

ARC WHITE PAPER

By ARC Advisory Group

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Rockwell Automation Builds a Business Value Proposition for the Oil & Gas Industry

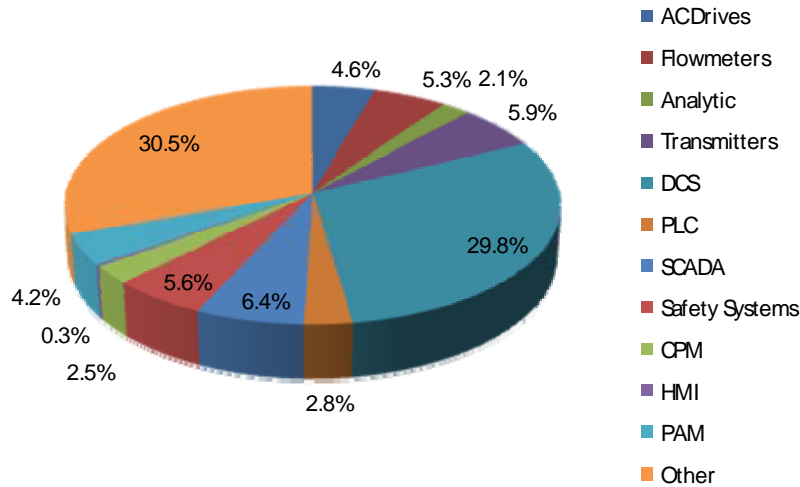
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Production		LNG	Transportation	Refining / Processing
Offshore	Onshore			
Well Head Platforms	Oil Sands	Re-gasification Process	Metering and Custody Transfer	Gas Fractionation Plants
Separation (Oil, Gas & Water)	Well Head	Storage	Pump Stations	Power Generation
Metering (Oil, Gas, Water)	Separation (Oil, Gas & Water)	Compressors	Compressor Stations	Steam Generation
Natural Gas Liquids Extraction / Processing	Metering (Oil, Gas, Water)	Metering / Custody Transfer	Segmenting / Block Valves	Storage
Crude Heating	Natural Gas Liquids Extraction	Heaters / Heat Exchangers	SCADA	Oil / Products Movement
Crude Pumping	Crude Heating	Pumps (Low pressure and High Pressure pumps)	Pipeline Supervision	Water Treatment
Gas Compression	Crude Pumping	Berth / Unloading	Process Safety	Lube Plants
Water Treatment	Gas Compression	Process Safety	MV Solutions	Terminal Management
Water / Gas Injection	Water Treatment		Leak Detection	Metering / Custody Transfer
Process Safety	Water / Gas Injection			Process Safety
Power Generation	Field Management			Pump Stations
Vessel Positioning / Management	Process Safety			Compressor Stations
Mooring and Ballast Control				



Rockwell Automation offers solutions across the Oil & Gas Supply Chain



**Automation Market for upstream Oil & Gas industry by product:
Rockwell Automation (including ICS Triplex) & its E+H partnership
effectively address nearly 70% of the market**

Executive Overview

The oil and gas market is the fastest growing industrial market for process automation today. Rockwell Automation has a long history of servicing the oil and gas industry through its wide range of products and services such as drives, motor control centers, PLCs, PACs, support and maintenance services and energy management solutions. With the company's push into the process industries including its Integrated Architecture™ system for multi-disciplined control and information, the acquisition of ICS Triplex for process safety and critical control, as well as its alliance with En-

dress+Hauser for process instrumentation and facility asset management, Rockwell Automation has a real opportunity to grow as a total solutions provider in the oil and gas market.

To create a compelling value proposition for the oil and gas industry, Rockwell Automation has the ability to combine its product, application, and service offerings to address many specific business requirements spanning from the wellhead to processing, storage, and transportation.

Like any industry, oil and gas end users are not so much focused on technology for technology's sake, but on the concrete business value that technology can provide. The oil and gas industry today is faced with many of the same challenges that users in the overall process industries face including shrinking personnel resources, a need for greater flexibility and agility in day to day operations, an increased focus on availability and safety, and a need for increased reliability. These requirements are manifested in various oil and gas industry initiatives such as a drive toward remote operations, integration of the oil and gas supply chain through Oil Field of the Future initiatives, space conservation on offshore platforms, and increased energy efficiency. Rockwell Automation's strategy for success in the oil and gas industry revolves around its addressing the key business issues that the industry faces.

To create a compelling value proposition for the oil and gas industry, Rockwell Automation has the ability to combine its product, application, and service offerings to address many specific business requirements spanning from the wellhead to processing, storage, and transportation. The company has many success stories in the industry spanning a range of applications that include pipeline SCADA to LNG terminal control, offshore production, and onshore production. In ARC's view, Rockwell Automation will continue to be a formidable competitor in the oil and gas industry on a global scale in the years ahead.

Rockwell Automation's Foundation in the Oil & Gas Industry

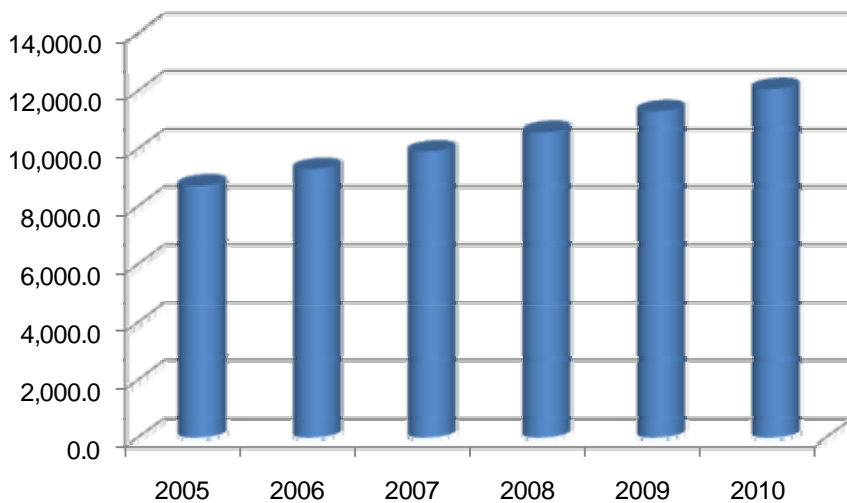
While we live with the uncertainty of whether there will be enough oil and gas to fuel the growth of worldwide economies, growth in the automation marketplace for oil and gas applications is an absolute certainty. In ARC's analysis of the automation marketplace, the upstream oil and gas market has moved to the forefront of growth. Projections indicate that integrated oil companies will be directing over 80 percent of their total capital and operational expenditures to the upstream sector. The scale of the large mega-

projects in the oil and gas industry easily outstrips other industry segments.

Though oil prices are at record highs, demand continues to outstrip supply. Consumption in emerging Asian economies, most notably China and India, will increase exponentially in the coming decades. Several recent incidents have brought the aging U.S. oil and gas infrastructure into sharper focus. The hurricanes that struck the oil and gas infrastructure in the Gulf Coast in 2005 exposed just

how vulnerable U.S. production and refining capacity was. Several other recent incidents exposed vulnerabilities within the industry, some may be addressed with better process control and safety solutions, as well as field instrumentation.

As the oil and gas industry works to find new reserves, build new capacity, and upgrade its existing infrastructure, it will look to automation technology to optimize its production processes to maximize profits, improve safety, fulfill regulatory requirements and meet growing demand. Comprehensive use of automation in upstream oil and gas can significantly reduce operating expenditures, while simultaneously delivering extraordinary levels of increased performance.



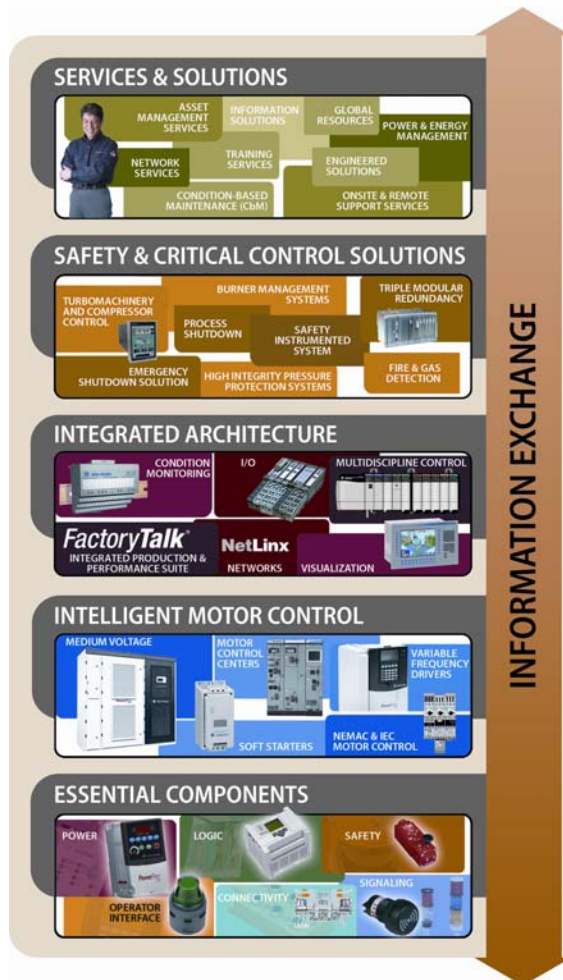
ARC's forecast for Automation Spending in the Oil & Gas Industry Worldwide shows very strong growth for the foreseeable future (Millions of US Dollars)

Rockwell Automation's History in the Oil & Gas Business

The process and hybrid industries have offered a substantial growth opportunity for suppliers in the past several years, and the overall process automation marketplace continues to be in an expansion mode that will continue for several years to come.

