Premier Integration Simplifies Drive Configuration and Maintenance

Integrated drive configuration with RSLogix 5000 reduces development time by as much as 70 percent.

Premier Integration enables users to configure both controller and drive network connections from a single location, which minimises the potential for errors when defining the EtherNet/IP or ControlNet network I/O.

Original equipment manufacturers (OEMs), system integrators and end users are always searching for ways to make drives easier to install, operate and integrate into their overall automation systems.

For these users, adding a drive to a control system typically has involved learning to work with different software programs and manage separate drive configurations. A new approach from Rockwell Automation® aims to change this.

Called "Premier Integration," this approach provides an array of programming tools to better integrate Allen-Bradley® drives with other Allen-Bradley products. These tools streamline drive commissioning, installation and maintenance, helping to reduce cost, time and errors.

Drive Programming Challenges

Traditionally, drives and controllers are treated as separate entities in the programming world: users require one programming application for the controller and separate configuration software for the drive. More likely than not, users refer to a manual because there is no way to set up the network I/O connections to the drive without it.

In addition, configuration is often done at two different times by two different people. Greg Mears, Rockwell Automation product manager of Drive Software and Premier Integration, explains, "The potential for user error is great and can result in no I/O connection being allowed due to a configuration mismatch."

Furthermore, the resulting tag names are generic and require individual tag descriptions so that anyone looking at the controller program can understand it. Also, the resulting tags are often of the same data type, such as integer or double integer. If drive parameters reflect a mixture of data types, then additional controller programming is required to convert to the desired data types.

"Such challenges," says Mears, "result in development, startup and operational delays."

A Smarter Approach

Rockwell Automation's Premier Integration enhances drive programming and commissioning of PowerFlex® AC drives. It does so by providing profiles, parameters and standardised tags that users can easily install from a pick list. In addition, copy and paste programming makes configuring multiple drives effortless. The catalyst for these capabilities is RSLogix™ 5000 v16 (and higher) software.

Mears explains that drive Add-On Profiles (AOPs) speed the configuration process. Users configure both the controller and drive side of the network I/O at the same time and in the same place – RSLogix 5000. This eliminates user configuration errors due to mismatches.

And, since the configuration software is part of the AOP, additional information about the drive is known. For example, descriptive drive tag names, such as *.AccelTime1, are automatically created, eliminating the need for users to manually add descriptions. The tag names match the drive parameter names, effectively providing standardised tags that are the same from one program to the next. The proper data types are also automatically generated for each tag, eliminating the need for users to program data conversion logic.

Mears also explains that all drive configurations are stored in the RSLogix 5000 *.acd file, so users have a single backup file of their Logix/PowerFlex drive system. When the *.acd file is downloaded to the controller, the drive configuration settings are stored there,

too. This gives users a single repository of the configuration settings for their networked drives. In the event of a failure, replacement and restoration of the original drive configuration is a much easier process.

Easier Automation

Premier Integration encompasses other tools to speed automation, as well. They include:

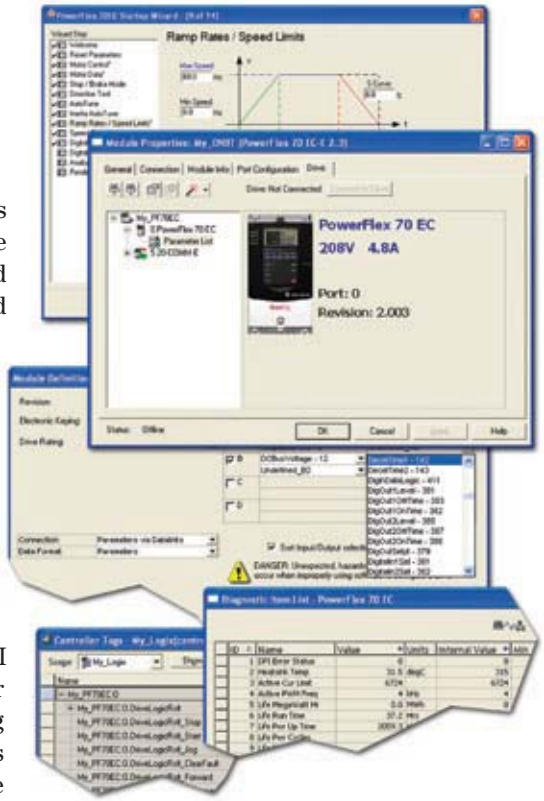
• **Startup Wizards.** These provide a simple, step-by-step process to program drives. Drives can be used on a variety of applications, ranging from fans and pumps, to conveyors, to winders, etc. As a result, a drive can have hundreds of parameters. Graphs, images and descriptive text assist users through the commissioning process. They reduce drive startup and commissioning time as well as improve setup accuracy by eliminating a significant amount of manual configuration with the end device.

