Integrated Motion on EtherNet/IP: Solution Overview

4/9/2019

Roman Foukal

Agenda

1 Controller Portfolio Update

2 Drive/Motor Portfolio Update

3 Studio 5000® Motion Feature Update

Integrated Architecture® Portfolio

Design Software

Studio 5000® | CCW | Arena®

Distributed Control System

PlantPAx®

Visualization & Information Software

FactoryTalk® | ThinManager®

Programmable Automation Controllers

CompactLogix™ | ControlLogix® | GuardLogix® | Armor™ GuardLogix®

Industrial Network Infrastructure & Media

Stratix®

Operator Interfaces & Industrial Computers

PanelView™ | MobileView™

Smart Sensing Devices

RightSight™ | VisiSight™ | RFID | Pressure

Input / Output Devices

Compact I/O™ | FLEX™ I/O | POINT I/O™ | ArmorBlock® | ArmorPOINT®

Motor Control Devices

PowerFlex® | IntelliCENTER®

Motion Control

Kinetix® | iTRAK® | MagneMotion®

Controller Portfolio Update

ControlLogix 5580 Analog Motion Interface – Version 31

ControlLogix® 5580 - 1756 analog motion interface module support…

- 1756-M02AE
  - 2 channel analog output
  - 2 channel AQB encoder feedback input
- 1756-M02AS
  - 2 channel analog output
  - 2 channel Serial Synchronous Interface (SSI) feedback input
- 1756-M02HYD
  - 2 channel analog output
  - 2 channel linear displacement tranducer (LDT) feedback input

ControlLogix 5580 controller migration and new applications

- Develop a new ControlLogix® 5580 project that includes 1756 analog motion interface module(s)
- Convert an existing ControlLogix 5550, 5560, or 5570 project with 1756 analog motion interface module(s) to a ControlLogix 5580 project

ControlLogix 5580 SERCOS Interface – V31

ControlLogix® 5580 - 1756 SERCOS interface module support

- 1756-M03SE
  - 3 axis SERCOS interface
- 1756-M08SE
  - 8 axis SERCOS interface
- 1756-M16SE
  - 16 axis SERCOS interface
- 1756-M08SEG
  - 8 axis SERCOS interface - third-party drive

ControlLogix 5580 controller migration and new applications

- Develop a new ControlLogix 5580 project that includes 1756 Sercos interface module(s)
- Convert an existing ControlLogix 5550, 5560, or 5570 project with 1756 SERCOS interface module(s) to a ControlLogix 5580 project

Motion Drive/Motor Portfolio Update

Motion Portfolio

SERVO MOTORS

Kinetix® MPx, VPx, TLx, HPK, RDB

- Compact and precise control, meeting the unique needs of many industries
- Single or dual cabling options for motor power and feedback
- SIL2 / PLd encoder options for safety

SERVO DRIVES

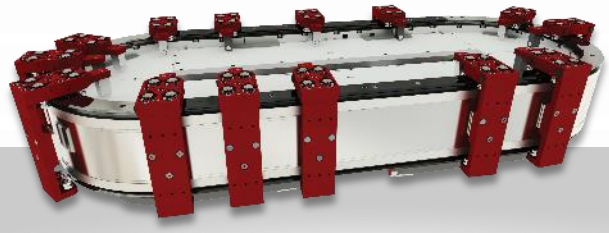
Kinetix 300, 350, 5500, 5700, 6500

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

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

*A Single Platform for **Complete** Motion Control*

Ability to **regenerate excess energy** back to the grid. Leverage EtherNet/IP to **monitor energy usage.** New

Best in class power density. ***40-70% cabinet space reduction.***

Single Cable Technology – ***60% less wiring.***

Features **Integrated Safety —** controller-based safety that is delivered via EtherNet/IP for **safe and flexible** machines.

