

FAQs for Background

1. What is Open Core Engineering?

It is a new Bosch Rexroth automation software platform and programming capability that combines the previously separate environments of PLC programming and IT programming into one comprehensive software portfolio.

It is a revolutionary approach to PLC programming that, for the first time in the industry, opens the core of intelligent motion-logic controls and drives platforms like the Rexroth IndraMotion PLC to enable programmers who use IT industry standard development tools such as C++, Visual Basic for Applications (VBA) and Java to create automation functions and applications as an alternative, or in combination with IEC61131 and PLCopen programming environments.

2. What does the Bosch Rexroth Open Core Engineering software portfolio consist of?

The Open Core Engineering portfolio consists of software tools, function toolkits, open standards, and the Open Core Interface - which is a newly launched interface technology that enables the creation of machine applications in high level programming languages such as C++.

3. How will Open Core Engineering make it easier for automation systems programmers to author and commission their machines?

The software tools, function toolkits and support for higher-level languages associated with Open Core Engineering are intended to help dramatically streamline the engineering workflow associated with automation programming.

From initial configuration to actual production operations, the detailed and time-consuming machine process programming can now be replaced by a simple assignment of parameters. Moreover, engineering personnel with extensive experience outside the more traditional PLC programming tools can now utilize tools such as C/C++ to program and flexibly integrate customized runtime machine functions, as well as augmenting and re-using them in a modular fashion.

4. How will Open Core Engineering enable automation software engineers to create customized solutions more easily? How will it enable software engineers to save time, money and programming complexities associated with creating customized automation solutions?

By giving machine builders and end-users the ability to interact with the core functionality of Rexroth motion control devices using standard programming tools, custom functionality -- both actual motion sequences, as well as peripheral automation functions such as diagnostics reporting or production and changeover tracking -- can be written using the most appropriate programming language, whether standard PLC IEC 61131-compliant languages, or platforms such as VBA, C/C++ or Java.

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2/2014

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Another benefit is that OEMS and machine builders can create new or custom features on their own, to provide a competitive differentiation for their products in the marketplace; in the past, they needed to partner with Bosch Rexroth to do this, limiting their ability to create original or proprietary controls capabilities.

Since Open Core Engineering has libraries of modules with process functions designed to support motion sequence programming and parameterization consistent with the way these higher level languages function, it is much simpler and faster to create custom functionality than in the past.

5. Can you provide an example of how Open Core Engineering enables easier creation of automation applications using higher level programming languages?

If an end-user wanted to capture real-time production data from an automation system (e.g., the number of parts produced during a shift, how many parts were good, how many bad) a programmer using VBA could use Open Core Engineering-supplied software libraries to create an Excel sequence that captures that information directly from the Rexroth IndraMotion automation platform, without having to go through PLC-language intermediate steps.

Another example is the use of the Rexroth Open Core Interface for rapid control prototyping using MATLAB or LabVIEW engineering environments. In this case, the same functional interface can be used within the high-level programming without having to change the PLC program.

6. What is the Open Core Interface, and how will it be used by automation engineers to create customized solutions?

The Open Core Interface is the software tool that enables the integrated open approach to combining PLC-based engineering and IT automation. It is a programming interface to create high-level language-based applications that speak directly to the core of the motion-logic runtime and, combined with the libraries provided by the Open Core Engineering Software Development Kit, provide a fully functional tool to enable the implementation of the Open Core Engineering capability.

7. What is the difference between Open Core Engineering and the Open Core Interface?

Open Core Engineering is the full software engineering capability that bridges the separate environments of PLC programming and IT programming for automation applications, offering a new degree of freedom across all Rexroth motion-logic controls and drives platforms. The Open Core Interface is a key component of the Open Core Engineering portfolio, and is the interface programmers will use to integrate applications and functionality in higher-level programming languages with the motion-logic automation solutions.

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8. How is the Open Core Interface different from other control authoring tools, both those offered by Rexroth as well as other controls vendors?

The Open Core Interface is the industry's first tool that provides access directly to the core PLC functionality of the IndraMotion platform, and it represents the first interface of its kind built on an open standards approach that permits enhanced access to the control core, offers numerous programming languages, and allows the integration of smart devices into automation systems.

The key advantages are the wide range of supported engineering environments, the high degree of functionality and the openness for future engineering platforms using high-level languages. In addition, individual real-time control functions can be independently created. These features together create an unprecedented level of freedom within software engineering.

9. The Open Core Interface is based on open standards and high-level languages – in what standards and high-level languages is it offered?

The high-level programming languages supported by the Open Core Interface include C/C++, C#, (.NET), Visual Basic, VBA (for Microsoft Office), LabVIEW G, Objective C, and Java. The development environments supported include MS Visual Studio, LabVIEW, Eclipse, Xcode, and Wind River Workbench, as well as support for both Android and iOS mobile platforms.

10. Have automation OEMs, manufacturing end-users and their engineering staffs been asking for this kind of capability?

Although previous PLC authoring packages like Rexroth's IndraWorks platform have become much more user-friendly and flexible, OEMs and end-users have expressed significant interest recently in having the ability to create a wider range of applications for their systems, and to do it much faster using coding tools that are familiar to many talented IT professionals. The Open Core Engineering platform and portfolio of tools, including the Open Core Interface, was created to provide that capability and freedom of operation.