• **Add-On Instructions (AOIs).** These allow users to encapsulate their most commonly used logic as sets of reusable instructions. Mears provides one example, the use of PowerFlex faceplates in FactoryTalk® View. The AOI is used to handle program control (automatic) versus operator control (manual).

According to Mears, "AOIs give users the ability to customise instructions to fit their needs and help to provide a standardised way of doing so." This reduces the development and validation effort and promotes consistency among projects since there's no need to constantly reinvent commonly used control algorithms.

• **Faceplates with AOIs.** PowerFlex faceplates are preconfigured HMI objects that can be imported into a user's HMI display. They allow for operator control, monitoring of metering data, parameter adjustments and fault description/corrective action – and can be downloaded for free from the Rockwell Automation Sample Code website.

The power of these Premier Integration tools lies in their implementation (see *Putting Premier Integration to the Test*). According to Mears, Premier Integration "encapsulates more intelligence into the RSLogix 5000 software and makes it available to users. Now, RSLogix 5000 and the controller know more about drives than before, enhancing the ease-of-use of our Integrated Architecture™." AT



Premier Integration provides profiles, parameters and standardised tags, enhancing drive programming and commissioning of PowerFlex® AC drives.

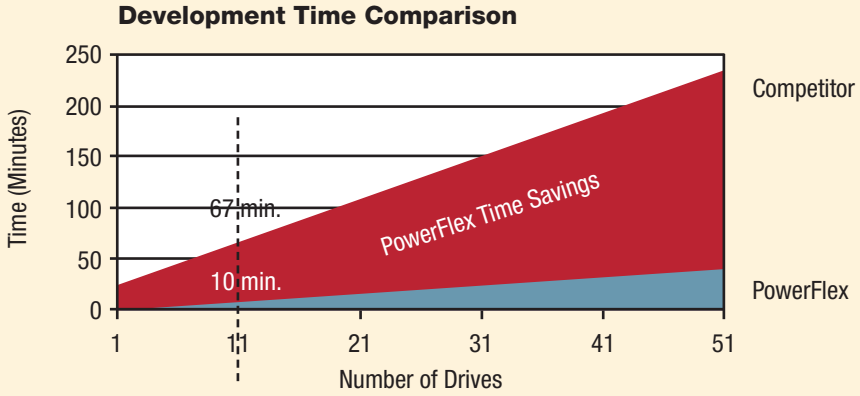
on the web

For more information on Premier Integration, visit: *www.ab.com/drives/software/integration.html* **and** *http://rockwellautomation.com/solutions/integratedarchitecture/resources5.html.*

Putting Premier Integration to the Test

A side-by-side drive configuration comparison of multi-drive systems showed that designers – when using Premier Integration – were able to program Allen-Bradley® PowerFlex® drives in Logix-based systems up to 70 percent faster than competitive drives.

Greg Mears, Rockwell Automation product manager of Drive Software and Premier Integration, explains that the comparison involved connecting a drive to a Logix system, adding necessary descriptions and ensuring that all tags were functional. In addition, the work required to add duplicate drives to the system was also considered.



Figures obtained from timed side-by-side configuration testing with a competitor's drive.

While it took a user 25 min to program a competitor's drive, it took that same user only 3.5 min to configure the PowerFlex drive, thanks to Premier Integration. To program 10 additional drives, the user took approximately 42 min for the competitor's drives and 7 min for the PowerFlex drives.

Energy Savings with Variable Frequency Drives

Rising energy costs are motivating industry to explore new methods to better control performance and increase productivity, while reducing energy use.

Since over 80 percent of pump and fan applications require control methods to reduce flow to meet demand, those applications are crucial to savings. Process engineers commonly use fixed-speed controllers and throttling devices such as dampers and valves, but these are not very energy efficient.

The use of variable frequency drives (VFDs), or variable speed drives, offers an alternative that both varies the motor speed and greatly reduces energy losses when you need to control fluid flow. Advancements in drive topology, careful selection of the hardware and power system configuration, and intelligent motor control strategies provide better overall operating performance, control capability and energy savings.

When choosing a motor control solution, there are several factors to consider including peak-demand charges, operating at optimised efficiency, power factor, and isolation transformer cost and losses. Regeneration capabilities, synchronous transfer options and specialised intelligent motor control energy-saving features are other items to keep in mind.