Servo and vector motor control with **extended power range** up to **112 kW.** New

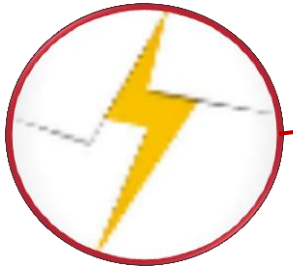
Embedded runtime tuning technologies to ***dramatically reduce commissioning time and improve machine performance***

Kinetix 5700 Regenerative Bus Supply

New

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

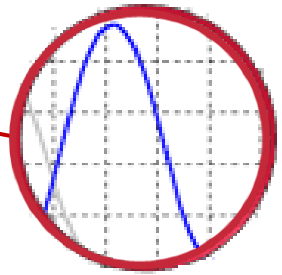
Right Sized
Wide power range in bookshelf zero stack format



Reduced Footprint
Power dense design supporting Kinetix® 5700 servo systems

4 Modules
35 A – 207 A continuous DC output current.

Consistent UX
Studio 5000® design environment integration and configuration



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

Integrated L-C Filter
Reduced wiring and fewer components required for complete solution

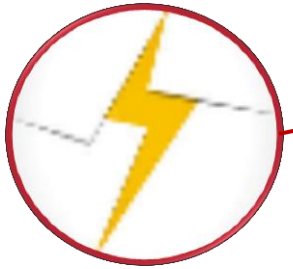
Kinetix 5700 Large Frame Inverters

New

Kinetix® 5700 Common Bus Capability

Common Format

Bookshelf zero stack format



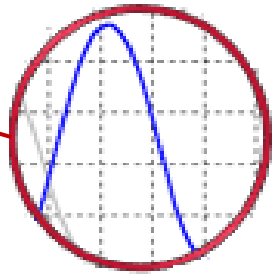
Reduced Footprint

Power dense design supporting Kinetix 5700 systems

90 kW and 112 kW
STO and Advanced Safety

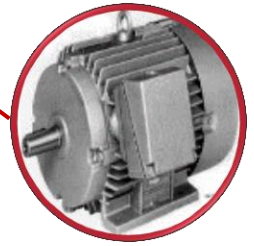
Advanced Safety Capable

Safely Monitor Speed, Direction and Position



Advanced Tuning

Improve performance and eliminate tuning



Kinetix 5700 Motor Control Core

Native application capabilities for synchronous and asynchronous motors

Scalable Software Safety Solutions

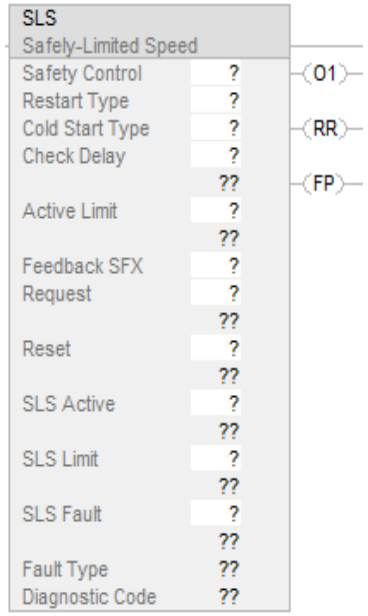
Control and Safety on the same wire

Networked Safe Torque Off

- PowerFlex® 527 drive
- Kinetix® 5500 servo drive
- Kinetix 5700 servo drive
- PowerFlex 755T drive S3*
- PowerFlex 755 drive S3*

Networked Advanced Safety Functions

- Kinetix 5700 servo drive
- PowerFlex 755 drive S4*
- PowerFlex 755T drive S4*



* Via Option Card

Kinetix® 5700 Safe Monitoring Servos

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

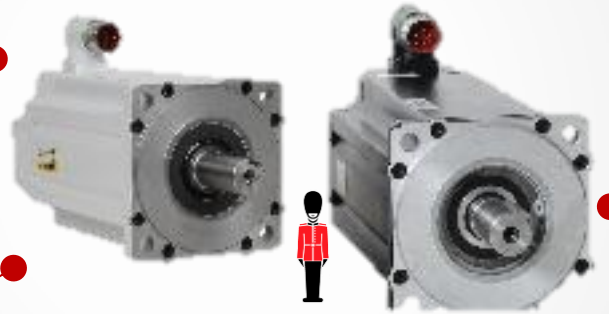
Ability to safety monitor speed, direction, and position

