T37 - What’s New in Kinetix Motion Control
Session Description

- Learn what's new in our Kinetix® motion control platform. This session will review products and technologies for OEMs.
Integrated Control and Information
Our Core Platforms Enable the Connected Enterprise

Integrated Architecture®
and Software

Intelligent
Motor Control

Solutions
and Services
Integrated Architecture
New Products Enabling a High-Performance Architecture

Controllers
I/O
Motion
Drives

Network Infrastructure
Visualization and Manufacturing Intelligence
Integrated Development Environment
Application Libraries
### Motion Portfolio

#### INDEPENDENT CART TECHNOLOGY
iTRAK® and MagneMotion®
- Modular, scalable linear motor system that allows independent control of multiple movers
- Ideal for packaging, automotive, life sciences, logistics industries

#### SERVO MOTORS and CABLES
Kinetix Motors and Cables
- Designed to meet the unique needs of many industries including wash down applications
- Single or dual cable motor options available
- Sil2/PLd encoder options

#### SERVO DRIVES
Kinetix Drives and Accessories
- Broad range of drives from low power indexing drives to high power, multi-axis drives
- Integrated motion on EtherNet/IP
- Embedded advanced safety features
Independent Cart: iTRAK and MagneMotion

Kinetix Motors and Cables

Kinetix Drives and Accessories

Motion Analyzer

Kinetix 5700 Advanced Safety Demo
MagneMover LITE

- Intelligent conveyor system for light payloads (≤10 kg)
- Easy design and setup
- Modular and flexible
- Simple programming and control of 1–1,000+ independent carts

QuickStick

- Intelligent propulsion and control system for intelligent conveyor and positioning systems
- Payloads from 10s to 1,000s of kilograms
- Flexible layout with variable motor spacing to optimize cost

QuickStick® HT™

- Intelligent positioning and conveyor system
- Deterministic closed-loop servo performance
- Automatic synchronization with other motion axes
- High dynamic performance and force
Independent Cart Technology (ICT) Benefits

Benefits

- Higher throughput
- Greater flexibility
- Increased uptime
- Smaller footprint
Hear It from Our Customer

KUKA Pulse

- Installed at numerous automotive end users
- Key features:
  - Dramatic uptime improvement
  - Reduced maintenance
  - Faster production rates
  - Smaller footprint
- Uses QuickStick® HT
Learn More

- See MagneMover LITE and iTRAK in the Integrated Architecture booth

- Attend Introduction to Independent Cart Technology (T20); 2 p.m. in 310C
Agenda

- Independent Cart: iTRAK and MagneMotion
- Kinetix Motors and Cables
- Kinetix Drives and Accessories
- Motion Analyzer
- Kinetix 5700 Advanced Safety Demo
Single Cable Motion Solution Overview

Kinetix VPL / VPF / VPC Motors

Kinetix 5500 / 5700 Drives

Single Cable Interface

60% LESS wiring!
SIL 2 Rated Kinetix VP Motors

- Will support advanced safety functions via Kinetix 5700 “ERS4”, Safe Speed Monitoring drives
- 9–12 bit safety channel feedback when used within Integrated Safety systems “W” or “Q” Encoder Option
- 23-bit primary channel feedback provides application flexibility (Frame 100 - Frame 165)
- Current “C, P” encoder options remain active for ease of ordering
- SIL 2 TÜV Certification on optical encoder

SIL 2 TÜV Certification on optical encoder

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Introducing the Kinetix VPC

- Expansion of the Kinetix VP motor series
- VP = Single-cable (option)
- C = Continuous-duty
- Interior Permanent Magnet (IPM)
- Higher power
- Higher continuous torque

Shipping Now!
VPC Key Features and Benefits

- EnDat digital multi-turn (25-bit)
- DSL digital multi-turn, (23-bit) SIL 2
- Hiperface single-turn (21-bit)
- Kinetix 5700 Servo Drive
- Foot mount option matches competition
- Extended L10 bearing life
- Expanded power up to 30 kW
- IP65
- Single and dual cable offerings
- Cooling fins
- Increased max speeds
- IE4 energy efficiency rated
- Quick-change fan kit
- Removable side shrouds

* BOLD text denotes a new servo motor feature with VPC
Flexible System Solution

Cable Options

- Single Cable
- Separate Power and Feedback Cables

Encoder Options

- Absolute, Multi-turn DSL protocol
- Absolute, Single-turn Hiperface protocol
- Absolute, Multi-turn EnDat digital protocol

Kinetix 5700 Drives

Kinetix VPC Motors
## Positioning: Kinetix VP Motors Portfolio

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*Dual Connectors*
Why the Kinetix VPC Motor?

