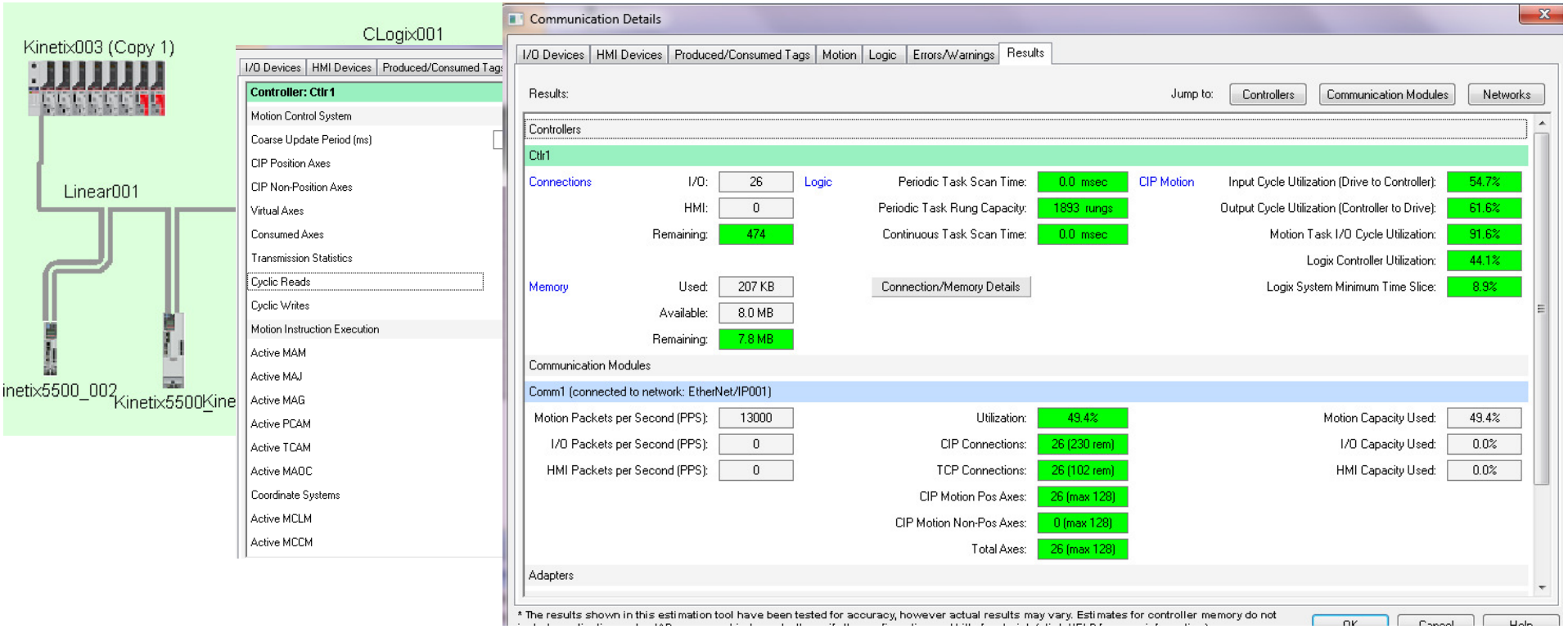
Objective:

- Compare three systems to show the improvement in Motion Performance
  - System 1: 5570 processor + EN3TR + 26 axes motion
  - System 2: 5580 processor + EN3TR + 26 axes motion
  - System 3: 5580 processor + Gb port + 26 axes motion

