ARC VIEW

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OPC Technology Well-positioned for Further Growth in Tomorrow's Connected World

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Overview

Since its founding in 1996, the OPC Foundation has been developing interoperability standards requested by industrial automation end users and suppliers alike. The OPC Foundation pursues interoperability in industrial automation by creating and maintaining open specifications. These are designed to standardize communication of acquired process, alarm and event, historical, and batch data to connect systems from multiple vendors and between different vendors' production devices.

The OPC Foundation has developed a series of interoperability standards requested by end users and suppliers alike. OPC technologies are widely adopted in industry and found in many industrial hardware and software products and systems.

OPC technologies are widely used throughout industry and found in many industrial hardware and software products and systems. ARC Advisory Group research estimates that more than 47 million automation products installed globally employ OPC client technology. (The number of products with embedded OPC servers are likely to exceed this.)

This should increase substantially in the coming years, since the Foundation's latest OPC UA (Unified Architecture) standard is well-positioned to help end users and suppliers deploy Industrie 4.0- and IIoT-based solutions. OPC UA is designed to provide multi-vendor interoperability for moving information vertically from the plant or factory floor up through the enterprise. It has already gained significant traction in this respect.

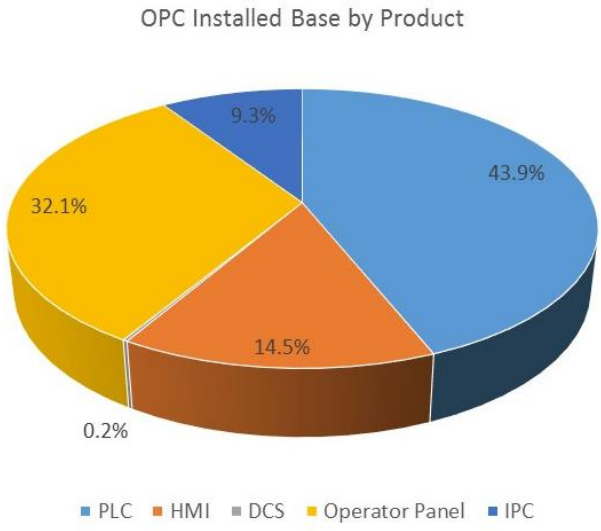
This ARC View, based on extensive ARC market research and analysis, attempts to quantify the current installed base of automation products with OPC and examines why it has been deployed so widely, the types of applications in which it has been deployed, and what lies ahead for the future.

About the Installed Base

ARC, with help from the OPC Foundation, performed an exhaustive analysis of data from the ARC research database to quantify the level of adoption for OPC technology globally. ARC has accumulated large volumes of data from its hundreds of market studies compiled over the years. These provide a solid foundation for analysis.

We looked at a variety of the automation systems and components that use OPC technology. These include programmable logic controllers/programmable automation controllers (PLCs/PACs), distributed control systems (DCSs), industrial personal computers (IPCs), human machine interface (HMI) software, and operator panels.

ARC's database includes the number of products shipped annually and estimates of the installed base for each category. ARC derives these estimates from historical annual shipment data, plus the expected lifecycles and retirement rates for each technology.



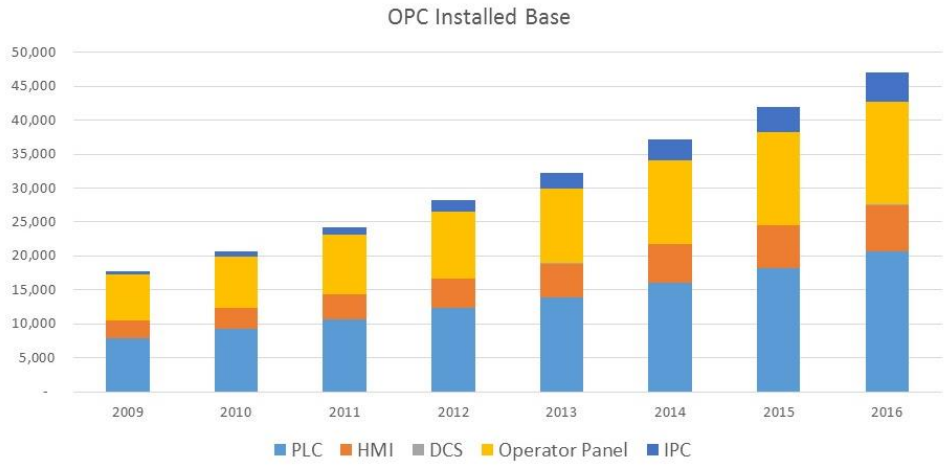
PLCs/PACs and Operator Panels Make Up Majority of OPC Installed Base

By calculating the percentage of each of these devices and systems that include OPC technology as part of a standard product offering, we can estimate that approximately 47 million automation devices installed worldwide include OPC technology. Of these, approximately three-quarters of the total are PLCs/PACs and operator interface devices. HMI software accounts for nearly 15 percent of total installations. Industrial PCs account for another 9 percent (most installed after 2012).

In our analysis, distributed control systems with embedded OPC technology amounted to less than 1 percent of the total installed base. This is due, in part, to the way ARC tracks DCS installations. (We count *systems*, not the multiple controllers and/or HMIs in each DCS in which OPC could potentially be embedded).

Over the eight years shown in the chart below, PLCs and operator interface products comprised the bulk of OPC-enabled products sold and installed. Both categories led the growth each year. HMI software has shown modest

growth. Industrial PC products have grown, but remain a small percentage overall.



