Yaskawa Application Solution Packages

Increasing value by reducing risk and improving productivity

The Elegant Solution
Yaskawa Engineering has developed a library of robust and efficient code solutions based on intimate product knowledge and expertise in applying motion control technology. Using best practice programming principles, these solutions are now being offered as Yaskawa Application Solution Packages.

Solution Packages include pre-engineered code templates, built around motion kernels, that easily integrate your machine control requirements. These solutions can be fully customized to meet specific application needs, and secured to protect your intellectual property.

Gain a competitive edge by spending less time controlling motion platforms and more time controlling your process. Pre-developed code templates reduce development time and time-to-market, lowering project risk. Get farther, faster with Yaskawa Application Solution Packages!

Reduced Development Time
Pre-engineered code template built around robust motion kernel reduces development time.
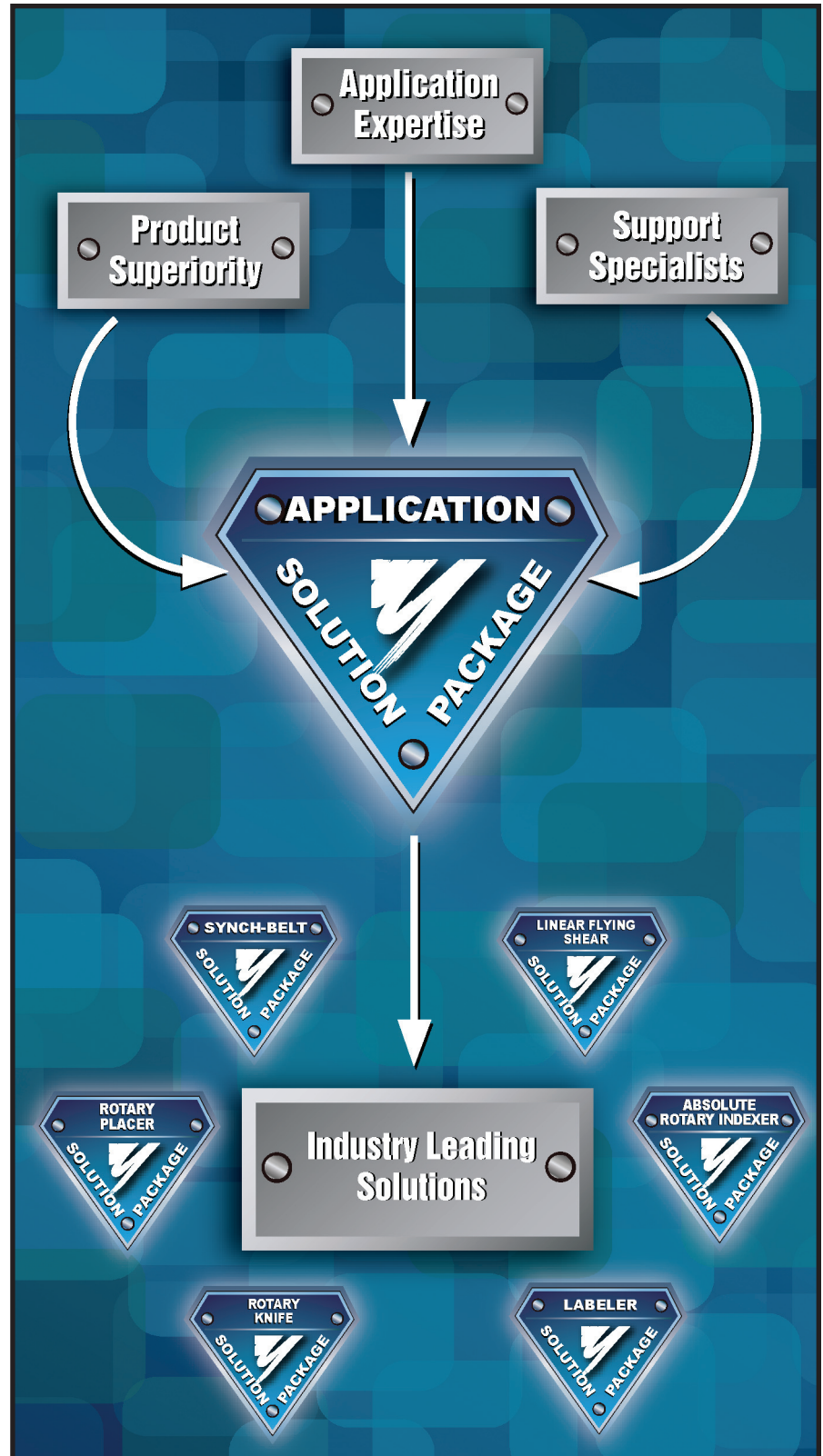
Reduced Risk
Yaskawa has completed the motion solution, minimizing possible risk factors.