IAB – Integrated Architecture Builder

Predict and Refine Controller Performance

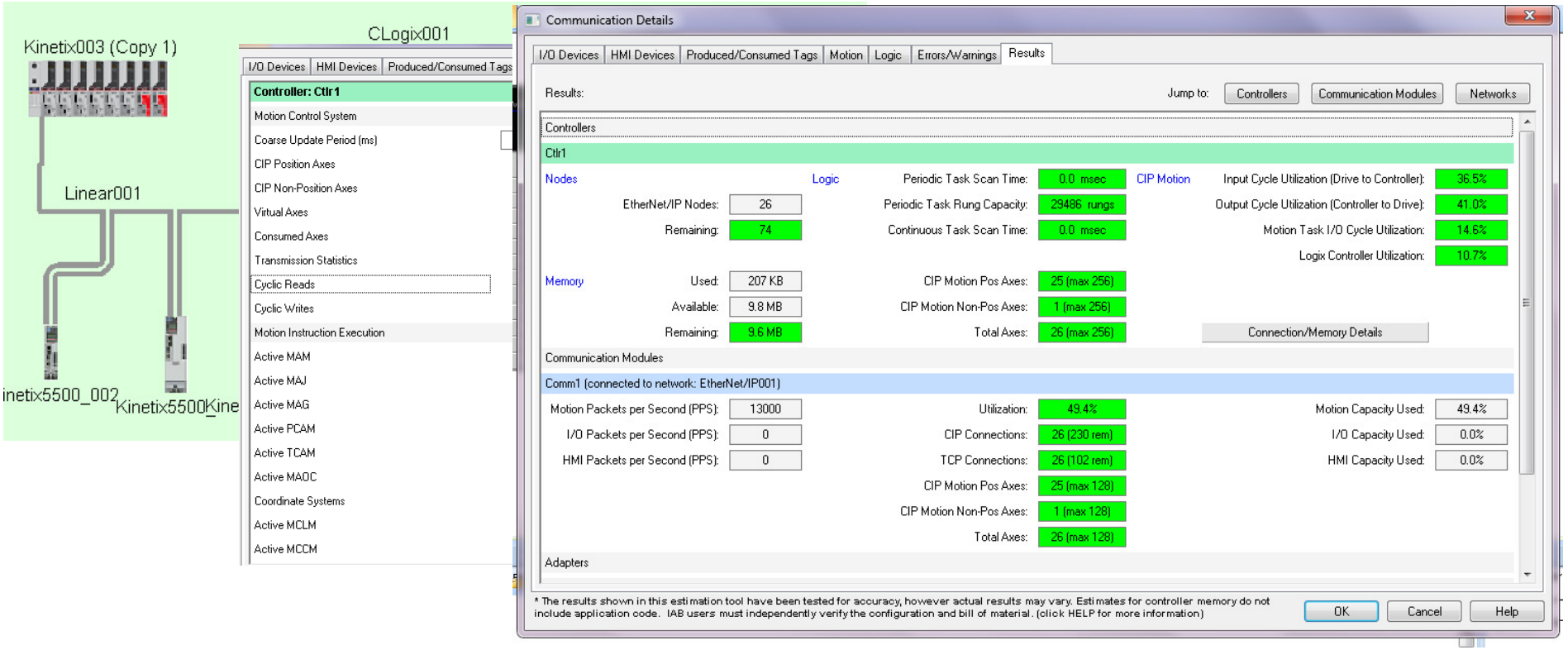
System 1: ControlLogix® 5570 processor + EN3TR + 26 axes motion