The market continues to be buoyed by infrastructural and grassroots development in China, India, and other developing economies, combined with users in the Americas and Europe that are making significant investments in upgrading equipment. Rockwell Automation, who has always had a strong presence in the batch market, has made the continuous process industries, which includes the oil and gas industry, a top strategic priority within its organization.

Rockwell Automation has long been a major supplier of products and services to the oil and gas industry. The oil and gas market is among the top five industry segments for Rockwell Automation overall, and the top 10 oil and gas companies currently use Rockwell Automation solutions. Half of Rockwell Automation's medium voltage drives and MCC product business goes to oil and gas applications. Acquisitions such as ICS Triplex, Pavilion Technologies, and ProsCon have also extended the Allen-Bradley® brand into technologies essential to the oil and gas industry.



Rockwell Automation has a complete portfolio of solutions for the Oil & Gas industry

Rockwell Automation has a complete portfolio of solutions to the oil and gas industry that includes Components, Integrated Architecture, Intelligent Motor Control, and Services. The Integrated Architecture system encompasses the Logix Control Platform for both process and discrete applications, FactoryTalk® software offerings for production management, NetLinx open networking technology for integration, visualization products, condition monitoring solutions, and I/O. Intelligent Motor Control includes medium voltage products, motor control centers, soft starters, variable speed drives, and NEMA and IEC motor controls. Rockwell Automation components for the oil and gas industry include power and energy management components, logic controllers, and opera-

tor interface components such as pushbuttons, machine safety, and signaling products.

Rockwell Automation is growing its services business to meet the demands of its process industry customers. The company offers a full scope of project services from consulting to engineering and design, commissioning, startup, and after sales service and support. Rockwell Automation has



been delivering turnkey applications for twenty-five years. Their broad service offerings include Concept, Consulting, Design, Engineering, Commissioning, Installation, Start-up, Technical Support Services, Production Management/MES implementation and integration, Network Services, Training, Asset Management Solutions, Process Control Solutions, Safety and Critical Control Solutions, Software Applications and Integration.

Rockwell Automation will also soon be launching Process Asset Reliability and Optimization services.

Solutions across the Oil & Gas Industry Supply Chain

You would be hard pressed to walk into any process plant or facility in the world and not find some Rockwell Automation hardware or software. This is also true for the oil and gas industry. Rockwell Automation offers solutions across the scope of the oil and gas supply chain ranging from offshore and onshore production applications to LNG terminals, pipelines, processing facilities, terminals, and refineries. According to ARC's most recent report on the automation market for the oil and gas industry, Rockwell Automation was the seventh leading supplier of automation products and services to the oil and gas industry worldwide. The company's presence is not limited to North America. With installations ranging from Latin America to Canada to Europe to Indonesia and China, Rockwell Automation is driving its initiative to grow its oil and gas business on a global scale.

Addressing the Core Business Requirements of Oil & Gas

Rockwell Automation realizes that simply offering products and services is not enough to succeed in today's marketplace. Automation end users are faced with an increasingly difficult task when it comes to justifying capital and automation expenditures. Even though the upstream oil and gas in-

dustry is leading the pack when it comes to capital expenditures, end users in the industry are not immune from the requirement to present a real business value proposition. When you look at the business requirements for oil and gas you can really boil them down to three fundamental areas – an increased need for flexibility and agility, a drive toward increased availability and safety, and the requirement for increased reliability. Using these three primary requirements, we can analyze Rockwell Automation’s solution offerings to the oil and gas industry and how they address each of the three requirements.

Flexibility & Agility: Reacting Instantly to Any Situation or Opportunity

Oil and gas end users need to be able to react quickly to changing market conditions and changing process conditions. This includes everything from being able to react to emerging market opportunities to being able to process a wider range of crudes and react quickly to changes in gas field conditions. When you take into account the enormously complex systems and processes involved in the oil and gas industry, this makes being agile and flexible an even more daunting task. To become more flexible, oil and gas users are looking to automate their procedures and streamline their processes.



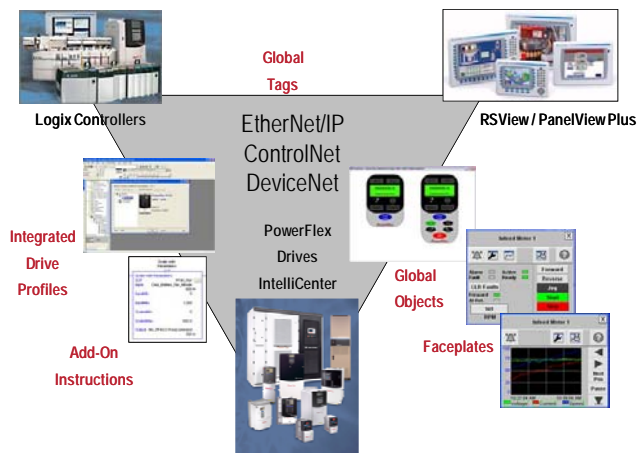
Rockwell Automation helps customers implement and maintain automation processes that allow them to respond proactively to changes in a quick and agile way, reducing changeover time and increasing profitability. The company also helps users reduce their space requirements and preserve real estate. With direct to drive technology, you eliminate the need for a transformer and increase the amount of space available.

Some of the more unique offerings from Rockwell Automation that address the specific needs of the oil and gas industry include high-density motor control centers for offshore platforms.

A Flexible & Agile Approach to Motor Control

Rockwell Automation's Intelligent Motor Control solutions combine motor control and protection devices with their Integrated Architecture system. Intelligent Motor Control at Rockwell Automation includes Common Industrial Protocol (CIP) network enabled electronic overload protection relays, soft starters, variable speed AC drives, motor control centers and packaged, pre-engineered, and turnkey motor control solutions.

A new integrated drive configuration feature now available in RSLogix™ 5000 v.16 software from Rockwell Automation allows users of Allen-Bradley PowerFlex® drives to consolidate drive system configuration, operation and maintenance into a single, integrated environment. Called 'Premier Integration'-- the way Rockwell Automation is enhancing the integration of products to achieve truly seamless integration-- this capability helps reduce programming, installation and overall ownership costs by minimizing the number of software tools required. Additional benefits include faster startup, improved accuracy and easier drive system maintenance. Integrated drive configuration allows users to configure both controller and drive network connections from a single location, which minimizes the potential for errors when defining the Ethernet/IP or ControlNet network I/O. This feature also eliminates the task of individually programming the required parameters and tags.



Rockwell Automation's Intelligent Motor Control combined with Integrated Architecture Provides Oil & Gas users with a high level of flexibility

Research conducted by Rockwell Automation shows that designers using this Premier Integration approach can program PowerFlex drives in Logix-based systems up to 70 percent faster than competitive drives.

To provide diagnostics and information about motor performance and enable oil and gas users to perform preventative maintenance before damage occurs to motors or connected equipment, Rockwell Automation offers networked solid-state relays, soft starters, vibration monitors, drives and motor control systems. Examples include the use of networked E3 Plus Overload Relays that recognize and send preventative data, such as overload condition, to alert operators to potential failures and XM modules performing predictive analysis on rotating equipment to improve maintenance activities.

Rockwell Automation also includes built-in drive safety features for their Intelligent Motor Control solutions, such as PowerFlex 70 AC drives with DriveGuard®, which are dual safety channels in the drive that put the drive in a safe state without removing AC power from the drive. The “safe-off” feature is enabled when the safety relay or safety PLC monitoring the machine safety system is activated. This puts the drive into a safe state, ultimately disabling the drive's ability to rotate the motor and the machine's ability to move until it is safe to do so.

Rockwell Automation has the capability to tie together their solutions for safety and equipment monitoring and management with their CENTERLINE® Motor Control Centers with IntelliCENTER® Technology, which provides MCC users with a plug and play integrated hardware, software and communication solution via pre-configured software and screens which show real-time data, trending, component history, wiring diagrams, user manuals and spare parts. Parts of this system, which is pre-tested in an ISO9001 facility, includes new DeviceNet products used to capture information for MCC design and installation, predictive information, process monitoring, and diagnostics, which provides for flexibility when moving and adding units to the system as well as keeping cables behind barriers to prevent accidental damage during installation.

Rockwell Automation also developed the space-saving and cost-effective Direct-to-Drive™ technology for its PowerFlex 7000 medium voltage (2.4kV to 7.2kV) drives. “Transformerless” Direct-to-Drive technology eliminates the need for an isolation transformer but still mitigates common mode voltage, and can be applied on either a retrofit or new motor with standard groundwall insulation.