Emergency safety stop functions and zero speed monitoring

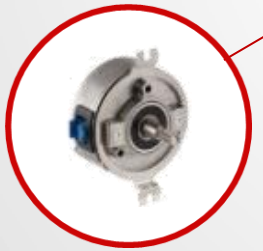
SIL 2 Rated Kinetix® VP Motors:

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

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



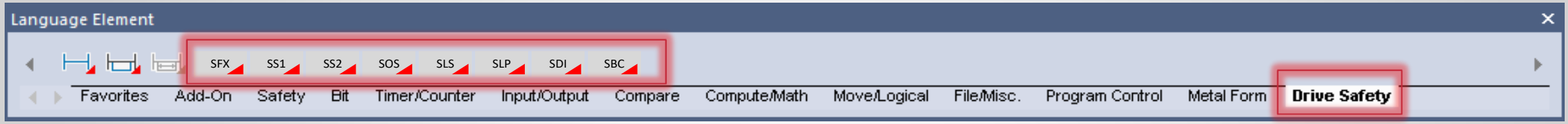
23-bit primary channel feedback on "Q" *encoder option provides application flexibility (Frame 100 - Frame 165)*



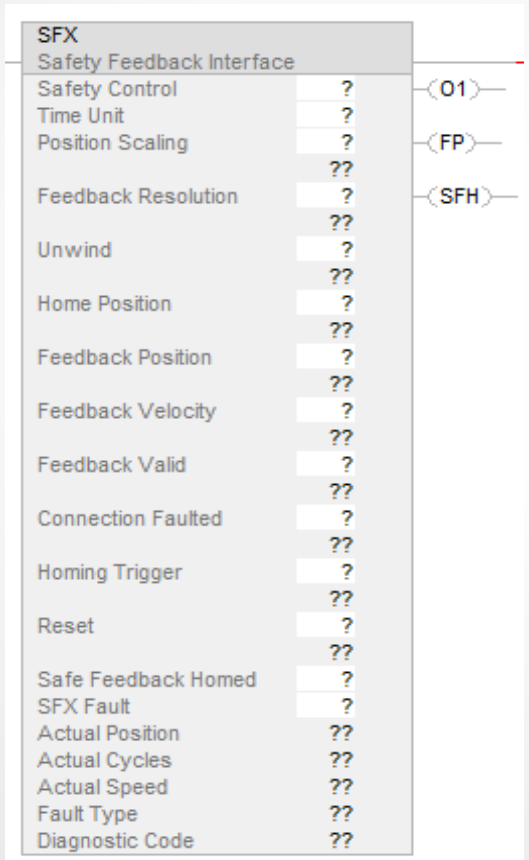
SIL 2 TÜV Certification *on optical encoder*