IAB – Integrated Architecture Builder

Predict and Refine Controller Performance

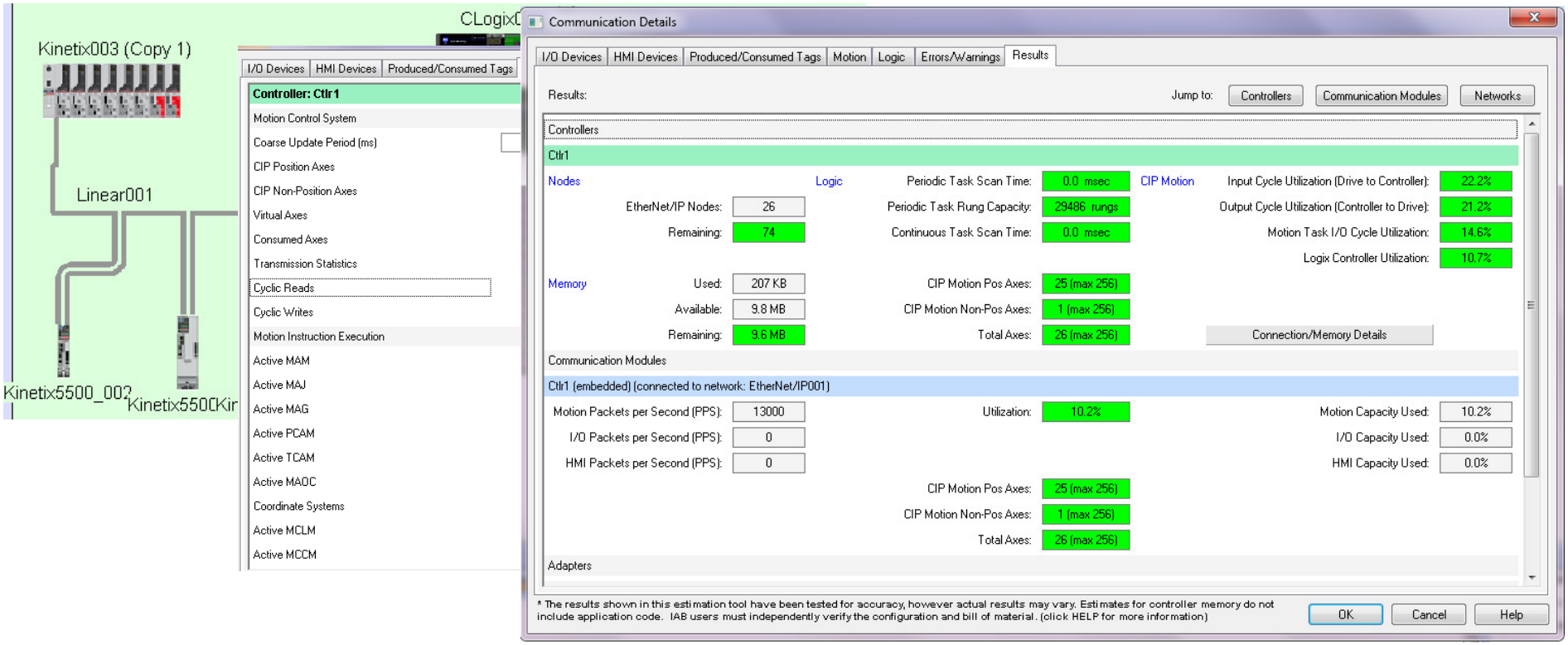
System 2: ControlLogix® 5580 processor + EN3TR + 26 axes motion