The significant space and weight savings is of high value on offshore platforms where real estate is at a premium. An isolation transformer can represent 30-50 percent of a drive system's size and 50-70 percent of the system's weight. For example, the typical volume and weight of a 1250 hp drive with isolation transformer is 13 cubic meters and 4,200 kg. The Direct-to-Drive version is 60 percent smaller at 5.4 cubic meters and 65 percent lighter at 1,350 kg. It is just one meter deep and is front-accessible for maintenance and repair.

Reduced downtime and fewer spare parts result from the drive's patented PowerCage™ power semiconductor. The advanced 6.5kV P.I.V.-rated symmetrical gate commutated thyristor (SGCT) power semiconductors

with an integrated gate drive, reduce the unit's component count to the lowest of any medium voltage drive and allow component replacement in less than five minutes. The SGCT also produces an advanced pulse-width modulation (PWM) switching pattern to selectively eliminate line side harmonics, and meets IEEE 159-1992 limits for current distortion.

Buckeye Partners, L.P. installed a 2000hp PowerFlex 7000 with Direct-to-Drive technology on its Pennsylvania pipeline to save space in the control house. A larger drive system would have increased costs to build a foundation for an outdoor transformer and run cables to it, as well as the cost of the transformer itself. Transformers for medium voltage applications range from \$15,000 to \$250,000 and add costs for extra cabling, air conditioning to cool the transformer, crating, handling and transportation.

AC Drives & Energy Savings in Pipeline Applications

In oil and gas pipeline applications it is very common to control the output of variable torque loads such as those found in pumps, fans, and blowers by throttling their input or output. This method, however, is inefficient.

Using Rockwell Automation PowerFlex drives in a typical pipeline application can result in savings of up to 14,370 Megawatt hours (MWh) per year, or over \$570,000.

The application of AC drives to large fans and pumps to control flow by modulating their speed can produce significant energy savings. The higher the level of motor operating time and the larger the variation in load duty cycles, the greater the savings.

Using Rockwell Automation PowerFlex drives in a typical pipeline application can result in savings of up to 14,370 Megawatt hours (MWh) per year, or over \$570,000. One pipeline customer expects to save \$5 million annually in transportation expenses and achieve reduced pipeline shutdowns that can cost up to \$750,000 per shutdown when the pipeline is running at full capacity.

Integrated Architecture Provides a Flexible Environment for Total Automation Management

Integration at oil and gas facilities, whether it is on an offshore platform or gas processing plant, is typically driven from the process automation system down to the components. Within this setting, the Rockwell Automation Integrated Architecture system provides an extremely flexible environment for process automation that is a good fit for the requirements of the oil and gas industry.

For many years now, the worlds of process and discrete automation have been converging. ARC’s Collaborative Process Automation System (CPAS) vision illustrates a single, consistent view into all domains of facility control and provides a common framework that allows for optimization of the entire manufacturing enterprise. Rockwell Automation has turned this vision into a reality. Their Logix PAC™ merges discrete (PLC) and process (DCS) control functionality into one system with a unified framework for interfacing to manufacturing enterprise systems.

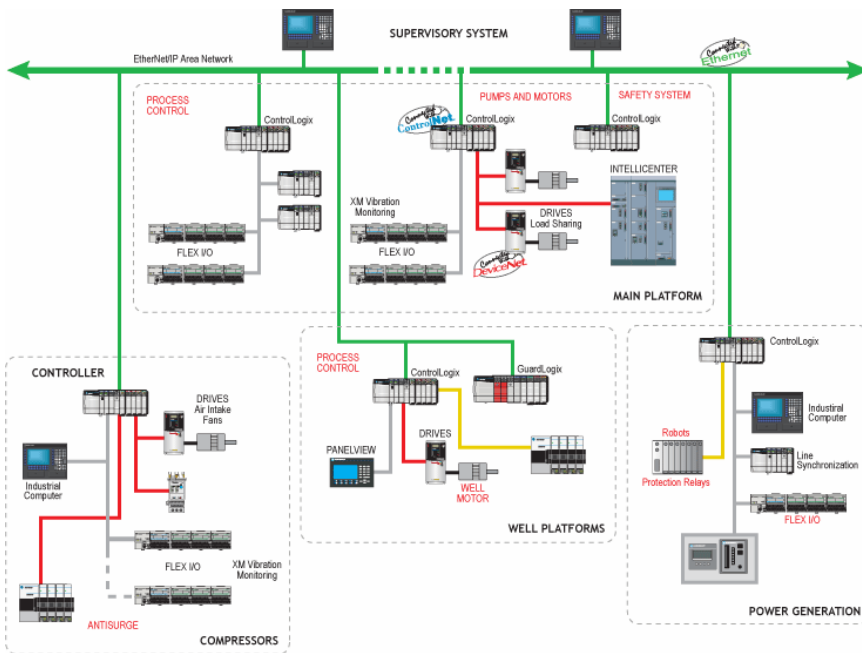
Rockwell Automation’s goal is not just to penetrate the process automation applications, but also to go after the total scope of facility control within specific industry segments, including oil and gas. Rockwell Automation’s expertise in the areas of drives, high-speed motion, safety, and discrete automation give the company significant presence in process facilities.

Their ability to integrate high-speed discrete, drives, and motion control applications with process applications opens up a new realm of facility-wide optimization for its core industries.

True operational excellence and maximum facility performance cannot be realized without the integration of all aspects of the manufacturing process. In the oil and gas industry, this means providing an integrated platform for all automation ranging from the wellhead or offshore platform through processing, storage, and distribution.

The Rockwell Automation Integrated Architecture system is unique in that it can offer a complete view of the entire facility across all aspects of the manufacturing process with a single unified platform for engineering and configuration, visualization, control, machinery protection, predictive maintenance and asset management, while eliminating the need for customization.

Rockwell Automation can articulate an operational excellence value proposition effectively to the domains of the plant, facility, or pipeline that need



Rockwell Automation’s goal is to integrate process automation with all other areas of the plant or facility (Offshore platform applications are shown here)

to understand it most. Rockwell Automation can combine its strength in these domains with its growing presence among the process side of the business to drive a significant financial impact on manufacturing. The future of manufacturing rests with a knowledge-based workforce that can have free access to all of the information required to do their job properly and, more importantly, make intelligent and timely decisions about how to improve performance. In an offshore platform, for example, the end user can have a unified view into the domains of process control, pumps and motors, compressors, safety systems, and the entire scope of operations.

Expanding Local Engineering Support Capability

Oil and gas industry end users are under more pressure than ever to perform, but at the same time they face an unprecedented shortage in skilled

According to the Journal of Petroleum Technology, for example, 60 percent of oil and gas industry engineers currently employed are going to retire by 2010.

labor and the pool is continuing to drain fast. According to the Journal of Petroleum Technology, for example, 60 percent of oil and gas industry engineers currently employed are going to retire by 2010. In a recent interview, a major refining company stated they had

lost 2,500 years of experience last year when 100 operators retired at one site, each with an average of 25 years of experience. As further evidence, a major chemical company analyzed their facility demographics and found one of their largest plants would lose 75 percent of its operating staff to retirement by the end of this decade.

Worldwide Field Support

Rockwell Automation has field service engineers dispatched from over 100 offices in 50 countries to deliver On-Site Support Services. Field service engineers are available for 24x7 callout service on an as needed basis, or can be scheduled to perform project and contract services including equipment startup, preventive maintenance, conversion services and network services. The appropriate On-Site Support Services for the customer's maintenance strategy are often identified through a Facility Baseline® Evaluation Service. This service includes a complete evaluation and analysis of the condition and performance of the control system equipment. Recommendations from the evaluation may include implementation of a preventive maintenance program, which can be executed by Rockwell Automation and includes documentation of system specifications, electrical, environmental, and mechanical inspection, measurement, and trending of key performance

parameters, software program revision check and if necessary, upgrade to the current version. For companies that require a dedicated automation specialist for an extended period, Rockwell Automation will provide a full-time, on-site Embedded Engineer for the required length of time.

Remote Support Services

Rockwell Automation’s Remote Support Services consist of a global customer support center network designed to provide real-time technical assistance 24x7x365. Through TechConnectSM Support, companies can directly access technical support specialists with fully equipped workstations and labs to simulate customer problems. For enhanced support of key

equipment, systems, and applications, TeamSupportTM Services provide a designated support team familiar with the system and application and the ability to remotely access it through a high-speed connection to expedite troubleshooting. TeamSupport360 Services add continuous remote monitoring of critical alarms and process parameters to facilitate troubleshooting and proactively identify potential problems and performance issues. This

Rockwell Automation Services & Support						
Predict		Prevent			React	
Assessment Services	Condition Monitoring	Asset Management Services	Safety, Network & Security Services	Training Services	OnSite Support Services	Repair Services
Plant Baseline Evaluation Services	Protection Systems	RAAMP – MRO Process Management	Network Design & Evaluation	Instructor-led Training	ProtectionPlus Startup Services	Remanufacturing Services
Installed Base Evaluation Services	Surveillance Systems	Spare Parts Management	Safety Services	Self-Paced Training	Extended Parts & Labor Warranty	Spare Parts Inventory Assurance Services
Integrated Performance Assessment Services	Portable Systems	RepairShield – Annual Repair Agreement	Security Program Development/Deployment	Competency Testing	PerformancePlus Preventive Maintenance	Exchange Services
Reliability Program Assessment Services	Sensors & Accessories				Conversion Services	RepairPlus Services
Safety Assessment Services	Condition Monitoring Services				Embedded Engineer	Renewal Parts
Controls Security Assessment Services					Callout Services	
Remote Support Services						
		TeamSupport360 Services	TeamSupport Services	TechConnect Support	E-Safe Support	

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Rockwell Automation’s scope of services is based on Predictive, Preventive & Reactive maintenance philosophies

method of supporting facilities/operations is especially cost-effective in situations where qualified staff is unavailable to continuously monitor and analyze equipment or the equipment is located in extremely remote, difficult to reach locations. Should a problem be identified, facility personnel are immediately notified and suggested corrective action is provided. Through this proactive response, problems are often resolved before a downtime situation occurs. This is especially important for oil and gas related processes that must function continuously. Performance improvement recommendations are made on an ongoing basis to optimize the Overall Equipment Effectiveness (OEE) and the process environment in which the equipment operates.