Reduced Total Cost of Ownership
Cost of ownership reduced by increasing throughput and offering a more robust solution to prevent downtime.
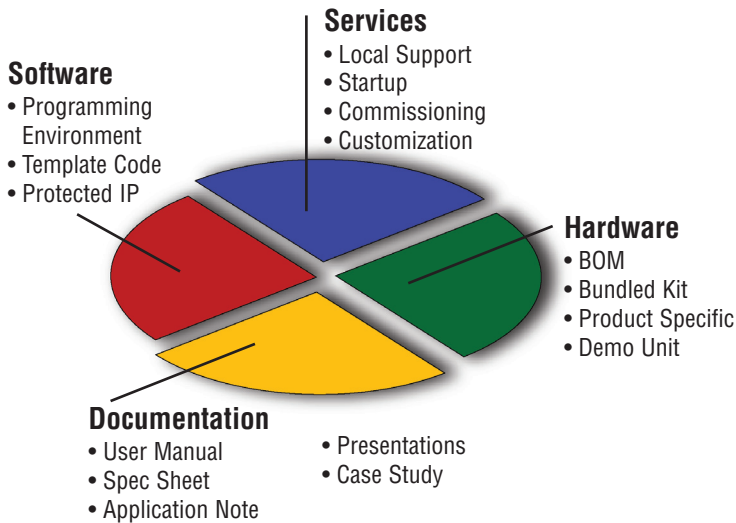
Increased Throughput
The elegant solution insures that optimal algorithms and motion solutions have been provided.

Solution Package Components

The Yaskawa Application Solution Package model harmonizes four basic areas to meet customer needs.

Software
• Programming Environment
• Template Code
• Protected IP

Services
• Local Support
• Startup
• Commissioning
• Customization

Hardware
• BOM
• Bundled Kit
• Product Specific
• Demo Unit

Documentation
• User Manual
• Spec Sheet
• Application Note
• Presentations
• Case Study

Hardware
Each Solution Package is setup for specific hardware configurations, taking advantage of scalable hardware platforms.
• Multiple Controller Products
• Bill of Material
• Demonstration Units

Software
Pre-written and debugged template code is available in different programming languages to match the customer's experience and programming references.
• MotionWorks
• MotionWorks+
• YTerm

Documentation
Documentation provided by Yaskawa explains the benefits and capabilities of each Solution Package. Technical documentation is also available to guide through setup and customization.
• Application Overview and Notes
• Code Template and Manual
• Success Story
• Spec Sheet
• Sell Sheet

Services
A wide variety of services are available through Yaskawa's Certified Motion Channel and System Integrators to help install, startup, and customize the Solution Package.

Solution Package Documentation
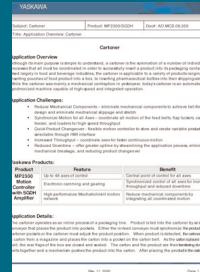
Application Overview
Provides a general introduction to the application and lists a variety of Yaskawa solutions.

Application Note
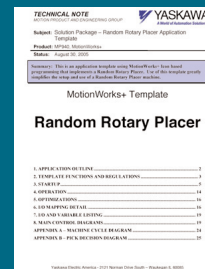Summarizes the technical details of a specific Yaskawa solution.

Success Story
Record of customer application including testimony, successes, and application challenges.

Code Template
Pre-engineered code template built around a robust motion kernel.
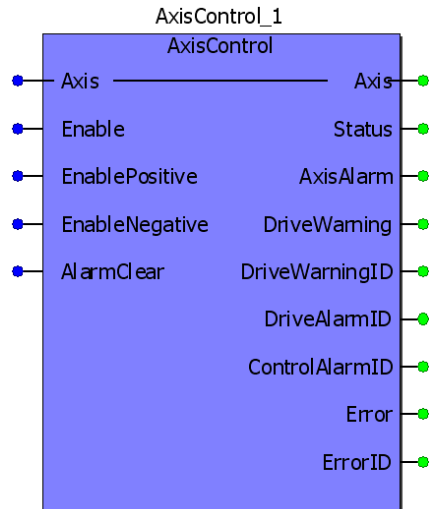
Code Manual
Support for code including variable definitions, diagrams, and startup instructions.

Spec Sheet
Details capabilities of Solution Package for use as a sales tool or spec development.