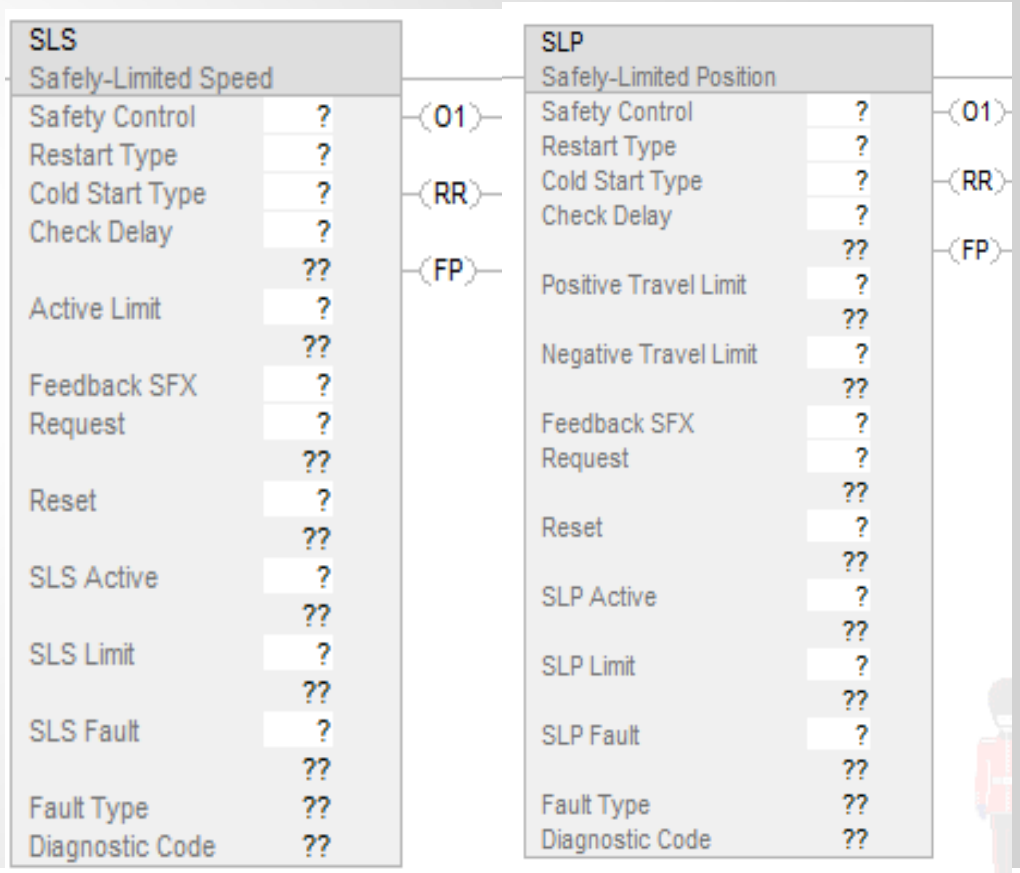
Current "C, P" encoder options remain active *for ease of ordering*

Drive Advanced Safety Instructions - V31



- Advanced drive safety for Kinetix® 5700 and PowerFlex® 755/755T drives
- 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)





Safe Monitoring Solution

1

GuardLogix® 5580 controller
or CompactGuardLogix
5380 controller

2

Kinetix® 5700 ERS4 Safe
Monitoring Servo Drives

VP Motors with SIL CL2
safety rated encoders

3

Studio 5000 Logix Designer®
Version 31 or greater

SIL2/PLd Solution

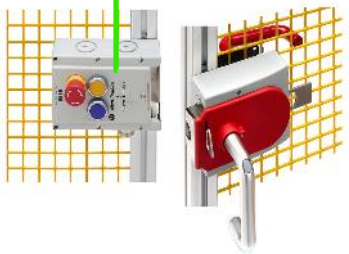
Controller owns everything – I/O devices, feedback scaling, safety configurations, safe feedback monitoring

V31 Safety Task

Motion & Safety Data over EtherNet/IP

Kinetix® 5700 - provides safe feedback from encoders to the safety controllers STO and SS1 in drive

Safety I/O over EtherNet/IP



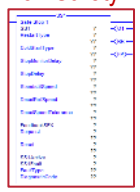
VP motor with SIL CL2 PLd safety rated encoder

MP motor with “M” and “S” encoder options

SIL3/PLe Solution

Controller owns everything – I/O devices, feedback scaling, safety configurations, safe feedback monitoring

V31 Safety Task



Motion & Safety Data over EtherNet/IP

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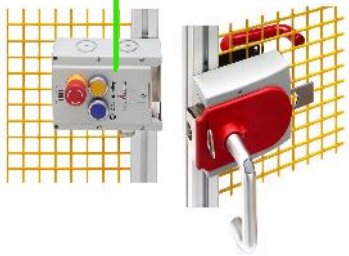