Network Services

Rockwell Automation also offers a full suite of Network Services, including baseline and annual performance evaluations, health checks, network validation and troubleshooting and repair. The Baseline Evaluation determines if an end user's architecture has the capacity to handle additional network traffic, the installation is within specification, and the performance of the network is within operational requirements. The resulting data provides a baseline of the current operating and physical status of the customer's network. Annual Performance Evaluations can be measured against the baseline evaluation to ensure continued optimal performance. They can act as an annual maintenance compliance assessment to ensure a smooth and long-term operation. These assessments are defined by scope and can range from a simple one-day/one-network evaluation to a full Baseline Evaluation.

The Network Health Check can be performed in one day, without interruption of production, and helps to ensure the reliability of automation networks prior to upgrades, expansions or in response to network issues. A systematic review of the network is conducted and the deliverable is a network score card, rating the five major characteristics of a network. The potential risk that the automation network may be imposing is realized and a recommendation on a remediation path forward is provided.

Network Validation is a comprehensive network analysis offered by Rockwell Automation that verifies the installation and operation of a network in comparison to network specifications defined by the associated governing bodies. The deliverable is a detailed report, including all measurements and testing results, analysis of results, summary of findings, and recommendations for remediation. Network Troubleshooting and Repair is a comprehensive look at an existing network to quickly identify and correct problems.

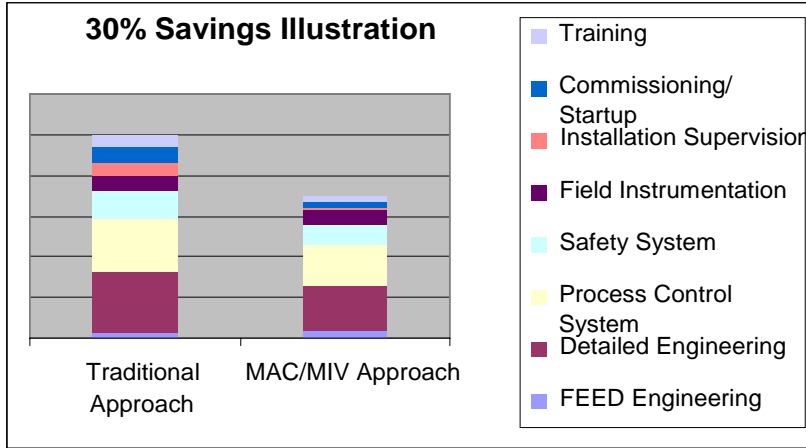
Key Relationships with OEMs on a Local Level

Having a relationship with key OEMs and skid mounted equipment manufacturers is key to success for any automation supplier competing in the oil and gas industry at the product level, particularly for drives and motor controls. Rockwell Automation already has a strong relationship with OEMs in the oil and gas industry and has made it a strategic initiative to form closer relationships with more OEMs on a global scale moving forward. These include skid manufacturers and pump and compressor suppliers.

Project Execution Capabilities

Project execution capabilities are becoming more and more important for automation suppliers as end users strive continuously to reduce overall project costs, reduce time to startup, and

reduce the number of interfaces they have to manage to execute a successful project. The concept of a Main Automation Contractor (MAC) for automation projects can provide considerable benefits. One major end user in the hydrocarbon industry, for example, has reported up to a thirty percent savings on MAC projects versus the traditional approach. Costs are reduced in nearly all areas of the project, from training to commissioning and installation. Rockwell Automation has the ability to



The MAC/MIV approach can result in project cost savings of up to 30%

network with its group of partners to be a main automation contractor for many oil and gas projects. Through the company’s partnership with Endress+Hauser, the company can provide a comprehensive automation solution for most upstream oil and gas applications from process instrumentation, analytical, and facility asset management to automation systems, drives, motor controls, and other products.

CACT Operator’s Group Uses Rockwell Automation Remote Services to Ensure Continuous Operation of Pumps

A consortium of China National Offshore Oil Corporation (CNOOC), Agip (Italy), Chevron (USA) and Texaco (USA), the CACT Operator’s Group was



CACT offshore platform

formed to develop hydrocarbon resources off the shores of China in the Pearl River Basin of the South China Sea. Initially, preventive maintenance was CACT’s standard approach to keeping the pumps online. However, the effectiveness of CACT’s maintenance system was limited. CACT was forced to react to equipment problems that went undetected during routine inspections.

To improve their system, CACT began to use Rockwell Automation products to monitor the pumps on three of its offshore platforms in the mid-1990s. Initially, CACT based their system on portable equipment, including Entek®

Datapac® and the Allen-Bradley VISTeC®. Emonitor® software was used to store the data from the DataPac portable data collector.

To implement any needed repairs, CACT contracted for maintenance through a third party at a charge of \$100,000 per year. Initially, CACT was pleased with the performance of their offline, portable system, but there were limitations. The data acquisition process itself could be very costly (\$2,000 per visit). Yearly transportation expense exceeded the installation cost of the new online system. Finally, the current offline system could not provide real-time pump protection outlined by the American Petroleum Institute (API) Standard 670.

CACT required a new system that would provide real-time equipment monitoring, API 670 compliance, and contain their maintenance costs. Rockwell Automation worked closely with CACT to develop a remotely

accessible solution that would meet their needs and preserve the initial investment. Via an onboard Ethernet network, the Enwatch® system provided scheduled monitoring of all the pumps on the platform. Measurement parameters include vibration and process variables. On the same network, XM

intelligent modules process critical parameters used to assess current health and predict future health of the pumps in real-time. Designed for critical machinery, the XM® system includes protection capabilities, which can be used to safely shutdown a machine before significant damage occurs.

Appropriately configured, the XM system meets the API 670 standard. CACT operators onshore can remotely configure the XM modules via a DeviceNet network and view the equipment status through PlantLink, a user-friendly interface that provides a graphical representation of the health of all the machinery being monitored online.

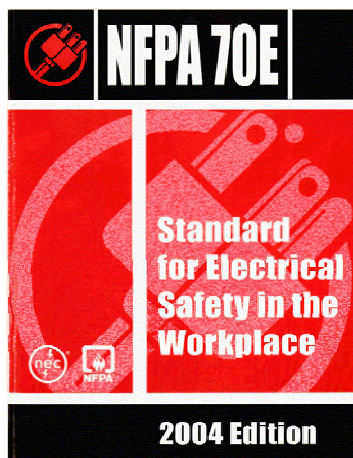
With the new condition monitoring system in place, CACT eliminated the need for manual data acquisition, and the associated costs. Since applying the Enwatch and XM systems, CACT has reduced their unscheduled downtime from 2.43 percent to 0.67 percent — a 72 percent decrease. During a five-year period, the system has prevented machines from catastrophic failures more than 20 times. Due to a Condition-based Maintenance strategy, annual maintenance expenses have also decreased \$100,000 annually.

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Standards-Based Automation Promotes Choice & Eases Regulatory Compliance

ARC defines standards as detailed descriptions of technological functionality certified by an international independent organization in the area where followed, it will take a long time to recover because your destiny is in someone else's hands. Choices should broaden, not limit, future options. Standards promote choices.

Standards supported by the Rockwell Automation Integrated Architecture system include IEC 61131-3 for programming and configuration and ISA-88 structures for batch and procedural applications. ISA-95, the international standard for the integration of enterprise and control systems, is supported as well. In the realm of networking and device connectivity, Rockwell Automation supports Foundation Fieldbus, HART, EtherNet/IP, DeviceNet, and ControlNet protocols, as well as in the Field Device Tool (FDT) Group, and is represented in board level positions within their supporting organizations. The company has also been a long-time supporter and board member of the OPC Foundation and embraces OPC UA (Unified Architecture) for open interoperability between the plant floor and the enterprise.



Many regulations are designed to promote worker safety. To address this, Rockwell Automation offers both low and medium voltage MCC arc flash solutions. A key differentiator for their medium-voltage MCC with ArcShield™ is that it maintains Type 2 protection in accordance with IEEE

C37.20.7. However, the ArcShield option does not take away the user's responsibility to conduct arc flash hazard analysis, override company safety policies or procedures, or eliminate Personal Protective Equipment (PPE) requirements. PPE requirements are in accordance with the National Fire Protection Association's NFPA 70E electrical safety standard developed in response to a request by the Occupational Safety and Health Administration (OSHA) for a standard that addresses safe work practices intended to protect workers from electrical hazards.