PLCopen Toolbox

AxisControl_1

AxisControl

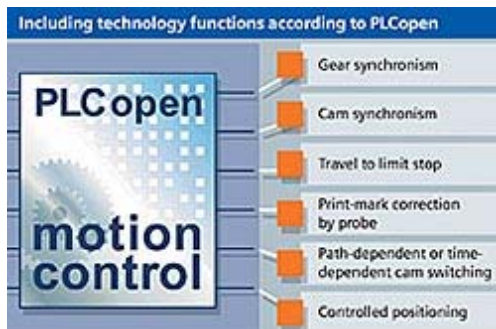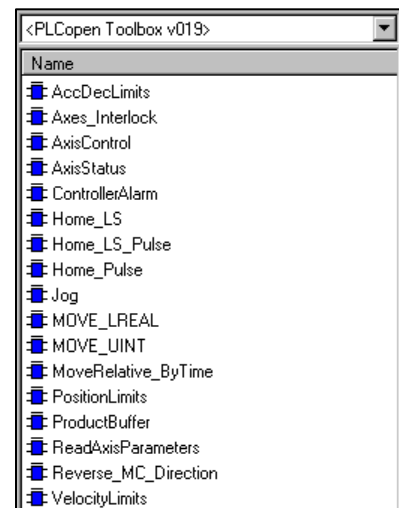|	
Axis ————	Axis
Enable	Status
EnablePositive	AxisAlarm
EnableNegative	DriveWarning
AlarmClear	DriveWarningID
	DriveAlarmID
	ControlAlarmID
	Error
	ErrorID

The PLCopen Committee sets standards for IEC61131-3 motion control methodology. Vendor conformance to the standards helps users choose best-of-class components without incurring large re-engineering costs as a consequence.

Certain motion control blocks such as MC_Stop, MC_Power, MC_MoveRelative and MC_MoveAbsolute contain standardized inputs and outputs. Users can expect a familiar implementation method and known performance result using these functions.

Yaskawa has combined and expanded upon these PLCopen function blocks to enhance usability while maintaining industry conformance.

The PLCopen Toolbox from Yaskawa provides a library of PLCopen-based functions for MP2000iec controllers that users can import into their IEC61131-3 control program.

Leveraging the pre-built library will save program development time for the software engineer and help speed project completion.

<PLCopen Toolbox v019>

Name
- AccDecLimits
- Axes_Interlock
- AxisControl
- AxisStatus
- ControllerAlarm
- Home_LS
- Home_LS_Pulse
- Home_Pulse
- Jog
- MOVE_LREAL
- MOVE_UINT
- MoveRelative_ByTime
- PositionLimits
- ProductBuffer
- ReadAxisParameters
- Reverse_MC_Direction
- VelocityLimits

Including technology functions according to PLCopen

PLCopen motion control

- Gear synchronism
- Cam synchronism
- Travel to limit stop
- Print-mark correction by probe
- Path-dependent or time-dependent cam switching
- Controlled positioning
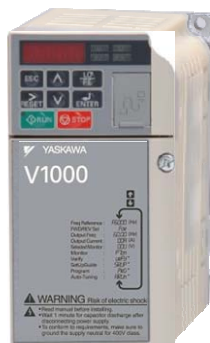
Yaskawa application toolboxes provide:

- Improved Ease of Use
- Reduced Risk
- Reduced Total Cost of Ownership

For more information and to discuss your application, contact your local Yaskawa Channel Partner or find them at www.yaskawa.com/partners.

VFD Toolbox

Many applications require the use of scalable motor technology. This means using servo and variable frequency drive (VFD) components where appropriate to provide the most cost-effective solution. Integrating these two technologies under a single control platform is a natural fit for the world's only company to produce and install over 5 million servos and 10 million VFDs.

Whether the network is MECHATROLINK or Ethernet, Yaskawa has a solution that tightly integrates servo and VFD control.

The VFD Toolbox from Yaskawa provides a library of PLCopen-based functions for MP2000iec controllers that users can import into their IEC61131-3 control program.

Leveraging the pre-built library will save program development time for the software engineer and help speed project completion.
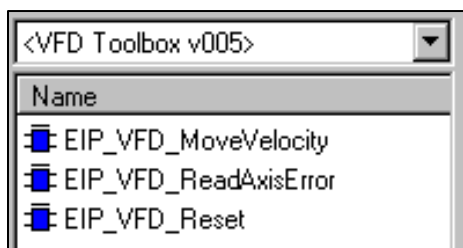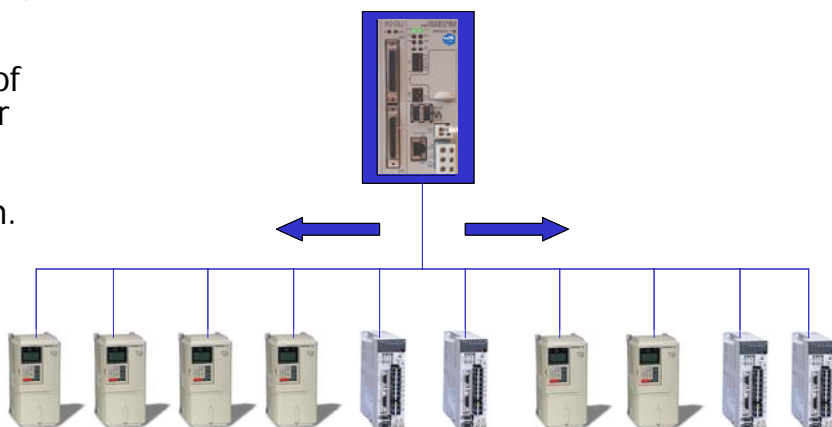
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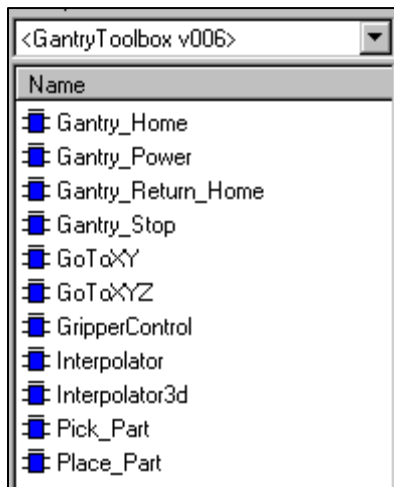
Gantry Toolbox