VP motor with SIL CL2 PLd safety rated encoder

842HR sin/cos encoder

VP Hygienic Servo Motor - VPH

New

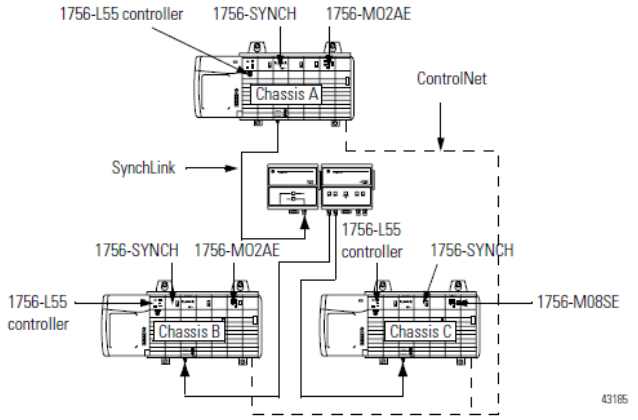
- IP69K Rated for **Wash-down Applications**
- **Hygienic Design** per 3A, EHEDG, NSF guideline
- Over **800 Configuration** Options

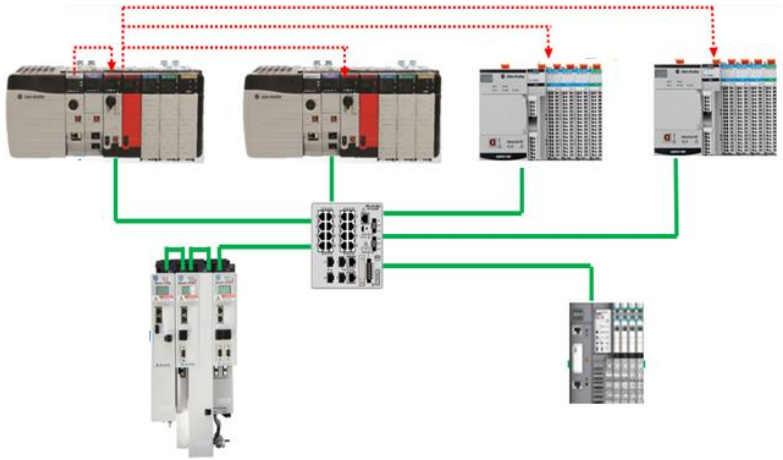
Studio 5000® Motion Feature Update

Produce/Consume Axis Options

- 1756 SynchLink™ Produced/Consumed axis
  - 1756-SYNCH module with fiber-optic “link”
  - Synchronize axes across Controllers in distributed 1756 racks
- 1756 chassis Produced/Consumed axis
  - 1756 backplane
  - Synchronize axes across Controllers in a single 1756 rack
- *EtherNet/IP Produced/Consumed axis*
  - *Controllers via EtherNet/IP*