Any controls used to ensure the safe operation of equipment in a hazardous area falls within the scope of ATEX (ATmospheres EXplosibles). It considers potentially explosive concentrations of gas, vapor or mist in the air, and

dust for both electrical and mechanical sources of ignition. It establishes minimum requirements for improving the protection of personnel from explosive atmospheres. ATEX covers a wide range of applications, including equipment used on fixed offshore platforms, petrochemical plants, mines, flour mills and other areas where a potentially explosive atmosphere may be present. To address this issue, Rockwell Automation has developed certain PowerFlex 700 AC drives to be ATEX-certified, as well as their condition monitoring devices and accessories designed to collect and analyze data.

Environmental Compliance

Maintaining an environmentally compliant oil and gas operating process remains a critical, but challenging achievement today. As environmental regulations evolve to achieve higher standards, many regional non-attainment response programs have set increasingly tight targets toward reductions from today's emissions. It was recently reported that 85% of the US refining capacity are under some sort of consent decree negotiated with the EPA. With the recent acquisition of Pavilion Technologies, Rockwell Automation can offer unique solutions for two critical needs in air emissions compliance and reporting. REM (Real-time Environmental Management) provides an active compliance, auditable system of record on emissions with advanced capabilities that includes predictions on emissions based on inputs such as an operating plan. It supplies broadly available information on emissions, compliance position and provides automatic alerts on issues. This information is becoming increasingly important in day-to-day operating decisions, and therefore a critical element in processing management in oil and gas.

A second solution deployed in many oil and gas operations is Pavilion Technologies' patented, industry-leading SoftwareCEM also known as PEMS (predictive emissions monitoring system). SoftwareCEM is a software-based solution that is reliably more cost effective than frequently troublesome hardware-based CEMS (continuous emissions monitoring systems).

Availability & Safety: Protecting Assets & Avoiding Shutdown

Asset and system availability along with process uptime are more important than ever in the oil and gas industry. Unplanned downtime and the inability to respond effectively to critical situations are the bane of the process industries. According to NIST (U.S. National Institute of Standards and Technology), for example, the inability of control systems and operating personnel to control critical conditions costs the U.S. economy at least \$20 billion a year.



Safety has moved to the forefront of critical topics for manufacturers in recent years. An increased awareness of the importance of safety in automation systems has resulted in a boost in markets for both process safety and machine (discrete) safety components and solutions. In addition to ensuring worker safety, manufacturers are starting to recognize significant business benefits resulting from well

thought out, intelligent safety systems. Several factors are driving this awareness. Most important of these is the need for manufacturers to avoid abnormal situations that can threaten the environment. This is a particular concern in the oil and gas industry, where recent incidents have cost the industry billions of dollars. From a business perspective, increased safety makes sense for several reasons, including the belief that integrated safety systems can reduce downtime and increase Overall Equipment Effectiveness (OEE).

Companies can leverage the domain expertise of Rockwell Automation and its partners, and a broad portfolio of controllers, instrumentation, condition monitoring equipment, alarms and safety services, to implement scalable safety solutions globally. This protection can also improve uptime and help customers prevent abnormal situations. Regardless their location, oil and gas companies that work with Rockwell Automation can effectively meet their safety standards and reduce their risk.

Enabling Remote Operations: Moving People Out of Harm's Way

Facilities today are stretched for skilled personnel. The combination of fieldbus, advanced diagnostics, and emerging technologies for application of wireless technology in plant environments is providing a path for many

The Human Cost of North Sea Production Provides a Powerful Argument for Remote, Unmanned Operations (Source: BBC & UK HSE)

- 2006/07 No fatalities, 7 major injuries
- 2005/06 One fatality, 28 major injuries
- 2004/05 No fatalities, 27 major injuries

users to implement remote operations, particularly in industries such as offshore oil and gas production.

The oil and gas industry is especially concerned with the transition to remote or "lights out" operations. Many of the operations in the oil and gas industry are conducted in remote locations that pose a potential hazard to life and limb. From offshore platforms in the North Sea, or the

hurricane-prone gulf coast, to Alaska's North Slope, there is a big advantage to building a strategy for remote operations.

Many of the leading end users in the oil and gas industry are building offshore platforms specifically to operate with a minimum core crew. This reduces logistics and support while minimizing the exposure to offshore hazards. End users are striving to leave offshore control rooms unmanned, if only for part of the time, so operators can be doing tasks in and around the plant or facility.

Fieldbus is a key enabler to remote operations in the oil and gas industry. Remote diagnostics and maintenance capabilities continue to be primary selection criteria for most users that purchase fieldbus-based control systems. Most users see remote diagnostics as a way to save on labor costs because they can avoid sending maintenance personnel on needless trips to the field to check or diagnose problems with instrumentation without the benefit of remote diagnostic data.

Another critical enabler for cost effective remote operations in the oil and gas industry is the fault tolerant design of the process safety systems and the ability to maintain these systems online without requiring a shutdown.

The efficient and secure operation of these remote resources requires close monitoring. The Rockwell Automation Integrated Architecture system offers a way of meeting all these demands at three capability levels: remote

automation, monitoring and safety, and connectivity to enterprise information systems, with specific solutions to meet remote operation challenges.

Endress+Hauser Partnership Brings Fieldbus and Facility Asset Management Capabilities to the Forefront

Rockwell Automation's partnership with Endress+Hauser is the focal point for their fieldbus and Plant Asset Management strategy. It involves joint research and development between the two companies, as well as fieldbus

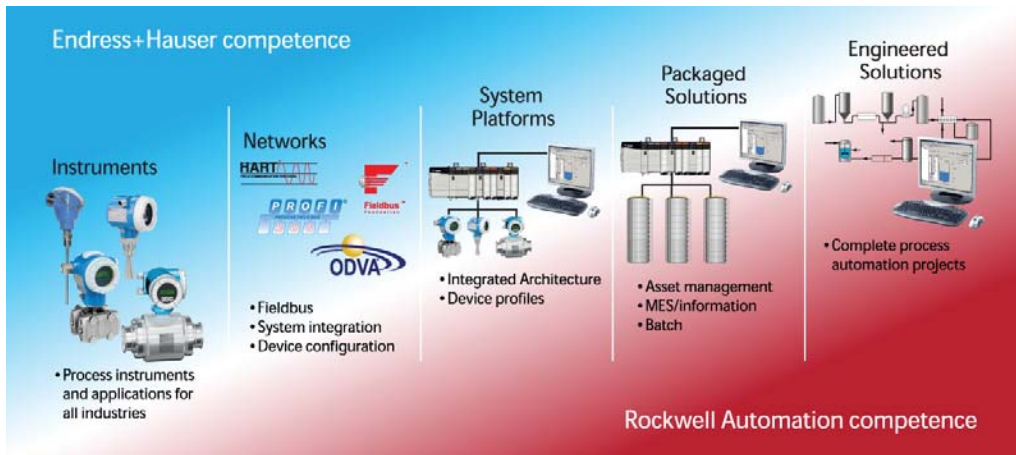
interoperability testing, and encompasses the integration of Rockwell Automation's own devices, such as drives, into a complete facility asset management solution. The overall mission of the alliance is to combine field instrumentation with fieldbus networks such as Foundation Fieldbus, Profibus, and HART,

with asset management capabilities and Rockwell Automation's system capabilities to provide a total engineered solution that is both seamlessly integrated and pre-tested for interoperability.

An Integrated Asset Management Solution

Rockwell Automation offers a broad asset management solution called FactoryTalk AssetCentre, which is an integrated asset management solution that provides configuration and calibration, predictive and preventive maintenance, and advanced diagnostics tools that reach from the process field device level to other devices in the facility such as drives, PLCs, PACs, robotics, and the process automation system itself.

Rockwell Automation and Endress+Hauser are supporters of the Field Device Tool/Device Type Manager (FDT/DTM) technology that provides a single interface to devices residing on multiple field and control networks. FDT/DTM functionality is being driven into the joint Rockwell Automation/Endress+Hauser solution in the form of an FDT container that supports DTMs. Both Rockwell Automation and Endress+Hauser support



Rockwell Automation's partnership with Endress+Hauser extends beyond field devices to include Networks, Asset Management & Solutions

standard bus technology and have board level positions on the Fieldbus Foundation, HART Communication Foundation, and FDT Group.

Rockwell Automation and Endress+Hauser also support Enhanced Electronic Device Description Language (EDDL), which is used to describe and present the various characteristics and parameters of intelligent, fieldbus and HART-compatible devices. The OPC Foundation has also announced its support in the continued effort to enhance and standardize EDDL, providing a much-needed interface for upper level software applications.