IAB – Integrated Architecture Builder

Predict and Refine Controller Performance

System 3: ControlLogix® 5580 processor + Gb port + 26 axes motion

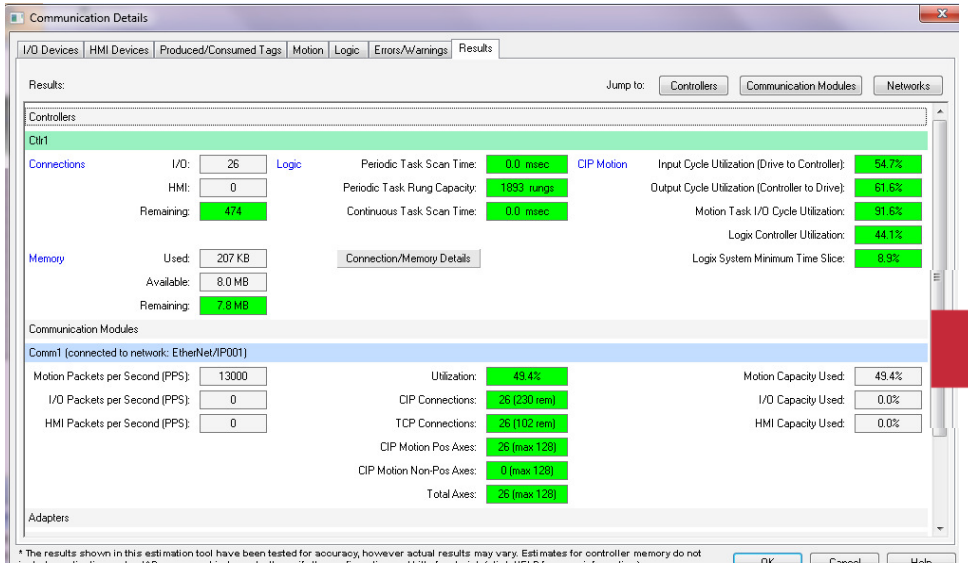


IAB – Integrated Architecture Builder

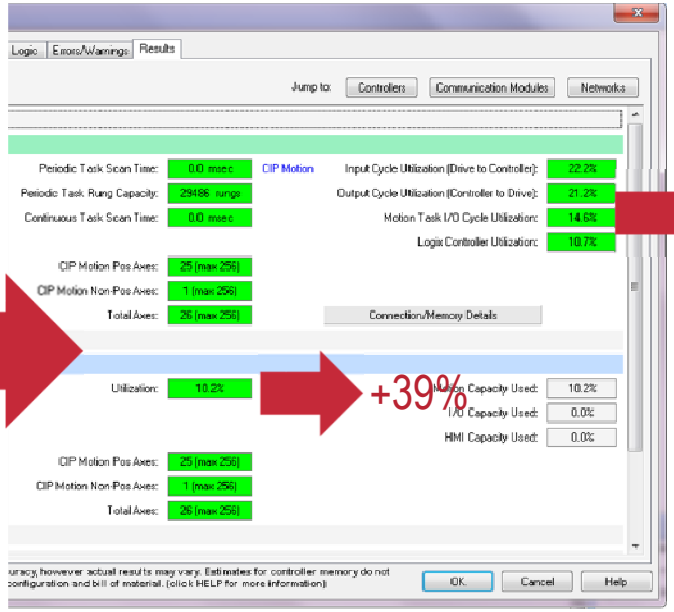
Predict and Refine Controller Performance

Results:

System 1 (5570 w/EN3TR):



System 3 (5580 w/embedded 1 Gb):