Gantry control is used in many parts-transfer operations as a means to combine motion with a supportive physical structure. Gantries, also known as *Cartesian Robots*, are often used in **pick-and-place** or **assembly** operations where articulated arms are not desired.

In some cases, the gantry consists of simple, cantilevered, XY, XZ, or XYZ configurations. In others that involve wider travel ranges, a dual XX'Y or XX'YY' configuration is necessary to properly support the payload.

The Gantry Toolbox from Yaskawa provides a library of PLCopen-based functions for MP2000iec controllers that users can import into their IEC61131-3 control program.

Leveraging the pre-built library will save program development time for the software engineer and help speed project completion.

<GantryToolbox v006>

Name

- Gantry_Home
- Gantry_Power
- Gantry_Return_Home
- Gantry_Stop
- GoToXY
- GoToXYZ
- GripperControl
- Interpolator
- Interpolator3d
- Pick_Part
- Place_Part

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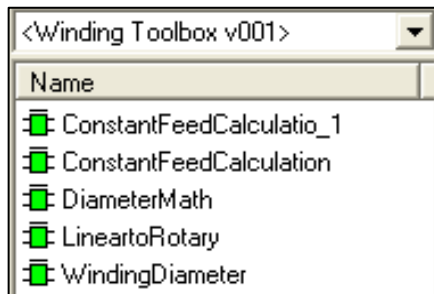
Winding Toolbox

Winders, unwinders, spoolers and tension controllers can be found in many applications in the **converting** industry. For narrow or wide **web handling**, controls must handle large changes in roll diameter and inertia. For wire **spooling** or **level winding**, an additional *traverse* axis is required to move product across the spool.

Winders use two main means of tension measurement: dancer arms and force transducers.

The Winding Toolbox from Yaskawa provides a library of PLCopen-based functions for MP2000iec controllers that users can import into their IEC61131-3 control program.

Leveraging the pre-built library will save program development time for the software engineer and help speed project completion.

<Winding Toolbox v001>

Name
- ConstantFeedCalculatio_1
- ConstantFeedCalculation
- DiameterMath
- LineartoRotary
- WindingDiameter

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Ethernet Positioning

Many machines feature a programmable logic controller (PLC) as the main control and HMI interface device. Traditionally, PLCs have not provided the optimal platform for motion control and creating an effective interface between PLC and motion controller has been challenging.

An Ethernet connection over Modbus/TCP or Ethernet/IP protocol enhances such a connection by increasing the amount of data that can be effectively transferred.

The Ethernet Positioning Solution from Yaskawa provides a library of PLCopen-based functions for MP2000iec controllers that users can import into their IEC61131-3 control program to pass motion commands and axis status between the PLC and motion controller.

Leveraging the pre-built core solution code will save program development time for the software engineer and help speed project completion.
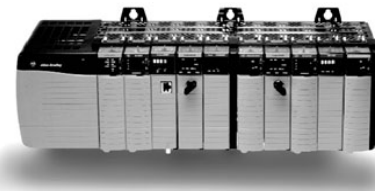
PLC images obtained from public sources

| Name	Usage	Description	Address
Axis1	VAR_GLOBAL		
⊟ E/IP Input Instance #111, ress Range: %IB0-%IB127			
Axis1_CmdPos	VAR_GLOBAL		%MW8
Axis1_CmdDecel	VAR_GLOBAL		%MW6
Axis1_CmdAccel	VAR_GLOBAL		%MW4
Axis2_HomeOffAccel	VAR_GLOBAL		%MW38
Axis2_HomeOffVel	VAR_GLOBAL		%MW36
Axis2_HomeType	VAR_GLOBAL		%MW34
Axis2_GearMaster	VAR_GLOBAL		%MW32
Axis2_GearRatio	VAR_GLOBAL		%MW30
Axis2_CmdPos	VAR_GLOBAL		%MW28
Axis2_CmdDecel	VAR_GLOBAL		%MW26
Axis2_CmdAccel	VAR_GLOBAL		%MW24
Axis2_CmdVel	VAR_GLOBAL		%MW22
Axis2_Control	VAR_GLOBAL		%MW20
Axis1_CmdVel	VAR_GLOBAL		%MW2
Axis1_HomeOffAccel	VAR_GLOBAL		%MW18
Axis1_HomeOffVel	VAR_GLOBAL		%MW16
Axis1_HomeType	VAR_GLOBAL		%MW14
Axis1_GearMaster	VAR_GLOBAL		%MW12
Axis1_GearRatio	VAR_GLOBAL		%MW10
Axis1_Control	VAR_GLOBAL		%MW0