Increase your machine performance
- Up to 60% increased continuous torque*
- Up to 150% increased max speeds*
- New 23 bit and 25-bit hi-resolution encoders

Reduce your downtime
- Up to 60% improvement in L10 bearing life*
- Single cable provides faster installations
- 10 minutes or less field-replaceable fan

Reduce your energy costs
- IE4 rating offers up to 5% greater efficiency than IE3 rated motors
- Less current draw by sizing smaller drive and motor*

* Comparisons made to current MP-series motors
Cables

- Patented DSL communication technology
- Single Extension cables up to 30 m **now available**
- New 6 AWG and 8 AWG **now available**
- Single cable options
  - 18, 14, 10 AWG
  - DF option – Kinetix 5500 drive with flying lead
  - DE option – Kinetix 5700 drive with DSL connector
  - DG option – Kinetix 5x00 drive with flying lead
Agenda

Independent Cart: iTRAK and MagneMotion

Kinetix Motors and Cables

**Kinetix Drives and Accessories**

Motion Analyzer

Kinetix 5700 Advanced Safety Demo
Kinetix 5500 Servo Drive

Flexible Control
- Safety options for hardwired or integrated safety over EtherNet/IP
- Integrated with SIL3/PLe and Hardwired SIL2/PLd

Scalable Platform
- Dual-port Ethernet for Linear or Device Level Ring topologies
- Safer commissioning and troubleshooting with 24V DC control power reducing overall power consumption

Simplified system design
- Innovative AC/DC bus improves energy efficiency while eliminating hardware, reduces installation time and lowers costs
- Single-cable solution reduces installation errors inventory and wiring pathways
- Zero stacked drives, no backplane or power rail required, reduces panel size
Kinetix 5700 Servo Drive

Flexible Control
- Single or dual axis modules available
- Safety options for hardwired or integrated safety over EtherNet/IP
- Integrated and hardwired with SIL3/Ple rating

Scalable Platform
- Dual-port EtherNet/IP supports both Linear and Device Level Ring topologies, and extends motion capabilities with integrated safety
- Multi-feedback port extends motor support for Stegmann Hiperface, EnDat sin/cos, EnDat digital, and TTL feedback with Allen-Bradley and third-party motors

Simplified system design
- Shared DC Bus minimizes wiring and optimizes energy usage, 24V DC Control Bus
- Four high-speed input ports for enable, home, registration, and over travel functions
- Single cable solution reduces installation errors inventory and wiring pathways
- Zero stacked drives, no backplane or power rail
Kinetix 5500 and 5700 drives will...........

- Reduce the need for a tuning expert
- Reduce the time to commission the drive
- Compensate for unknown mechanical effects
- Compensate for loads that can change over time
- Improve the performance of most applications
- Minimize power consumption and machine vibration
- Provide diagnostic data for preventative maintenance
Kinetix 5500/5700 Drive - Tuning Technology

- **Load Observer: Improved performance and time savings**
  - Tune servo loops similar to a motion control expert
  - **Automatically compensates** for unknown mechanics, and compliance – and shafts
  - Applications where inertia varies during operation
  - **Save time** by eliminating the need for tuning each axis

*Dramatically reduces the need to tune most motion axes*
Kinetix 5500/5700 Drive - Tuning Technology

- **Adaptive Notch: Time savings and ease of use**
  - Higher performance tuning possible as tracking notch can eliminate harmful resonance and vibration in systems
  - Automatically adapts to changing frequency over time
  - Use tracking notch as an indicator to proactively monitor machine performance

_Dramatically reduces the need to tune most motion axes_
Kinetix 5700 Drive - Advanced Safety

Scalable

**Scalable Safety Level**
- SIL CL2, Up to Pld – Single Encoder
- SIL CL3, Up to PLe – Dual Encoder

Productive

**Studio 5000 Logix Designer**
Configure safety and motion control

Flexible

**New Safety Functions in GuardLogix®**
Safety applications that are customized for any industry
Differentiation

- **Improved Productivity**: Complete safety function integration within Studio 5000 Logix Designer® software
- **Higher Availability**: Seamless integration of safe monitoring capabilities within the safety controller
- **Improved Flexibility**: Setpoints that can be adjustable during runtime
- **Superior Scalability**: Right sized safety solutions to efficiently solve safety requirements
- **Superior Implementation**: Safety applications that are easily customized for any industry
Kinetix Advanced Safety Elements

- Common, unified safety monitoring in Logix Controllers
  - High-performance 5580ES GuardLogix and 5380ES Compact GuardLogix controller platforms
  - Programmed with new safety instructions in Studio 5000 design environment
- Safety instructions based on IEC 61800-5-2 safety standards
- Common, unified safety implementation for motor control
  - Kinetix or PowerFlex® drives
IEC 61800-5-2 Safety Functions

- Initial release:
  - STO Safe Torque Off
  - SS1 Safe Stop 1
  - SS2 Safe Stop 2
  - SOS Safe Operational Stop
  - SLS Safely-Limited Speed
  - SDI Safe Direction
  - SBC Safe Brake Control
  - SLP Safely-Limited Position
  - SFX Safe Feedback Scaling
Controller owns everything – I/O devices, feedback scaling, safety configurations, safe monitoring