+39%

+33%

+40%

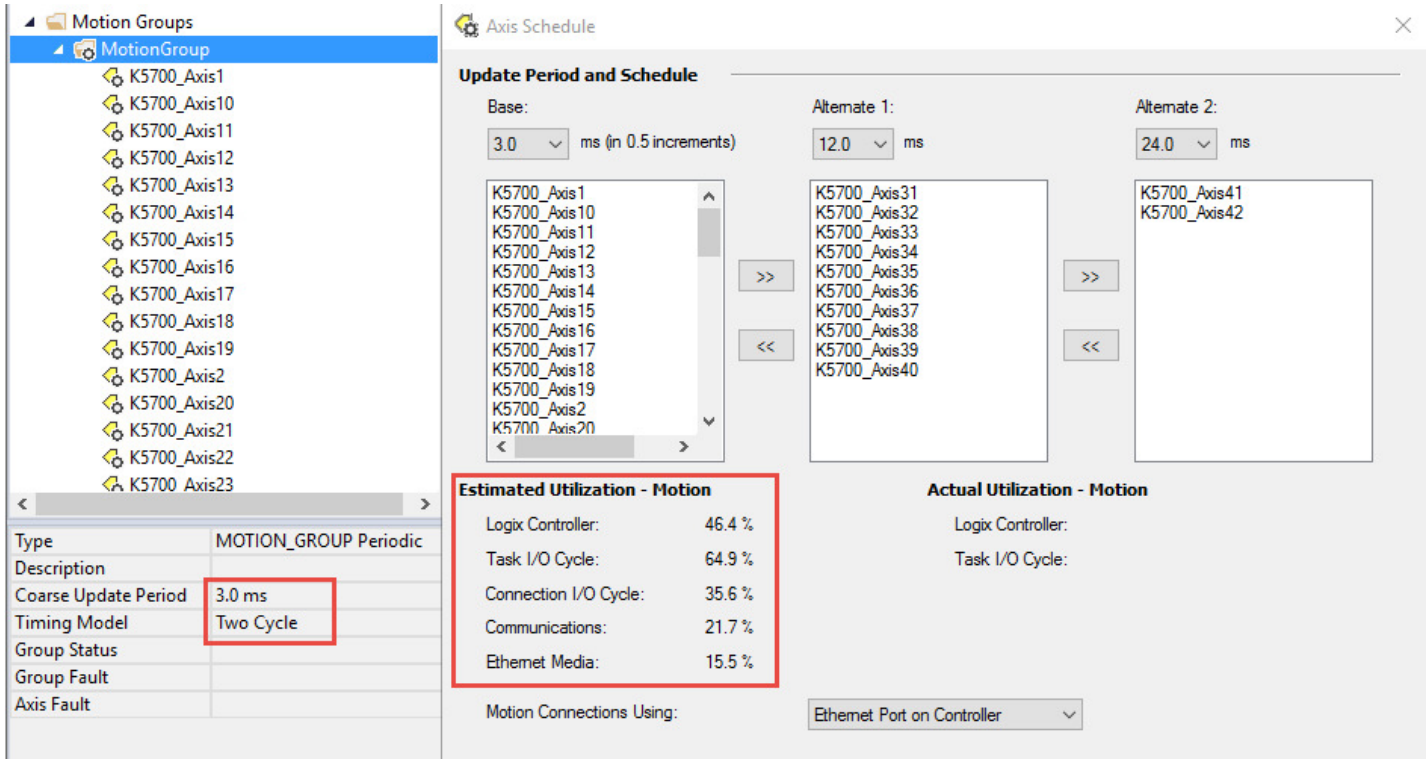
+77%

+33%

IAB – Integrated Architecture Builder

Predict and Refine Controller Performance

Example 1: ControlLogix® 5580 with **50 CIP axes at 3ms**:

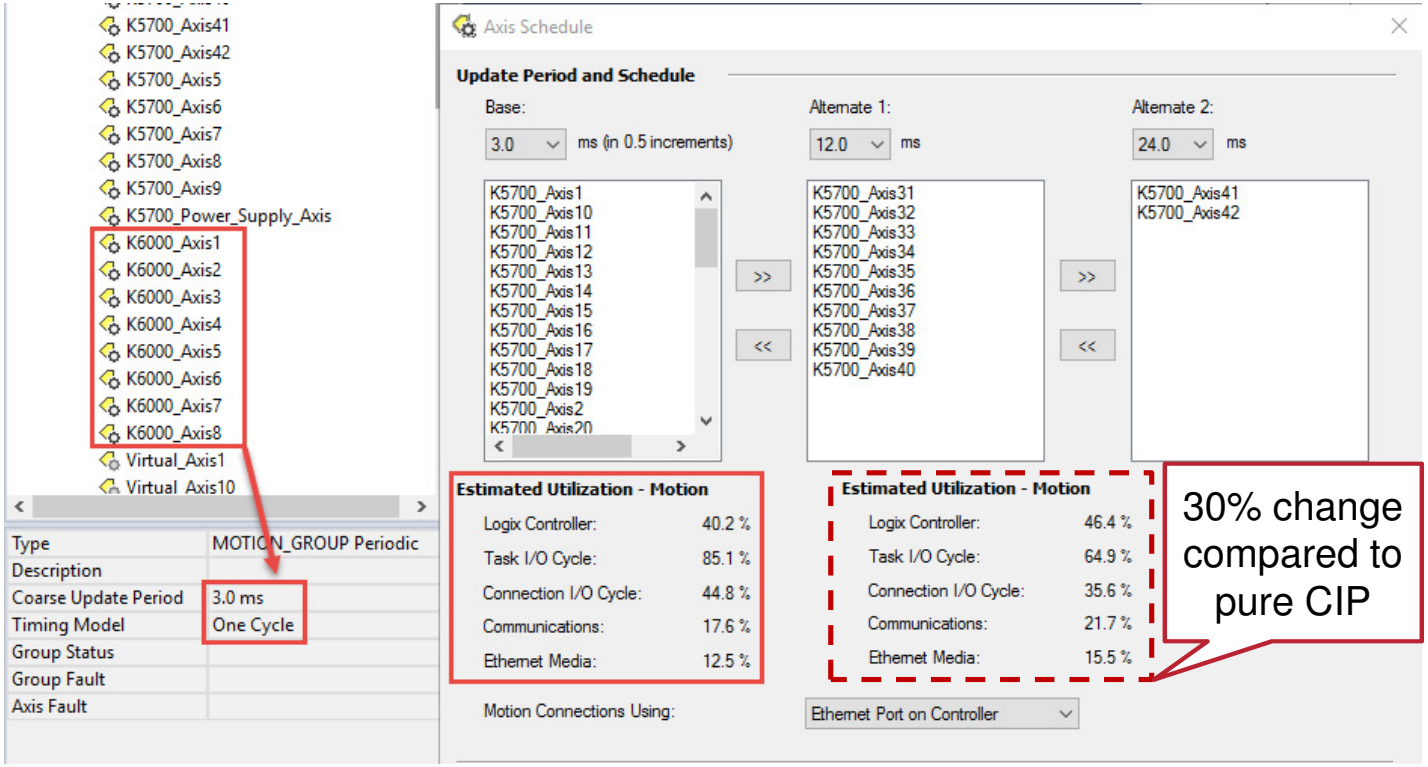


- (50) CIP axes with mux
- (10) Virtual axes
- (100) cyclic reads
- (50) cyclic writes

IAB – Integrated Architecture Builder

Predict and Refine Controller Performance

Example 2: ControlLogix® 5580 with **50 <u>mixed</u> CIP and analog/SERCOS axes at 3ms:**