What About the Future?

Clearly, OPC UA will be the primary technology that the OPC Foundation will be using going forward. Based on recent research and what we are hearing from suppliers, we anticipate that OPC usage will grow at approximately 45 percent annually for at least the next five years. This growth is being driven by the adoption of OPC UA technology into smart automation devices at the edge of the network and into new markets, such as traffic signal systems in Germany. OPC UA has the potential to grow out of its core automation area in many other markets, including building automation, medical, telecom, data centers, warehouse, and transportation. ARC and the OPC Foundation plan to collaborate on further research into this area in the near future.

The OPC Foundation is international, having regional organizations in North America, Europe, Japan, and China. The OPC Foundation is expanding into other regions that includes creating a regional organization in Korea, and work is underway to form regional organizations in India, South Africa, and South America. This global expansion is leading more and more major manufacturers to join the OPC Foundation, such as LG CNS and Samsung in Korea, Volkswagen and Miele in Germany, and the world's four largest Tobacco companies, Phillip Morris International, British Tobacco, Imperial Tobacco, and Japan Tobacco International. These manufacturers want to have access to resources to get early insights about upcoming information modeling for their specific needs. This will dramati-

cally speed up the growth of OPC UA technology adoption as the active requests from manufacturers and integrators continues to rapidly increase.

Ecosystems Support OPC UA Adoption

For OPC UA to achieve the anticipated rapid growth of adoption and provide maximum benefits for end users in both the industrial and commercial markets, new collaborative ecosystems will need to emerge.

One current example is Microsoft's collaborative effort with the OPC Foundation to enable interoperability between Microsoft applications and OPC UA-compliant industrial equipment. Microsoft will enable its users to connect to a range of manufacturing equipment and software to support interoperability between multiple suppliers' products and systems and multiple generations of systems.

Here, OPC UA provides the standardized communication, security, and metadata and semantics abstraction for a wide range of industrial equipment. It also serves as a gateway to cloud-enabled industrial equipment. This includes providing data and device management, insights, and machine learning capabilities for equipment that was not designed with these capabilities built in.

Microsoft's extended support for the OPC UA open source software stack spans its offerings, from local connectivity with Windows devices to cloud connectivity via the Microsoft Azure platform. Integration with Azure allows users to send OPC UA data to the Azure cloud for insights and optionally manage and optimize their OPC UA devices remotely from the Azure cloud. Microsoft has also built an open-source, preconfigured "Connected Factory" solution that allows users to connect their OPC UA-based machines in minutes. In addition, Windows 10 devices running the Universal Windows Platform can connect and openly communicate with other devices via OPC UA. Finally, Microsoft has built a growing ecosystem of partners around the OPC UA standard.

Another example is collaboration between the OPC Foundation and World Wide Web Consortium (W3C). This provides the infrastructure for the Industrie 4.0 reference architecture facilitating the vision and execution of a smart factory. The collaboration will focus on a common framework for

semantic interoperability and secure services across platforms. These will have broad applicability beyond digital automation. The collaboration will focus on the underpinning necessary to achieve seamless interoperability in the IIoT.

Additionally, the OPC Foundation and VDMA in Germany signed a collaboration agreement. The VDMA represents more than 3,200 mostly medium-sized companies in the capital goods industry, making it the largest industry association in Europe. VDMA hosts 38 vertical markets and is now actively pushing OPC UA information modeling for each of those markets, with current activities for injection molding, machine vision, and robotics. For example, the OPC Foundation and the VDMA's Robotics Division signed an agreement to develop an OPC UA Robotics Companion Specification. VDMA Robotic Division members include manufacturers of robotics and system integrators. This agreement would enable the robotics manufacturers to achieve machine to machine (M2M) communication via Industrie 4.0 by leveraging OPC UA, enabling information integration from the robots directly to the cloud, as well as a service-oriented architecture (SOA) that allows for information integration between machines and robotic equipment at both a horizontal and vertical level.

OPC UA is also growing beyond its core automation markets into other areas. For example, the HKI Industry Association and the OPC Foundation signed an agreement to use OPC UA for interoperability across disparate devices and applications in commercial and professional kitchens to address the requirements of food production and processing.

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OPC UA "Living at the Edge" for IIoT

Increasingly, we're seeing IIoT-enabled edge devices embedded with OPC UA being leveraged as an "asset gateway." This can help organizations maximize their return on assets (ROA) by helping ensure that their automation investments are scalable, future-proof, adhere to open standards, and integrate with existing assets to avoid having to "rip and replace" current automation infrastructure.

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Furthermore, edge devices embedded with OPC UA are well-positioned to support plant floor-to-enterprise communications as well as participate in emerging IIoT applications.

Recommendations

OPC technology has become a de facto global standard for moving data from industrial controls to visualization and database applications. The rapid expansion of OPC UA in automation, IIoT, and into new, non-industrial markets suggests that OPC will remain an important technology for multivendor secured interoperability, plant floor-to-enterprise information integration, and a host of other applications yet to be envisioned.

As a framework for industrial interoperability, OPC UA delivers information modeling with integrated security built in by design, access rights, and all communication layers to provide plug-and-play, machine-to-machine (M2M) communication within plants and factories. It is scalable across an enterprise, from the plant floor and from sensor to enterprise IT and cloud scenarios. Automation suppliers and end users alike should take note of these important capabilities.

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