11. What types of customized applications can OEMs expect to be able to build using the Open Core Engineering?

The range of possibilities is quite large, from core real-time automation motion sequences, such as complex interpolated multi-axis motion, to rapid control prototyping, as well as data gathering functions - such as drive and motor energy usage and energy efficiency tracking that runs on external devices such as PCs, tablets or smartphones connected to the core via a communications bus such as Ethernet, Sercos or wireless interface.

As part of a machine's total automation package, an OEM could create a mobile, Android-based diagnostics app that wirelessly accesses machine

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performance data, and lets a plant operator contact the equipment vendor and share that diagnostics data for real-time troubleshooting. With the Open Core Interface and its related software libraries, authoring that app on an Android platform and running it with the IndraMotion PLC is much easier and faster to accomplish.

Essentially, the Open Core Interface “opens” the range of automation functions and applications to encompass a much wider range of potential tools and options for machine builders and end-users by leveraging a broader range of programming expertise and creativity enabled by commercially available tools utilized in the IT world, and by simplifying how those tools can be utilized to create capabilities for PLC-driven automation platforms.

The expanded range of capabilities offered by Open Core Engineering means that software professionals and programmers who are more experienced with higher-level programming languages will not necessarily need to become experts in IEC 61131 PLC programming languages in order to program automation sequences and applications for manufacturing systems that utilize Rexroth’s motion-logic automation platforms with Open Core capabilities. This will enable both OEMs and end-users to widen the range of programming talents who can contribute innovative new functions and tools for automation applications.

12. Prior to Open Core Engineering, how did OEMs and end-users create these types of applications for PLC automation platforms?

Although it was possible to create automation applications and motion sequences using higher-level languages (instead of PLC/IEC 61131-compliant tools), the process of integrating the programs written in those higher-level languages could be convoluted and time-consuming.

If a machine builder wanted to include a new type of remote diagnostic capability, for example, building that capability into their machine’s operating system using standard PLC programming languages might not be easy; but building it in a higher-level language might be -- the integration into the PLC however, might require added resources such as purchase of a specialized translation module, revisions to PLC firmware or support from an outside PLC programming consultant.

By giving programmers who are using higher-level languages direct access to the IndraMotion PLC core using the Open Core Interface, Open Core Engineering eliminates many of these complications. Most importantly, using the Open Core Interface does not require a change in PLC programming.

13. Why is support for mobile tools important for OEMs building automation systems?

Smart mobile devices are rapidly becoming standard tools used in many manufacturing environments – for example in configuring automation systems, or in servicing and operating machinery; the new application options

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available for smart devices, together with their integration into IT infrastructures, are changing the automation sector.

Through the Open Core Interface's support for Google Android and Apple iOS, a much wider range of potential applications (and application developers) can now apply their creativity to automation challenges, bridging the worlds of PLC and IT software development without the need to create complex, intermediate steps in machine-level languages.

14. Is there any security risk associated with Open Core Engineering?

The implementation of the Open Core Engineering portfolio and Open Core Interface tool does not add any additional network vulnerability to outside hacking or viruses. The Open Core Interface on the Rexroth IndraMotion MLC provides for password security and connection access management. However, as with all automation networks, best practices require an appropriate level of plant-level and enterprise-level network security, such as firewalls, in order to keep automation platforms secure.

15. How can I purchase Open Core Engineering? Is it a standalone Rexroth controls platform?

Open Core Engineering is not a standalone Rexroth controls product. Instead, the Open Core Engineering portfolio, including the Open Core Interface, will be made available on the Rexroth IndraMotion MLC Version 13 firmware package, which was commercially available in the fourth quarter of 2013. It is integrated into the Version 13 firmware.

In addition, there is also a free Software Developers Kit (SDK) available for download with registration from the Bosch Rexroth Open Core Engineering website at www.boschrexroth.com/oce. The SDK contains libraries of function blocks and headers which are loaded into the higher-level language development platforms such as C/C++ or Visual Studio, and which are accessed through the Open Core Interface into the core of the control.

16. Is Open Core Engineering being developed to replace or supersede Rexroth's IEC 61131 and PLCopen compliant PLC programming platforms?

No. Open Core Engineering augments the Rexroth PLC engineering framework (IndraWorks) with the Open Core Interface and function development toolkits such as Rexroth's FlexProfile, to widen the range of choices for automation programming. It is anticipated that a significant range of automation functions will still be programmed using standard PLC programming languages; however, Open Core Engineering makes it possible to easily write specific functions in other programming languages that run as real-time functions within the Rexroth IndraMotion PLC, or as external applications that run in parallel with the core IndraMotion PLC motion and logic functions.

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17. Can Open Core Engineering be used with earlier Rexroth PLC versions, or with third party controllers?

Open Core Engineering is a portfolio of capabilities and tools that is bundled into the Rexroth IndraMotion MLC Version 13 firmware and later versions, as well as the IndraLogic XLC 13 and later versions; there are no current plans to make it available for previous IndraMotion MLC or IndraMotion MLD automation platforms, or third-party controller platforms.

18. What technical and user support is available for those who choose to implement Open Core Engineering and the Open Core Interface in their automation programming operations?

Bosch Rexroth has established an “Engineering Network” to support the platform and provide the basis of a user community to help advance the usefulness and versatility of the platform. Following the philosophy of “members helping members,” it offers a live real-time forum for asking questions and discussing issues with a panel of experts.

By registering for the network, developers will have the ability to download the Open Core Interface Software Developers Kit. Bosch Rexroth will support the Engineering Network with a dedicated team of developers, core specialists and product managers.

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