Yaskawa Solution Packages™ provide:

- Improved Ease of Use

- Reduced Risk

- Reduced Total Cost of Ownership

- Pre-engineered Performance

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Feed-to-Length Solution
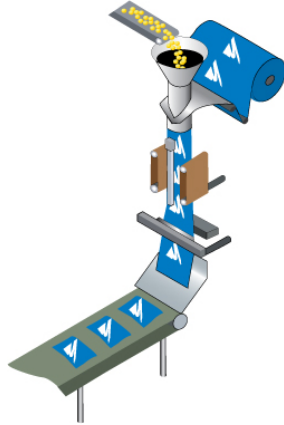
Many applications in **Assembly** or **Converting** involve feeding a product to a precise length either based on a pre-programmed distance, or to a registration mark. In many cases, the feeding mechanism consists of pinch rollers. In others, a clamp and push/pull method is used. Yaskawa's Feed-to-Length Solution can operate in either mode with either mechanism to provide precise product feeds with a minimal amount of programming.

The Feed-to-Length Solution from Yaskawa provides a library of PLCopen-based functions for MP2000iec controllers that users can import into their IEC61131-3 control program. The solution distills the core control algorithm down to a single function block that is easy to implement.

Leveraging the pre-built core solution code will save program development time for the software engineer and help speed project completion.

Feed_To_Length_1 — Feed_To_Length

Input	Output
Axis	Axis
Execute	Done
Trigger	Busy
MaxPartLength	Active
Window	CommandAborted
WindowStart	Error
WindowWidth	ErrorID
FeedVelocity	MissedMark
FeedAcceleration	ContinuouslyMissed
FeedDeceleration	MissedMarkCNTRFull
FeedJerk	RegistrationDistanceShort
RegistrationDistance	MinRegistrationDistance
RegistrationVelocity	
RegistrationAcceleration	
RegistrationDeceleration	
RegistrationJerk	
MaxMissedParts	
ResetMissedCounter	
AbortFTL	
AbortFTL_Deceleration	
AbortFTL_Jerk	
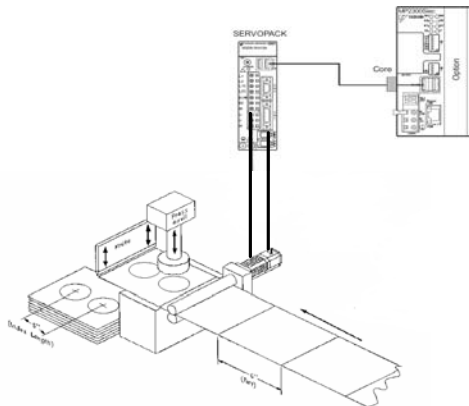
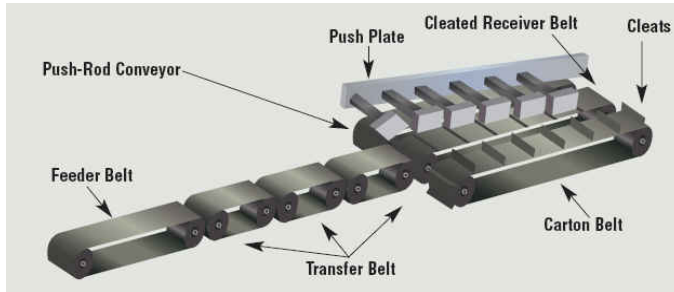## Yaskawa Solution Packages™ provide:

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- Pre-engineered Performance

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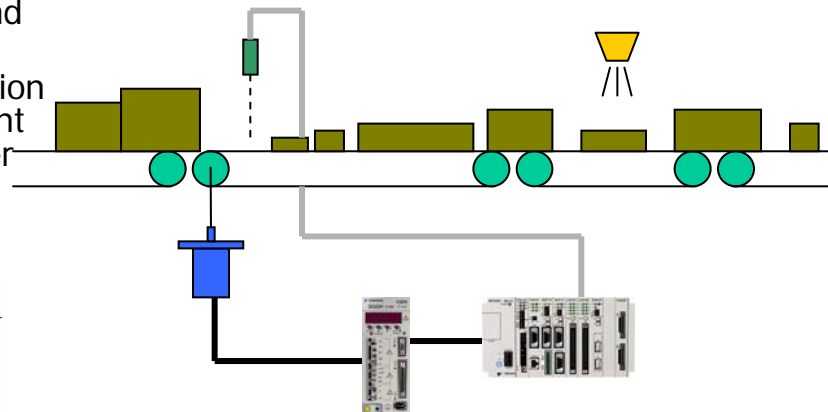
Synch-belt Solution

Applications in **Packaging**, **Palletizing** and **Material Handling** often involve pacing or synchronizing product between processes. The Synch-belt Solution Package can:

- Synchronize product to pocket
- Perform product Gapping
- Merge or combine product
- Create Groups of product

The Synch-belt Solution from Yaskawa provides a foundation of core example code that is pre-tested for functionality and ready for user customization.