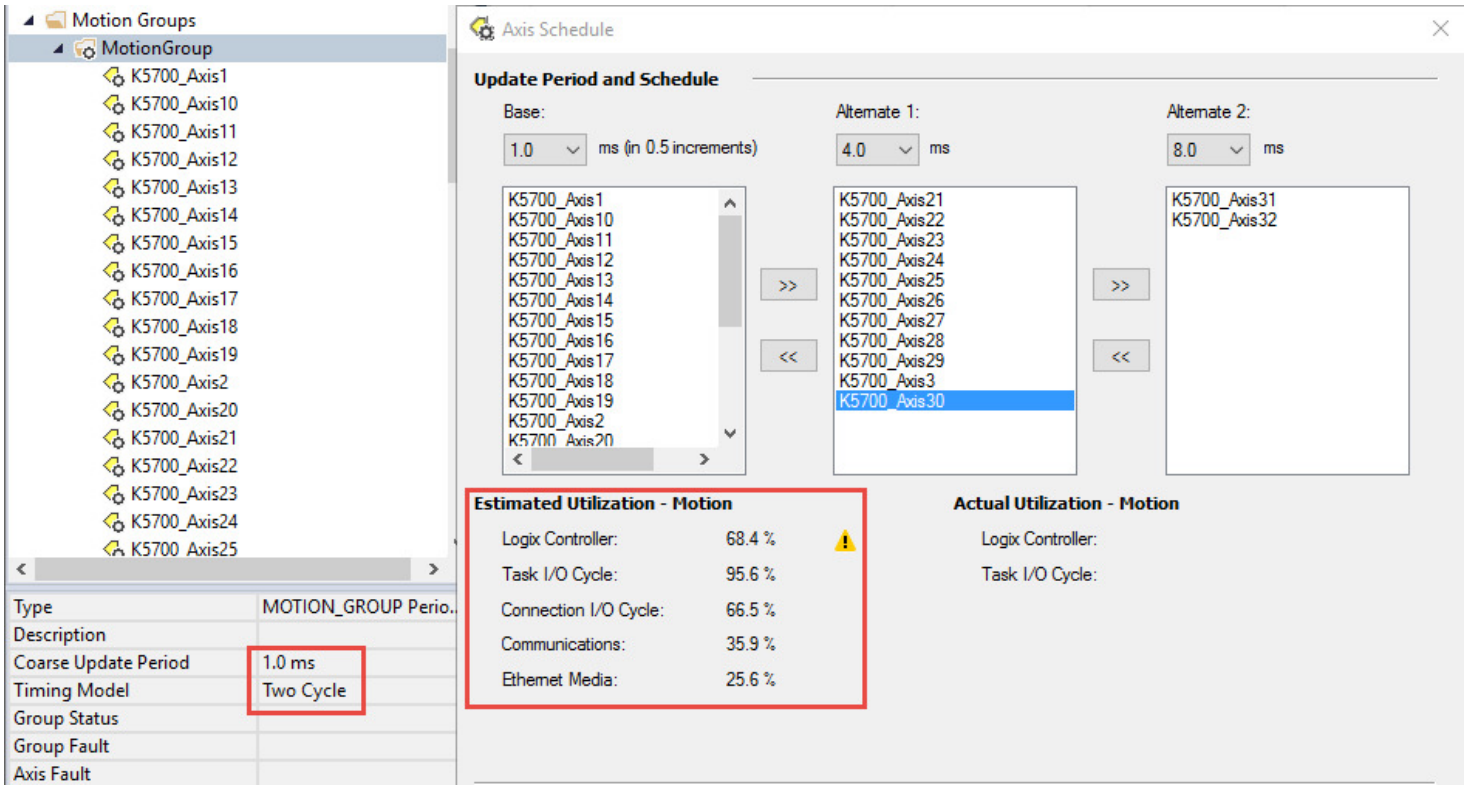


- (42) CIP axes with mux
- (8) SERCOS axes
- (10) Virtual axes
- (100) cyclic reads
- (50) cyclic writes

IAB – Integrated Architecture Builder

Predict and Refine Controller Performance

CompactLogix™ 5380 with **32 axes in 1 ms**:



- (32) CIP axes with mux
- (2) Virtual axes / MCT
- (64) cyclic reads
- (32) cyclic writes

IAB – Integrated Architecture Builder

Predict and Refine Controller Performance (FUTURE IAB/LD Updates)

CompactLogix™ 5480 with **150 axes in 1 ms**:

Motion Control System		
Logix Controller	5480	family
Base Update Period	1	msec
Timing Model	2	cycles
CIP Drive Axes	150	axes
Cyclic Reads	450	attributes
Cyclic Writes	200	attributes
Motion Planner	**Basic**	
Active MAM	0	axes
Active MAJ	0	axes
Active MAG	0	axes
Active PCAM	150	axes
Active TCAM	0	axes
Active MAOC	0	instances
Coordinate Systems	0	instances
Active MCLM	0	instances
Active MCCM	0	instances
Active MCT (Articulated)	0	instances
Active MCT (Cartesian)	0	instances
Motion Task Avg Scan Time	426	usec

Estimated Utilization - Motion

Logix Controller:	42.6%
Task I/O Cycle:	66.4%
Connection I/O Cycle:	93.8%
Communications:	75.0%
Ethernet Media:	18.3%

- (150) CIP axes no mux
- (150) PCAMs
- (450) cyclic reads
- (200) cyclic writes

LISTEN.
THINK.
SOLVE.

Otázky?

Děkuji Vám za pozornost

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