New





EtherNet/IP Produced/Consumed Axis Features

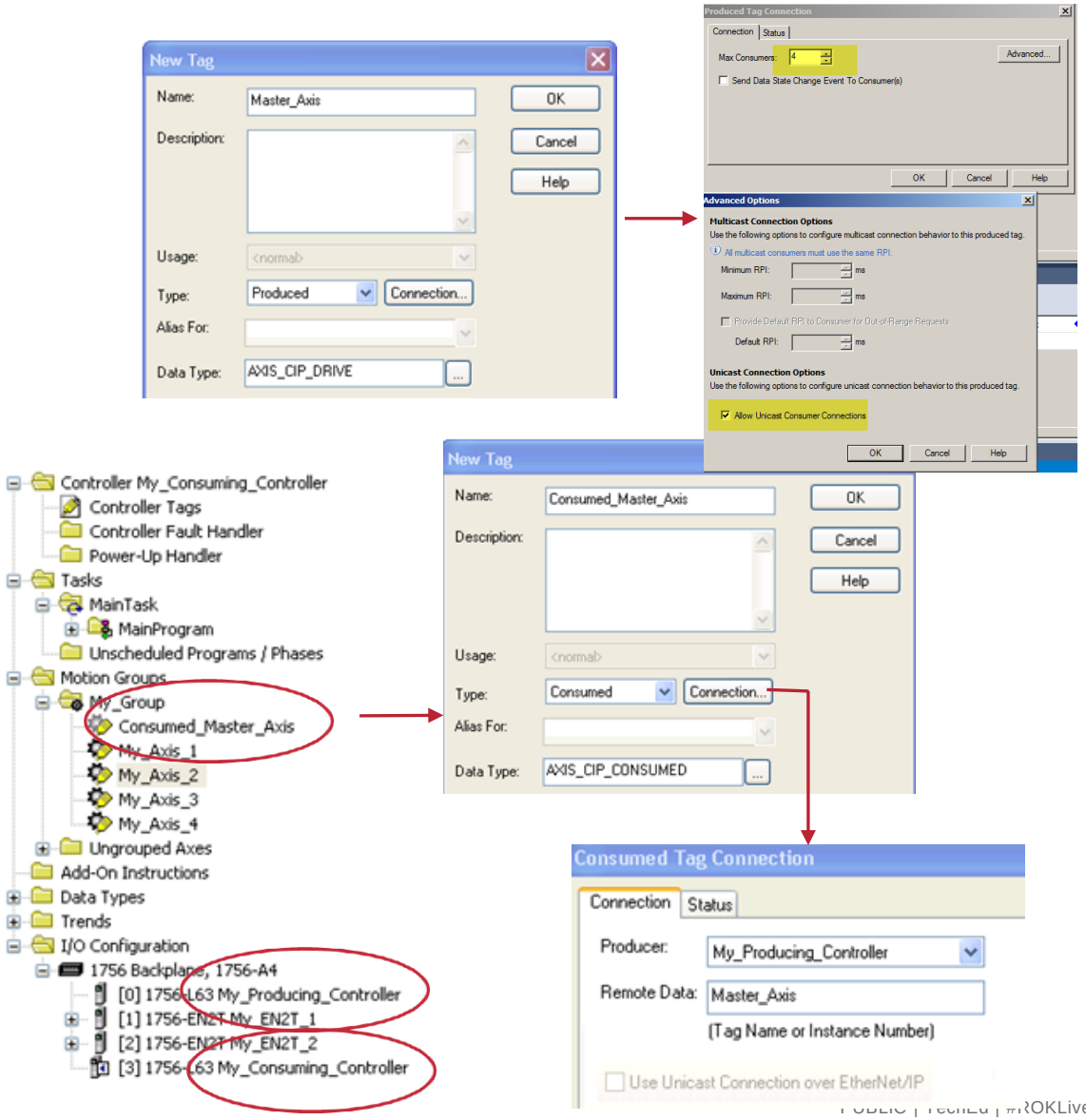
- Produced-Consumed axis
  - 1756 chassis and EtherNet/IP

- EtherNet/IP supported controllers
  - ControlLogix® & GuardLogix® 5580
  - CompactLogix™ & Compact GuardLogix 5380
  - CompactLogix 5480

- Features
  - Multi-cast and unicast EtherNet/IP Producer/Consumer configuration
  - Support for non-matching Producer/Consumer axis RPI's (Motion CUR)
  - SERCOS, CIP Motion, Analog, Virtual axis types
  - 1756 chassis Produced/Consumed axis data structure/attribute list
  - Compatible with SynchLink™ (Coexist)

EtherNet/IP Produced/Consumed Axis

- Produce/Consume axis tag between controllers on EtherNet/IP
  - SERCOS, analog, CIP Motion, virtual
- Consumed axis use:
  - Master axis for gear, Cam, MDSC
  - Master axis for MAOC
  - Position driven general purpose logic
- Fixed-format attribute list
- PTP based
- Performance
  - Cyclic update @ produced axis CUR



Independent Cart Technology

MagneMover® Lite – Ethernet

Features and Benefits Summary

New

- Performance
  - Peer-to-peer communication over 100 Mb/s Ethernet (200X faster than serial)
  - Enables condition monitoring and performance analytics
  - New high-performance Ethernet node controller (NC-E) (28:1 reduction of NC LITE Serial)
- Scalability
  - Expands Rockwell Automation industry-leading scalability
  - Kilometers of track, thousands of motors and carts on a single system
- Flexibility
  - Virtual nodes and paths to improve system control
  - Supports star and chain (linear string) wiring topologies
- Compatibility / Modularity
  - Can be used to extend existing serial systems
  - Uses standard Rockwell Automation Ethernet cables