Leveraging the pre-built solution will save program development time for the software engineer and help speed project completion.
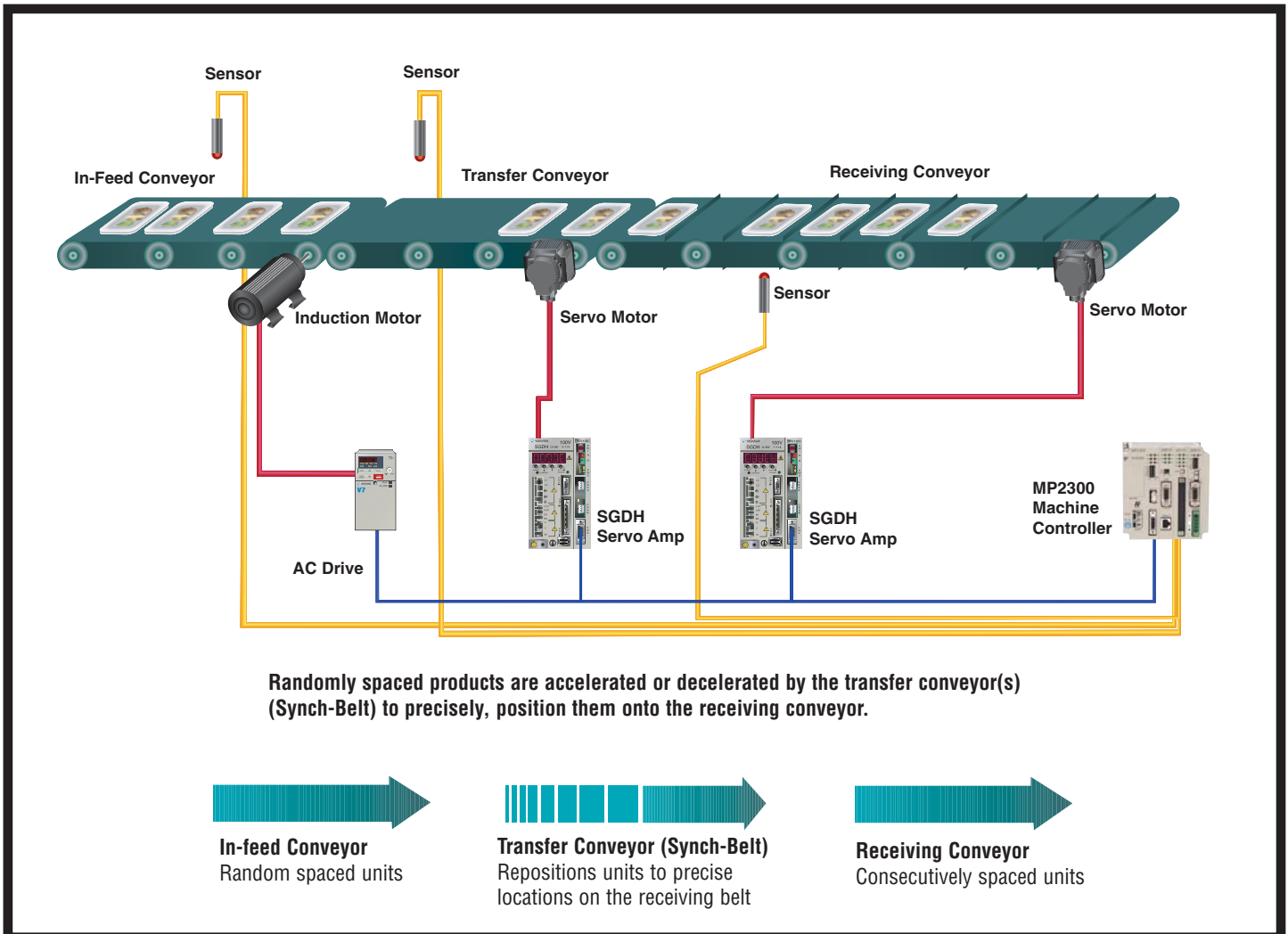

Yaskawa Solution Packages™ provide:

- Improved Ease of Use

- Reduced Risk

- Reduced Total Cost of Ownership

- Pre-engineered Performance

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Synch-Belt Application Template

Sensor

Sensor

In-Feed Conveyor

Transfer Conveyor

Receiving Conveyor

Induction Motor

Servo Motor

Sensor

Servo Motor

SGDH Servo Amp

SGDH Servo Amp

MP2300 Machine Controller

AC Drive

Randomly spaced products are accelerated or decelerated by the transfer conveyor(s) (Synch-Belt) to precisely, position them onto the receiving conveyor.