Interoperability Testing Eliminates Integration Headaches

Interoperability between fieldbus-compatible devices and system hosts requires testing, and Rockwell Automation has established device interoperability testing centers along with Endress+Hauser to ensure a maximum level of interoperability between Endress+Hauser devices and Rockwell Automation products, systems, and applications. After testing, devices are given interoperability statements for certain version levels of Rockwell Automation platforms. Many Endress+Hauser devices are currently being tested, while several Foundation Fieldbus and HART devices have already been tested and Interoperability Statements issued. Internet listings of tested devices, links to DDs or DTM files, are available for download. Rockwell Automation has published interoperability statements on its web site.

On the system side, Rockwell Automation is executing system tests for Foundation Fieldbus and HART devices in a large process automation system configuration. The test system plans have been exchanged, reviewed, and approved by each company, and a large test bed is currently in place. This was an important step for Rockwell Automation to become a full-scale fieldbus solutions supplier. The company's heavy emphasis on interoperability testing will not only reap benefits in terms of the company's relationship with Endress+Hauser, but will also provide benefits for any Rockwell Automation fieldbus implementation project involving instrumentation from the various field device suppliers.

Building High Availability & Safety into the Integrated Architecture System

One of Rockwell Automation's advantages is that it has been making control hardware for use in harsh industrial environments for many years. Logix I/O and controllers are highly durable and can be mounted in harsh environments outside the control room. Another key advantage is that Rockwell Automation has a very large installed base, with thousands of

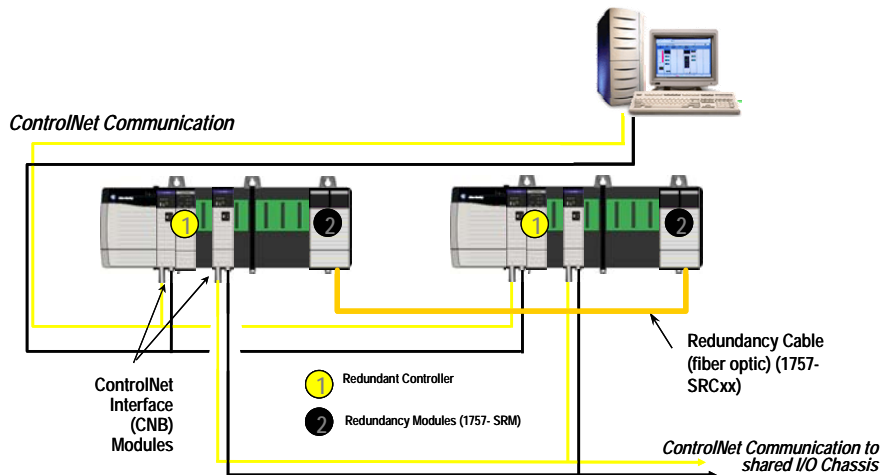
systems running in virtually all manufacturing industries. This makes it easier to find personnel trained to program and maintain Rockwell Automation systems.

The recent creation and adoption of new performance based safety standards such as IEC 61508 and IEC 61511 has led to the need for solutions to meet these new non-prescriptive requirements. Adoption of the

standards has required quantifying the "risk" and reducing it to an acceptable level. The risk requirement is quantified as one of four Safety Integrity Levels (SILs). Process safety standards such as IEC 61511 and its predecessor ANSI/ISA-84 identify layers of protection to mitigate the risk.

One way to mitigate risk is through use of an independent Safety Instrumented System (SIS). To meet these new requirements, Rockwell Automation had TÜV certify ControlLogix for use in up to SIL 2 applications. Rockwell Automation has developed a SIL 3-rated 1oo2 offering called GuardLogix®. The company provides a redundant version of ControlLogix® for implementing high availability, which can be used in fault tolerant applications of the SIL 2 ControlLogix and I/O. These same High Availability and SIL rated offerings are available for the ControlLogix when it is used as a basic process control system (BPCS).

The controllers support full redundancy, avoiding a single point of failure. No extra programming is required for redundancy, which minimizes engineering effort. Automatic program synchronization eliminates the need to maintain separate programs for the primary and secondary controllers.



Integrated Architecture controllers support full redundancy & avoid single point of failure

Integrated Architecture controllers and I/O also offer high availability, supporting runtime edits for tags and logic. One feature that benefits users of highly available systems is the ability to upgrade the controller firmware and control strategies while a system is running.

Acquisition of ICS Triplex Brings Safety & SIL 3 Expertise

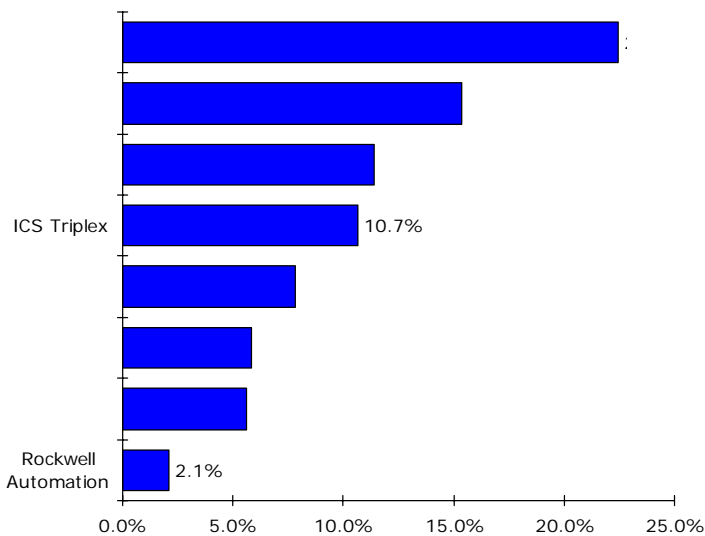
Rockwell Automation recently acquired ICS Triplex, a leading global supplier of safety and critical control solutions (SCCS) to process industries.

With 40 years of experience, ICS Triplex develops, delivers and maintains products and solutions for high availability, fault-tolerant applications in process industry segments worldwide.

ICS Triplex will continue to operate under the name “ICS Triplex - A Rockwell Automation Company” with more than 500 employees and operations across Europe, the Middle East, Asia and North America. ICS Triplex provides engineering services, products, and solutions for industries that demand high reliability for SIL3/SIL2 applications, coupled with the highest possible availability throughout the system

as well as fault tolerance and online repair... These industries primarily include oil and gas exploration, production, transportation, and refining as well as chemicals and power generation.

Increased demand for oil and gas due to the economic growth of China and India, along with the other BRIC (Brazil, Russia, India and China) countries, is fueling investments in oil and gas production and in refining, leading to increased demand for safety systems. With the acquisition of ICS Triplex, Rockwell Automation will gain a strong foothold in the oil and gas, chemical, and power generation industries and will significantly improve their capabilities in the fast growing process safety systems and services market.



The acquisition of ICS Triplex makes Rockwell Automation the third largest process safety system supplier worldwide
 Source: ARC Global Market Shares of Safety System Suppliers (Other supplier names removed)

ArcFlash Protection Capabilities a Prime Differentiator

Another area of focus for Rockwell Automation is arc flashes, which are concentrated radiant energy that explodes inside electrical equipment and are responsible for a substantial portion of electrical-related injuries. Arc-flash incidents are caused by arcing faults, which can cause current to travel out of its normal path and can happen in a fraction of a second. The incidents can injure workers near the arcing fault, even if they are not working directly on the equipment. Injuries associated with arc flashing are burns resulting from high levels of heat and intense pressure associated with the incident. When you are dealing with an offshore platform, the issue is compounded due to the remote location and lack of facilities available.



An Arc Flash can have an impact of more than \$15 Million in direct and indirect costs to a company

To address this issue, Rockwell Automation developed both low and medium voltage MCC arc flash solutions. Their CENTERLINE 2100 Motor Control Center (MCC) with ArcShield option provides arc flash protection in a low-voltage MCC up to 600 volts. ArcShield features a reinforced enclosure and special arc-containment door latches that allow internal pressure relief and help keep the doors from unlatching during an arcing fault. ArcShield also uses a lower horizontal bus rating (maximum 1,200 ampere bus) and main fused disconnects with specific current-limiting protection to reduce the amount of let-through energy.

Rockwell Automation also offers the CENTERLINE with ArcShield medium-voltage (up to 7,200 volts) MCC. To protect personnel, the design redirects arc flash energy out relief vents at the top of the unit through an overhead plenum. To contain the pressure blast and add to security, the ArcShield controller's cabinet and doors are reinforced with 12-gauge steel, multipoint latches and robust door hinges.

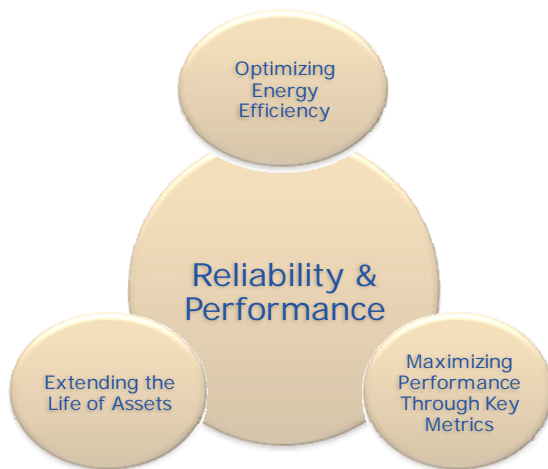
Many arc flash incidents result from mistakes made while servicing the equipment, such as dropped tools or improper work practices. Rockwell Automation's IntelliCENTER Technology for both low voltage and medium voltage MCCs further enhances arc flash safety by enabling remote access to motor control devices. Oil and gas facility personnel can configure, monitor, and troubleshoot equipment without the need to enter the MCC room,

room, eliminating the risk of arc flash injury commonly associated with such activities.