Motion and Safety Data over EtherNet/IP

Kinetix 5700 Feedback from Encoder STO and SS1 in drive

VP motor with SIL2/PLd safety rated encoder

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

842HR sin/cos encoder

Layer 2 Managed Switch

Safety I/O over EtherNet/IP

STO and SS1 in drive
IEC-61800-5-2 > Adjustable speed electrical power drive systems – Safety requirements - Functional

- New “Drive Safety” Instructions (8)
  - 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 w/ external brake)

- Available in the 5380ES and 5580ES Family of Controllers
Kinetix 5700 Safe Monitoring Servos

- **New Safe Stop functions**
  - SS1, SS2, and SOS

- **Increase efficiency:**
  - Keep equipment running while safety monitoring

- **Power meets flexibility:**
  - Unlimited setpoints and Multiple functions capable

- **Single Axis “ERS4” Servos**

- **Dual Axis “ERS4” Servos**

- TÜV certified for SIL3/PLe safe monitoring solutions

- Safety monitor speed, direction, and position

- Supports Kinetix VP motors with SIL2/PLd rated encoders and sin/cos encoders
EtherNet/IP Encoder Output Module

Synchronize third-party devices to your integrated motion system

**Simplified installation** – Eliminates need to mount external encoders on the machine.

**Ease of use** – Configure with Studio 5000 Logix Designer application. Programming interface with Logix Add-On Instruction.

**Flexibility** – Synchronize to any axis of motion (CIP™ or Virtual) within the system.

**Reduce wiring and increase reliability** – Eliminate the need to split encoder signals between the motor and drive.

**SHIPPING NOW!**
EtherNet/IP Encoder Output Module

**Simplified installation**
Eliminates need to mount external encoders on the machine.

**Ease of use**
Configure with V30 Studio 5000 Logix Designer software. Programming interface with Logix Add-On Instruction.

**Dual EtherNet/IP ports**
 Supports standard network topologies.

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

**Flexibility**
Synchronize two axes of motion (CIP™ or Virtual) within the system.

**Configurable Outputs**
AQB or Pulse Train.

**Simplified installation**
Eliminates need to mount external encoders on the machine.

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System Architecture

- **Logix PAC®**
- **Encoder Output Module**
- **EtherNet/IP**
- **Kinetix Motion Systems**
- **PowerFlex Drives**

Connections:
- Logix PAC® to EtherNet/IP
- EtherNet/IP to Kinetix Motion Systems
- EtherNet/IP to PowerFlex Drives
- Encoder Output Module to In Line Printers, Glue Dispensers, Camera Systems, Print Registration Systems, Robotics
Agenda

- Independent Cart: iTRAK and MagneMotion
- Kinetix Motors and Cables
- Kinetix Drives and Accessories
- Motion Analyzer
- Kinetix 5700 Advanced Safety Demo
Motion Analyzer Evolution

**Drives and Motion Sizing**
Single-stop shop and resource center for drives and motion sizing.

**Independent Cart Sizing**
Sizing and selection of next generation motion solutions.

**Studio 5000 and IAB Integration**
Optimized workflows, data import into Studio 5000 and IAB data exchange.

**Collaborative Design and Optimization Platform**
Application templates and design optimization in a collaborative environment.

**Comprehensive Partner Product Portfolio**
Broad portfolio of partner products to complement RA offering.
Motion Analyzer Releases

- **R1 – New Profile Editor, May ‘17**
  - Completely redesigned profile editor
  - Modeled after the familiar MA 7.2 editor
  - Brings together all plots in one view for better visibility
  - Segment-based approach to building motion profiles
  - Advanced zooming and panning capabilities
  - Full screen view for better utilization of screen real estate

- **R2 – UX and Workflow, Dec ‘17**
  - New project and axis workflows
  - New profile editor backwards compatibility with existing projects
  - New profile editor support for application templates
  - Solution search enhancements
  - Profile import / export
  - Performance enhancements
Kinetix 5700 Advanced Safety Demo

Independent Cart: iTRAK and MagneMotion

Kinetix Motors and Cables

Kinetix Drives and Accessories

Motion Analyzer
Stop Functions

Power, that can cause rotation (or motion in the case of a linear motor), is removed from the motor. The drive will not provide energy to the motor, which can generate torque (or force in the case of a linear motor).

Initiates and monitors the motor deceleration rate within set limits to stop the motor and initiates the STO function when the motor speed is below a specified limit.

Provides a safe output signals to control an external brake. The SBC function is coordinated with the STO function.
Stop Functions

Stop Functions – Safe Stop 2

Initiates and monitors the motor deceleration rate within set limits to stop the motor and initiates the safe operating stop function when the motor speed is below a specified limit.

Stop Functions – Safe Operating Stop

The SOS function prevents the motor from deviating more than a defined amount from the stopped position. The drive provides energy to the motor to enable it to resist external forces.

Can monitor either position or speed of motor while stopped.
Monitoring Functions

The SLS function prevents the motor from exceeding the specified speed limit.

The SDI function prevents the motor shaft from moving in the unintended direction.

The SLP function prevents the motor shaft from exceeding one or more specified position limits.
Thank You!