MagneMover Lite – High Payload

New

AFC June 2019

Features and Benefits Summary

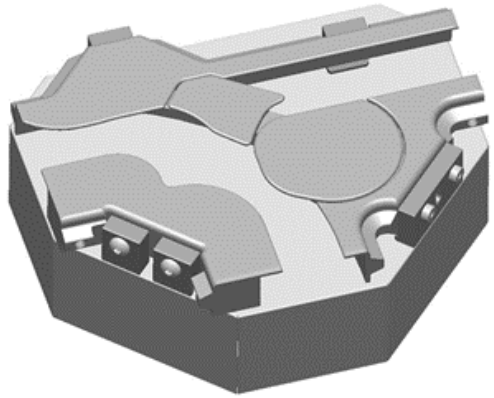
Wheeled Puck:

- Payload increase of 3X – 5X over sliding puck
  - Rolling friction increases force for acceleration
  - Single and tandem versions
- Long Life
  - Expected wheel life >16,000 km
- Clean
- Compatible with existing MagneMover® Lite systems

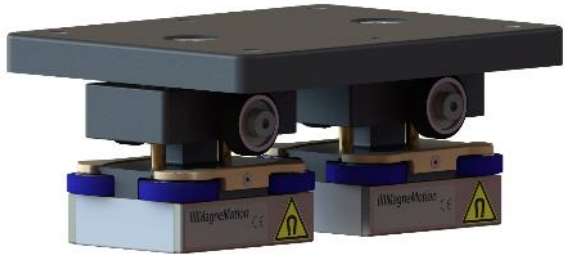
High Payload Switch:

- New motor type to match performance of wheeled pucks
- Improves layout flexibility

Combination = New Applications for MagneMover LITE



High Payload Switch



Tandem Wheeled Cart

iTRAK Next Generation

New

AFC Q1 CY20

Features and Benefits Summary

- First platform of next generation iTRAK® architecture
- Key features
  - Direction connection to ControlLogix® or CompactLogix™ controller
    - Integrated Motion over EtherNet/IP
    - Integrated Safety over EtherNet/IP, Safe Torque Off
    - Common firmware features with Kinetix® 5x00 platform
    - High servo performance
  - Size appropriate for lighter payloads and smaller machines
    - True 50 mm mover pitch
    - Small diameter and small transverse width
    - Up to 40 N continuous force, 100 N peak force
    - Up to 4 m/s
  - Robust mechanical bearings and mounting
- Planned availability in early 2020
  - ETO and standard product

Concept art for final hardware

Rockwell Automation

Motion Analyzer Update

Motion Analyzer

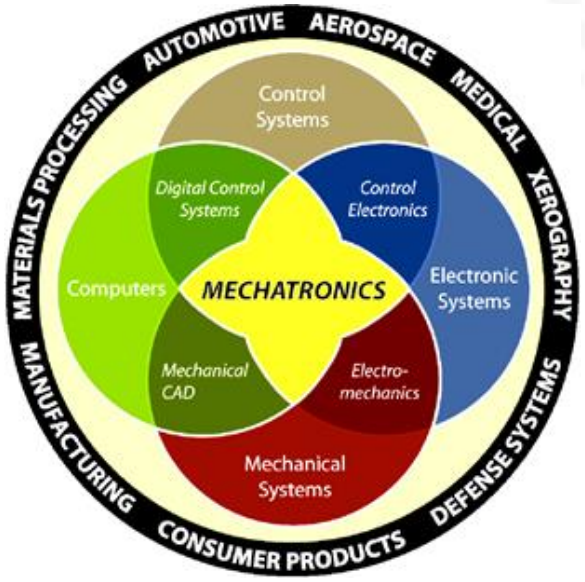
Product Overview

DESIGN & SIZING PROCESS

Define Motion

Select & Size

Analyze



MOTION & DRIVE PRODUCTS

Motion Analyzer is a sizing and selection tool for mechatronics systems

Rockwell Automation

Thank you

www.rockwellautomation.com