Rockwell Automation ArcFlash Services can help reduce the risk of employee injury from electrical arc flash/ blasts and the associated release of excessive heat energy, fire, molten materials, flying shrapnel, and vaporized solids that can be inhaled. Rockwell Automation Arc Flash Services include Electrical Power Systems Analysis, Arc Flash Safety Training, Short Circuit Current Analysis, Overcurrent Protective Device Coordination Analysis, Hazard Analysis and Mitigation and On-line Diagrams.

Reliability & Performance: Running Critical Assets Optimally

Mass quantities of precious fossil fuel require large, critical assets that need to run continually. Any disruption of the supply chain creates a strain in the market and lost opportunities. Pumps, compressors, control systems and instrumentation need to be in top condition at all times to ensure throughput and uptime. With a drive toward remote operations, much of today's critical equipment exists in remote or inaccessible locations, making it a challenge to monitor system health and ensure reliability.



While many oil and gas facilities, such as offshore platforms and refineries, are process-intensive and highly automated, other links in the production and supply chain have deployed automation technology more sporadically. When oil prices were lower, large investments in process automation on pipelines (both midstream and

downstream) could not be justified—and relying on field workers (and their clipboards) to do the job was good enough. At prices approaching \$100 per barrel, saving every drop of oil counts. End users need real-time monitoring and control over production and pipeline assets because every minute of uptime counts, and lost production time carries costly consequences. Rockwell Automation offers several avenues for oil and gas

industry end users to keep process running optimally, extend the life of critical assets, and achieve optimum energy efficiency.

Power Management Systems Optimize Energy Efficiency

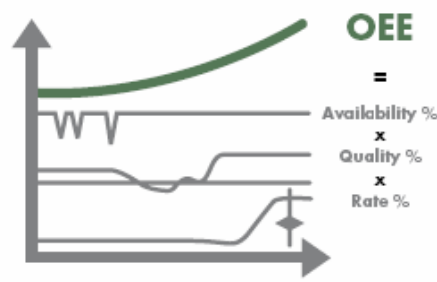
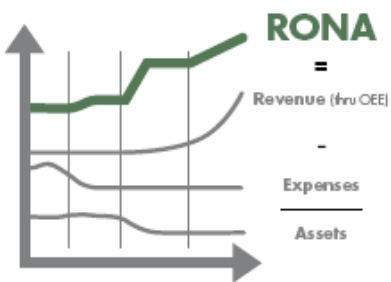
Rockwell Automation’s Power and Energy Management Solutions (PEMS) business has had success in several major oil and gas projects over the past several years and continues to grow. Rockwell Automation offers strong capabilities in emergency load shedding and can monitor the quality of power being distributed to a plant, facility, or offshore platform in real-time.

The company offers specific energy monitoring and management tools that are key elements of their Intelligent Motor Control solutions and Integrated Architecture system. Load Profiling measures and records energy use, then stores that information which can be to verify electric bills, negotiate a better rate structure, and identify opportunities for demand management. Users can often reduce energy costs after accurately profiling their energy load. Distribution System Monitoring identifies equipment that may be approaching failure and as a result, can reconfigure electrical system topology and manually limits demand by shedding loads or increasing generator output. Power Quality Monitoring pinpoints the cause of failures of motors and drives, and can be used to negotiate better service from utilities and identify the need for power factor correction.

Services & Solutions Capabilities Tied to Key Performance Metrics

End users in the oil and gas industry are trying to drive the maximum performance out of their installed assets. The value of assets in the oil and gas industry, from pumps and compressors to valves, is enormous. Key metrics

being used include Return on Net Assets (RONA) and Overall Equipment Effectiveness (OEE), both of which are critical contributors to the overall goal of achieving Operational Excellence (OpX). The nemesis of many manufacturers is unscheduled downtime – unexpected stoppage resulting from equipment failure, operator error or nuisance trips. Leading manufac-

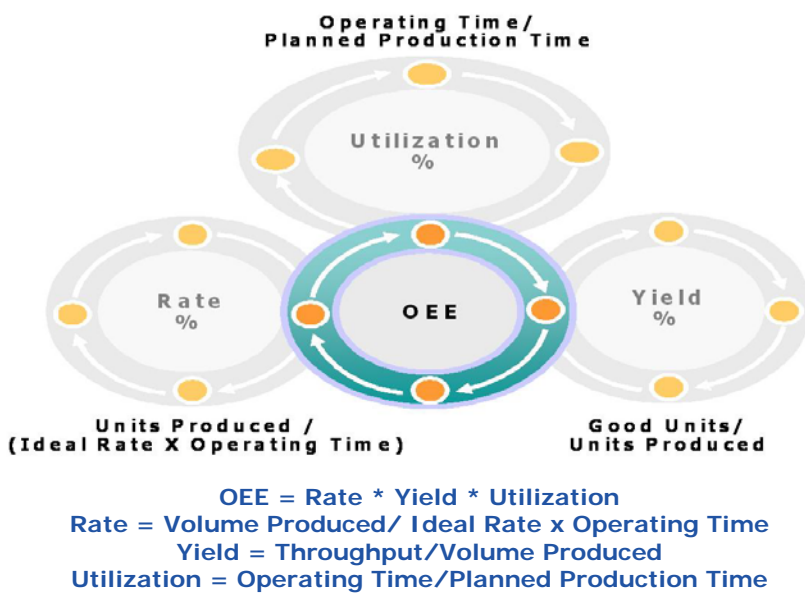


Return on Net Assets (RONA) & Overall Equipment Effectiveness (OEE) are good measures for the success of a maintenance strategy

tures will have an OEE of between 85 to 90 percent. Many manufacturers, for example, operate with an OEE of only 65 percent. Each percentage increase in OEE will increase the total output of the facility by an equal amount without increasing fixed costs.

Rockwell Automation provides services and products to implement an OEE system that will help companies improve operations and increase efficiency. Rockwell Automation helps end users identify business drivers for implementing an OEE system. This includes looking at the major problems of meeting demand/delivery dates and controlling operating costs. Data from processes and equipment is then used to measure efficiency, analyze operations, and determine methods to improve operations.

In Rockwell Automation's view, any good OEE system installed must be designed from the top down, with the flexibility to answer business problems.



This may be accomplished by calculations in a PLC or PAC with a panel display, or it may require development of an information-enabled architecture to collect the data in a central repository for reporting and analysis. The installation of a data collection system allows a company to review past operations and determine trends in efficiency. Another approach is to have a service organization or consultant observe operations and collect data for a fixed interval (2-3 days), although this approach only provides a snapshot of operations and not the complete picture of the system over time.

After installation of the system, information is collected from the production process to prepare a baseline for measuring progress. This allows the company to see its progress and be able to understand the value received from the system. The collected data is then analyzed to give the company an understanding of what is happening in their production process.

The different items analyzed include downtime analysis, where the equipment with the greatest amount of downtime and the reasons or faults that caused the downtime are analyzed. These can be corrected by improving maintenance, changing operation, adjustment of the equipment, or re-

placement. If the downtime is great enough, purchase of a new piece of equipment can be justified. Each piece of equipment has a recommended speed for process operation. By reducing the speed, downtime decreases, but the equipment does not produce as much product. The relationship between optimal speed or equipment settings, downtime, and output must be studied and optimized.

After the major causes for efficiency loss are determined, the oil and gas user can implement procedures to mitigate the contributing factors. They must continue to analyze the data to insure that they are seeing improvement. They can accomplish this by comparing results to the baseline that has been created.

Inferred Quality Models and Model-Predictive Control Optimize Operational Performance

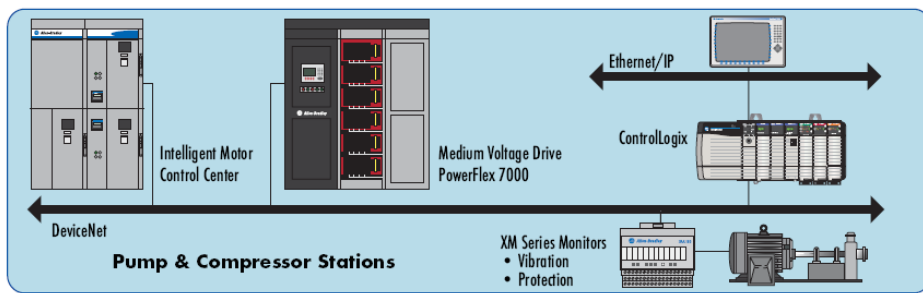
Operating with direct feedback on process analytics has always provided tighter process performance because control decisions can be made more directly based on control objectives and be on-spec at highest efficiency. The oil and gas industry has always been an innovator in leveraging process analytics and model predictive control. Pavilion Technologies and Rockwell Automation have a unique legacy on high fidelity, inferred property models of process analytics without analyzers (cloud point, freeze point, 95% boiling point, etc). These Soft Sensors® have broad use in refining, hydrocarbon chemical processing and gas processing. They can be leveraged in direct quality control, most valuable in combination with performance targets on capacity, yield or energy efficiency. Model predictive control was invented in oil and gas and has a long legacy of success. While many standard processes have already deployed solutions, there remains a broad array of more difficult process optimization opportunities that are well suited for solutions such as Pavilion's established nonlinear control application. This includes solutions from gasoline blend quality control to crude switch. The integrated solution suite of Pavilion, combined with the Rockwell Automation Integrated Architecture system, offers a more maintainable advanced control solution than many alternative technologies.