In-feed Conveyor
Random spaced units

Transfer Conveyor (Synch-Belt)
Repositions units to precise locations on the receiving belt

Receiving Conveyor
Consecutively spaced units

Yaskawa's Synch-Belt Solution Template is unique and robust. This complex application is made easy by Yaskawa's proven, fully developed solution package.

The result is dramatic reduction in the cost of ownership for a variety of applications in the Packaging Machinery and Material Handling industries, including Case Packers, Shrink Wrappers, Flow Wrappers, Cartoners, and more.

Synch-Belt offers unique advantages
The Synch-Belt application solution contains Yaskawa's patented, "Dynamic Smooth Path", complex motion technology. Smooth Path automatically creates ideal move profiles for each product on the conveyors. This assures

accurate, shock-free product placement without operator intervention. The ability of the Synch-Belts to transfer multiple products, on each conveyor, eliminates the need to modulate the speed of feed conveyors. Since products are fed at full production speed, output is significantly increased. Products are transferred more efficiently, so fewer transfer conveyors are required, reducing machinery size and cost.

This inherent ability to accurately phase multiple products on each conveyor also removes the major source of misfed product that causes downtime.

Features and Benefits

Feature
Pre-Engineered Application
> **Benefits**
> • Proven Code
> • Low Risk
> • Fast Time to Market
> • Reduced Development Time and Cost
> • Full Documentation

Feature
Reduces the Number of Conveyors
> **Benefits**
> • Reduced Machine Size
> • Reduced Cost

Feature
Scalable Solution
> **Benefits**
> • Works with Servos and VFDs
> • Integrates into Applications, Regardless of Complexity

Feature
Precise Registration of Product Position at Each Conveyor State
> **Benefits**
> • Accurate Positioning onto Receiving Conveyor

Feature
Works with or without Flights on the Receiving Conveyor
> **Benefits**
> • Rapid Changeover Between Product Sizes

Feature
Multiple Products can be on Synch-Belts During Position Moves
> **Benefits**
> • Unique Capability
> • Higher Throughput
> • Reduced Risk of Feeding Errors
> • Minimized Downtime Occurrence
> • Reduced Number of Conveyors are Required

Feature
Yaskawa's Patented "Dynamic Smooth Path" Technology is Embedded
> **Benefits**
> • Minimized Shock
> • Automatically Calculates Ideal Move Profile
> • Only 4 Parameters to Enter
> • Adaptive

Feature
Program can be Modified by Customers
> **Benefits**
> • Can be Customized to Application
> • Security Provisions Protect Customer Innovations

Feature
Number of Synch-Belts can Vary
> **Benefits**
> • Can be Scaled to Meet a Wide Variety of Applications

Wide Range of Products
• 10W - 90kW Rotary Servos
• Direct Drive Servos
• Linear Servos
• Inverter Drives
• I/O
• Motion Sequencers
• Programmable Motion Controllers
• Programmable Machine Controllers
• Robots

10W to 90kW

High Performance
• Deterministic Updates
• On-the-Fly Adjustments
• Precise Control of Complex Motion
• Tight Integration of PLC Sequence & Motion

Connectivity Options
• OPC Server
• Ethernet TCP/IP
• Profibus
• Deterministic Network Control – Mechatrolink-II
  (Servo, Direct Drive, Linear, I/O, VFD on one network)

MP2200

MP2300

For more information on Synch-Belt, visit:
www.yaskawa.com and enter **synch-belt** in the search box.

For general information on Yaskawa Products, visit:
www.yaskawa.com

For application support call **1-800-YASKAWA** and ask for Motion Application Engineering or contact your local Yaskawa distributor.

Locate your local certified distributor, visit www.yaskawa.com
click on sales ⟶ servo and motion ⟶
motion control distributor

YASKAWA

Servo Network Driver for
LabVIEW

YASKAWA ELECTRIC announces the release of a new driver for National Instruments' LabVIEW graphical programming environment. This driver allows for the creation of motion profiles on a standard PC with Windows XP/Vista, which allows for simple point-to-point moves in test and measurement, lab automation, and many other applications. The driver combines the power of LabView with Yaskawa's family of AC servo drives and motors via a PCI communication card running MECHATROLINK-II. Now, LabVIEW can fully harness the broadest range of servo products from 30W to 7.5kW.

LabVIEW **+** **M**ECHATROLINK **+** **YASKAWA**

PC w/XP or Vista   Digital Network   Servo Amps & Motors
                          PCI Card   Sigma Product Family

= Your Application
SOLUTION

This MECHATROLINK-II driver provides LabVIEW users a simple, easy-to-use, and powerful network for controlling "point-to-point" and velocity motion in MECHATROLINK-II enabled devices:
- Yaskawa's Sigma III and Sigma-5 servos
- Yaskawa's VFDs
- Other MECHATROLINK-II enabled devices (i.e. steppers and remote I/O modules, etc.)