Beat Peak-Demand Charges

It is important to be aware that utility companies charge higher peak-demand electricity prices when companies exceed a preset limit or base load of electricity. Peak-demand charges often occur when industrial motors draw large peaks of current when started across-the-line.

VFDs help reduce the peaks by supplying the power needed by the specific application and gradually ramping the motor up to speed to reduce the current drawn. The VFD also automatically controls the motor frequency (speed), enabling it to run at full horsepower only when necessary.

Optimise Power Usage

In addition to starting the motor, consider also how energy-efficiently the pump or motor operates. In applications where motors are unloaded or lightly loaded, VFDs can deliver additional energy savings and performance capabilities.

Centrifugal loads, such as pumps and fans, offer the greatest potential for energy savings when applications require less than 100 percent flow or pressure. For example, significant energy savings can be gained by using VFDs to lower speed or flow by just 20 percent. If this reduction doesn't impact the process, it can reduce energy use by up to 50 percent, which in many operations can equate to substantial energy savings.

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Energy consumption in centrifugal fan and pump applications follows the affinity laws, which means that flow is proportional to speed, pressure is proportional to the square of speed and horsepower is proportional to the cube of speed. That means if an application only needs 80 percent flow, the fan or pump will typically run at 80 percent of rated speed. However, at 80 percent speed, the application only requires 50 percent of rated power.

In other words, reducing speed by 20 percent requires only 50 percent of the power needed at full speed. It is this relationship between flow and power that makes VFDs such good energy savers.

Power Factor Makes a Difference

Power factor and the way it affects displacement and harmonic distortion are also important considerations in drive selection. Drives that are near-unity true power factor translate to reduced energy use.

Leading drives produce a 0.95 power factor or greater throughout a wide operating speed range. An example of the effect of power factor on energy cost compares two 4,000 hp drives, one with a true power factor of 0.95 and one with a true power factor of 0.98. The annual operating cost for 8,760 hours of use at US$0.11 per kilowatt hour results in savings of US$97,390 annually using the 0.98 power factor drive system compared to the 0.95 power factor drive system.

Energy management solutions are investment strategies for long-term reduced operating costs.

Look for drives that use intelligent motor control through advanced technology features.

The Hidden Cost of Transformers

Every drive creates harmonic distortion, which creates extra heat in the plant power system and losses to the drive system. Manufacturers can reduce harmonics by either using a phase-shifting and multi-pulse rectifier transformer or an active front-end (AFE) rectifier.

Transformers have long contributed to the costs of the overall drive system. Some of the negative issues include increasing the size, cost, weight and complexity of the drive system. Extra air conditioning is necessary to cool the transformer, which adds to capital costs as well as consumes excess power on an ongoing basis.

Engineers can now take advantage of transformerless medium-voltage drives. These drives use an AFE rectifier with a line reactor and integral common-mode voltage protection that has a simpler power structure. They help reduce drive system size by as much as 50 percent and lower drive system weight by up to 70 percent.

Since transformerless medium-voltage drives produce fewer losses due to fewer magnetic components in the line reactor, they also eliminate the need for extra air conditioning. A transformer is about 98.5 to 99 percent efficient while an AFE line reactor is about 99.5 percent efficient. This difference of 0.5-1 percent sounds small, but this can add up to big savings. Engineers can retrofit AFE drives to existing motors, making the drives ideal for process improvement or energy-saving projects with existing motors, switches and control rooms, where space is often limited.

Use One Drive for Multiple Motors

Synchronous transfer capability is another way to reduce energy costs. The synchronous bypass method uses only one drive to start and synchronise multiple motors through the process of transferring a load from one source to another by matching the voltage waveform frequency, amplitude and phase relation between the two sources. Using a VFD to start a motor, bringing it up to speed and then synchronising it causes a reduction in full-load current and optimises the process.

The economic advantages of the VFD with a synchronous bypass are in both installation and operating costs. A synchronous system for two motors costs 33 percent less in initial capital outlay.

Energy Management Provides ROI

Industry has many options for energy-savings opportunities. Intelligent motor control solutions, including high-efficiency VFDs, are an important part of an energy-savings programme to optimise energy consumption and reduce energy bills.

Careful evaluations of your facility, application and of the VFDs on the market are the keys to investing well. Look for drives that use intelligent motor control through advanced technology features such as regeneration, synchronous bypass, transformerless options, software and communications to optimise energy consumption. VFDs as energy management solutions are investment strategies for long-term reduced operating costs that have typically provided users payback within one to three years. AT

on the web

For more information, visit: *www.ab.com/mvb/pf7000.html.*