ARC believes that a key technology to effectively implement a Supply-Chain solution answer is model predictive control, and therefore is a critical technology to evaluate in integrated process operations within the oil and gas industry.

Condition Management & Plant Asset Management Extend Asset Life & Significantly Reduce Costs

Embedded within its Asset Management Services, Rockwell Automation Repair Services include remanufacturing and exchange services, as well as renewal (replacement) parts and custom manufacturing for products that are no longer mass-produced. Seventeen ISO 9000/14000 certified global remanufacturing locations perform repairs on Allen-Bradley and third-party products. Rockwell Automation Advance Remanufacturing and Advance Exchange services consist of over 15,000 remanufactured Allen-Bradley catalog items inventoried at nine global part hubs for expedited delivery (Advance Remanufacturing: 3-5 days - often within 72 hours; Advance Exchange: next day).

Rockwell Automation also offers condition monitoring services, including Reliability Services, Data Collection and Analysis Services (vibration, infrared thermography, oil), Condition-based Maintenance (CbM) Program Development and Deployment and Engineered Project Services.



Rockwell Automation's Intelligent Motor Controls, Drives, and Condition Monitoring at a pump or compressor station

Oil and gas producers use condition monitoring to help lower inventory costs, reduce spare parts, schedule maintenance, boost availability, increase capacity and throughput, reduce unplanned downtime and planned downtime duration, lower meantime to repair (MTTR), and improve safety

and quality. Condition monitoring data can be used with CMMS and other facility floor systems as part of an overall Condition-based Maintenance program with the added benefit of combining pertinent data from the control system for improved predictive analysis.

Long-term support for products and solutions to help customers maximize return on assets has been a tradition at Rockwell Automation. This support includes continuous upgrades to current product and worldwide service and support. It also involves helping customers understand when they should consider upgrading individual pieces of equipment through Silver Series advance notifications that indicate when a product is scheduled to be discontinued or through the Custom Classics program that allows custom-

ers to continue to purchase select products that are no longer mass produced but are custom made.

The aging asset base in the oil and gas industry, combined with the cost and production risk associated with system upgrades, have pushed manufacturers to view migration decisions as an integral part of their long-term competitive strategy. By combining its industry, technology, and project management expertise, Rockwell Automation has positioned itself to help oil and gas companies develop migration solutions that dovetail with their individual needs. The solutions provided can include technical migration enablers and practices that allow phased migration approaches to help reduce short-term production risk and budgeting costs. These approaches allow oil and gas companies to migrate the segment of their facilities that has the greatest impact on increased performance while mitigating production risk, further increasing their financial return on investment. Migration solutions are available for Rockwell Automation and non-Rockwell Automation equipment allowing oil and gas customers to focus on a complete solution.

System Integrator Partners with Rockwell Automation for Energy Efficiency

Bantrel is a leading engineering, procurement and construction company providing multidiscipline engineering, project management, procurement and construction services to the petroleum, petrochemical, gas and power, and oil sands industries in Northern Canada. To meet its reliability, maintainability and efficiency requirements, Bantrel worked with Rockwell Automation to create a new system using advanced control technology, including an Allen-Bradley CENTERLINE 2100 Motor Control Center (MCC) with IntelliCENTER Technology and an Allen-Bradley Redundant ControlLogix PAC System. Resistance temperature detectors (RTDs) which are used to monitor pipe and vessel temperatures are wired to 1794 Flex I/O modules. The modules are then connected to the ControlLogix PAC system via ControlNet. DeviceNet is used within the MCCs for load control and system monitoring.

Ensuring a high level of reliability was important due to the millions of dollars lost by the industry in the last several years from EHT systems failures.

By leveraging the benefits of Rockwell Automation Integrated Architecture, and the E3 Plus relay and IntelliCENTER Technology, Bantrel and Rockwell Automation customers can quickly realize savings using standard control components and reduced wiring and installation costs of the new EHT sys-

tem. Power and RTD cable is reduced by more than one-third, which in turn cuts long-term maintenance costs.

Increased safety is another benefit. Low voltage MCCs are inherently safer than conventional EHT control systems as the main disconnecting means is integral with the contactor wrapper unit. In addition, conventional EHT control systems do not offer the safety features associated with draw out MCC style metal-clad control gear. Traditional systems are plagued by failures, but the combination of proven ControlLogix and Flex I/O, used in conjunction with CENTERLINE MCCs with IntelliCENTER Technology for this EHT solution, greatly increases the overall system reliability.

Strengths & Challenges Moving Forward

Rockwell Automation is leveraging its entire portfolio of products, services and software to grow its business in process automation systems. Rockwell Automation already has a large presence in the industry through its motor control businesses, and the oil and gas industry has always been a major customer. Today, Rockwell Automation has identified the oil and gas industry as a strategic objective for its process automation business, and has already had many success stories worldwide. Specific areas of success include offshore platforms, onshore production, lube oil blending, and SCADA for oil and gas pipelines. The major process automation system players should consider Rockwell Automation as a formidable global competitor in the years ahead.

The recent Rockwell Automation acquisition of Pavilion Technologies will provide some valuable inroads into advanced applications for oil and gas. As the cost of discovery declined, companies exploited production in the early lifecycle phase of a reservoir and moved on to find new reservoirs. However, with limited new discoveries of easily exploited reservoirs, the emphasis is shifting to extending the productivity of mature fields. Through its partnership with Landmark, a brand of the Halliburton Digital Consulting Solutions Division, Pavilion is providing important technology to advanced the digital oil field of the future and increase the productivity of a reservoir throughout its entire lifecycle.

Landmark is embedding Pavilion's modeling, control, and optimization technology engine into their DecisionSpace Production solution to develop

a real-time integrated optimization model, which incorporates the reservoir, wells, gathering network, and production facilities. This integrated production operations solution facilitates collaboration by providing holistic asset information, a decision support system, and automated workflow to help companies optimize production. The approach overcomes traditional modeling problems associated with sub-surface and production dynamic mismatch. The solution is intended to highlight interdependencies that occur across multiple disciplines and various touch points along the value chain, thus enabling the dissemination of relevant and accurate real-time results of various scenarios and alternatives based upon actual reservoir and production facility conditions.

Rockwell Automation does have some challenges. In the oil and gas automation system marketplace, the top tier of suppliers controls a significant

Rockwell Automation has identified the oil and gas industry as a strategic objective for its process automation business, and has already had many success stories worldwide.

portion of the market, with long held installed bases of DCS systems and instrumentation. Rockwell Automation must continue to provide a superior business value proposition that gives oil and gas users a reason to migrate to

their solutions outside of their traditional strong position in drives and MCCs. Another challenge for Rockwell Automation is to focus on competitive differentiation of their Intelligent Motor Control solutions in applications that do not leverage their Logix Control Platform and Integrated Architecture system.

ARC is a strong advocate of the philosophy that increased safety results in increased productivity. Oil and gas companies who invest in solutions that advocate workplace safety as well as asset monitoring and management will see returns on investment and assets that can be made immediate based on just one incident or incident avoided. ARC feels that Rockwell Automation has a very competitive offering in this area for oil and gas customers. Rockwell Automation's acquisition of ICS Triplex has strengthened the company greatly. They need to continue to ensure that their customers clearly understand that "increased safety, combined with increased availability, results in increased productivity".

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Acronym Reference: For a complete list of industry acronyms, refer to our web page at www.arcweb.com/Community/terms/terms.htm

API	Application Program Interface	ERP	Enterprise Resource Planning
APS	Advanced Planning & Scheduling	HMI	Human Machine Interface
B2B	Business-to-Business	IT	Information Technology
BPM	Business Process Management	MIS	Management Information System
CAGR	Compound Annual Growth Rate	MRP	Materials Resource Planning
CAS	Collaborative Automation System	OpX	Operational Excellence
CMM	Collaborative Manufacturing Management	OEE	Overall Equipment Effectiveness
CNC	Computer Numeric Control	OLE	Object Linking & Embedding
CPG	Consumer Packaged Goods	OPC	OLE for Process Control
CPAS	Collaborative Process Automation System	PAC	Programmable Automation Controller
CPM	Collaborative Production Management	PLC	Programmable Logic Controller
CRM	Customer Relationship Management	PLM	Product Lifecycle Management
DCS	Distributed Control System	RFID	Radio Frequency Identification
EAI	Enterprise Application Integration	ROA	Return on Assets
EAM	Enterprise Asset Management	RPM	Real-time Performance Management
		SCM	Supply Chain Management
		WMS	Warehouse Management System

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