High Performance

Simple, asynchronous, point-to-point commands are initiated in the LabVIEW environment, while the real-time position loop and trajectory generation is handled by each individual servo drive. Trapezoidal motion profiles (as seen to the right), jerk-limited accelerations, as well as sophisticated control loops, are some of the features of this high-performance servo drive.

Speed (%)

(100%)

Rated speed

Travel speed

0

Linear acceleration time

Linear deceleration time

Time (t)
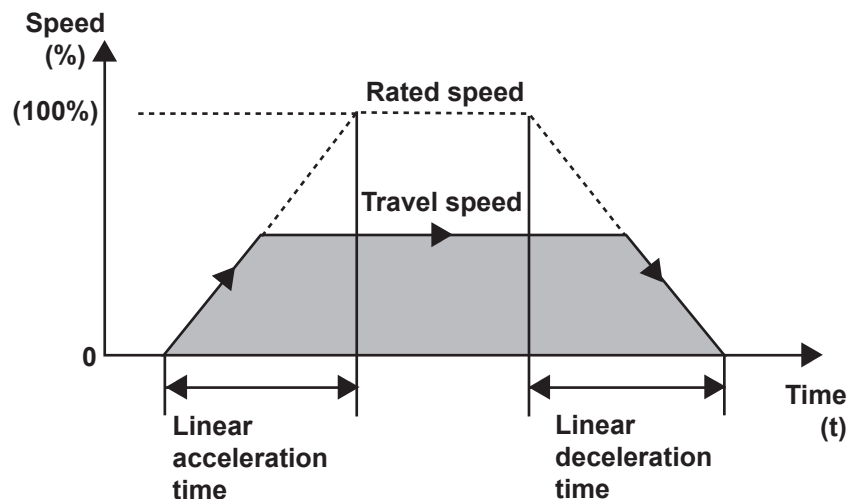
Plug-and-Play

MECHATROLINK-II is a digital servo network which reduces wiring between servo drives and a host controller. It enables quick and reliable bidirectional transfer of servo axis data. A serial encoder interface further increases the communication between motion control components by allowing motor data to be accessed by the host controller. The new LabVIEW driver for the NT110 PCI card allows an ordinary Windows XP/Vista PC to be the host controller for a real-time servo system.
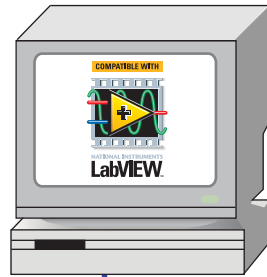
**LabVIEW on PC with XP/Vista
NT110 card using MECHATROLINK-II**

**MECHATROLINK-II
Digital Network**

Servo Drives

AC Drive

Servomotors

AC Motor
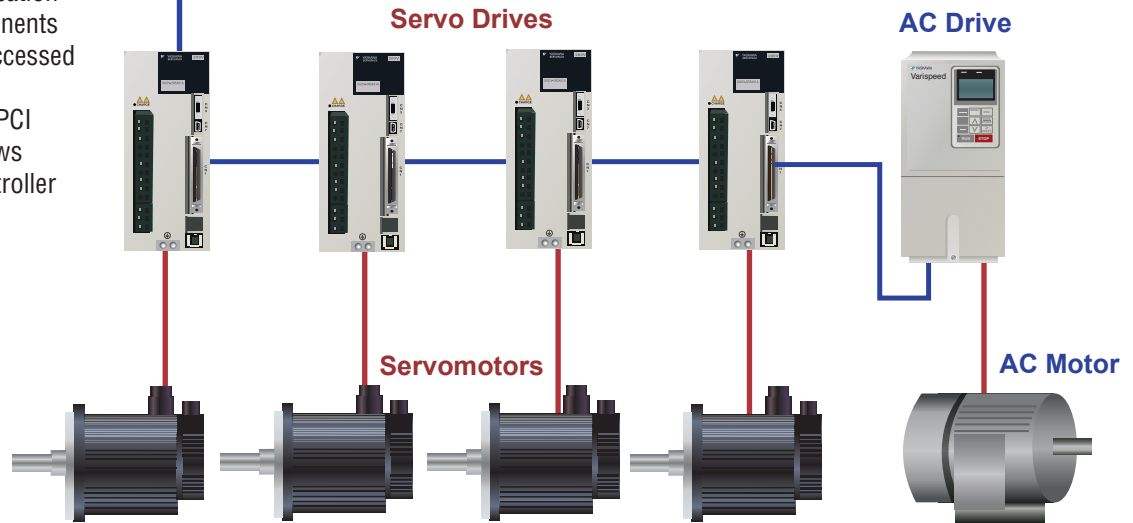
VI Driver Palette

Setup Utility

Driver Setup

Example Programs

Macros

Commands