Building Applications Knowledge Can Unlock Value In Pump Selection

LEVERAGING THIS EXPERTISE SOLVES CUSTOMER PROBLEMS AND CREATES A SUSTAINABLE COMPETITIVE ADVANTAGE

By Nate Maguire
PSG®, a Dover Company

Executive Summary

Industrial manufacturers in the United States and around the world are facing an increasingly challenging operating environment. Such hard-to-control factors as energy price volatility, increased regulatory costs and public demands for improved environmental stewardship regarding the use of scarce natural resources are among the most notable ways that the pressure to perform reliably, cost-effectively and safely is growing. To combat and overcome these challenges, industrial operators are discovering that applying applications expertise when selecting critical equipment, such as pumping systems, can help meet operational performance standards that will only continue to get stricter in the future. When properly deployed in pump-system selection, applications expertise – defined as "specific knowledge pertaining to the use of certain products in certain conditions" – can enable the operator to unlock additional production value and build more precise and bottom-line-friendly manufacturing processes.

Building Applications Knowledge Can Unlock Value In Pump Selection

LEVERAGING THIS EXPERTISE SOLVES CUSTOMER PROBLEMS AND CREATES A SUSTAINABLE COMPETITIVE ADVANTAGE

By Nate Maguire

Wilden® Original™ Series Air-Operated Double-Diaphragm (AODD) Pumps in operation at a ceramic plant in Spain.

In industrial business-to-business equipment markets, manufacturers are faced with an increasingly difficult operating environment. Energy price volatility, the increasing costs of regulatory compliance, and public demands for improved environmental stewardship in regards to scarce resources are three prominent factors that are now impacting industrial organizations in the United States and around the world.

In confronting these challenges, manufacturers are having to adapt in numerous ways, including investing in next-generation technologies. For example, industrial producers, such as paint and resin manufacturers or oil-and-gas refinery operators, are investing in advanced technologies that will help them achieve their business goals. Smart SCADA systems can reduce downtime though proactive monitoring, and energy-efficient pump technology delivers operating cost savings, hedges against energy-price fluctuations and helps companies meet their environmental stewardship goals by reducing carbon emissions.

However, the adoption of any new technology can dramatically increase the complexity of business operations at a time when cost pressures and economic headwinds threaten to curtail growth and profitability. Further, these technology investments require knowledge and expertise – specialized knowledge and expertise – to build, operate and maintain. Many industrial producers, like most businesses, face resource constraints and are operating with leaner staffing levels than ever before. As a result, they are finding they don't possess the in-house expertise to effectively select, build, operate and maintain increasingly complex equipment and systems, and often are forced to turn to third-party organizations with specialized expertise for support.

Pump manufacturers in particular, along with their related distributors, engineering firms, consultants and other third parties, are increasingly stepping up to supply this critical applications expertise to their end-user customers. This white paper will illustrate how properly deployed applications expertise can unlock value for industrial producers, and makes the case that organizations that build superior applications expertise in their markets can gain a significant competitive advantage.

The Challenge

Industrial manufacturers are facing an increasingly difficult business environment, one that is often impacted by these and other critical factors:

- Energy-Price Volatility
- Regulatory Compliance Legislation and Associated Costs
- Public/Customer Expectations for Enhanced Resource Stewardship

Lets take a look at all three.

Energy-Price Volatility
Price volatility is defined in the energy industry as how quickly or widely electricity and/or natural gas prices change over a given time period. Prices are governed by supply and demand, where demand is impacted by factors such as weather patterns, economic conditions and consumer behavior. In recent years, price volatility has increased in the energy market. To protect against this volatility, many companies "hedge," or buy a commodity at a price that is locked in over a set period of time. While this may improve peace of mind for the operator, hedging is costly and doesn't create value for the operator beyond reducing energy-cost volatility.

The severity, and potential impact, of price volatility is such that in its 2015 report titled, "The New Normal,"[1] the World Energy Council (WEC) opined that, "The uncertain impact of volatile energy and commodity prices…has now established itself as the number-one issue for energy leaders worldwide."

The good news is that global energy leaders have recognized this challenge and are beginning to take measures to address it. According to Francois Moisan in WEC's triennial 2016 report, "Energy Efficiency: A straight path towards energy sustainability,"[2] "The introduction of energy-efficiency policies and measures has been growing fast around the world. The increasing number of countries with an energy-efficiency law… signifies a strengthening and consolidation of the industrial commitment to energy efficiency."

The report does also indicate, however, that "despite the significant advances, much more can and should be done to improve the efficiency of energy production and use." This is extremely noteworthy for industrial manufacturers because, as the WEC also notes, "industrial electric motors and electric motor-driven systems

A stainless-steel Wilden® Advanced™ PX Series AODD Pump in use at the SABA B.V. glue- and adhesive-manufacturing facility in The Netherlands.

consume almost half of the total electricity and account for 70% of the total (amount of) electricity consumed in industry."

For many industrial companies, where energy is a significant portion of operating costs, price volatility will continue to be a challenge. These companies will be well served to evaluate energy-saving technology, but will only reap the greatest rewards if they do so by taking into account the intricacies of their equipment in the specific applications in which they operate. Only by developing and using the proper applications expertise will they be able to identify and choose the technology that is best suited to mitigate the cost risks associated with energy volatility.

Regulatory Compliance

Regulatory compliance is by definition a necessity for businesses in the modern world. These laws collectively shape the environment in which businesses operate. While addressing the effectiveness of regulations is outside the scope of this paper, from a cost perspective, the number of federal regulations in the U.S. has been growing steadily for several decades, requiring investments by many businesses in order to maintain compliance. In fact, a study by George Mason University shows that "the effects of federal regulation on value added to the (U.S.) GDP for a panel of 22 industries…over a period of 35 years…dampened (GDP by approximately) 0.8% per year since 1980, eliminating $4 trillion in growth by 2012."[3]

Two prominent examples in the industrial-manufacturing universe are the motor-efficiency regulations that have been developed by the U.S. Department of Energy (DOE) and the International Electrotechnical Commission (IEC) in Europe.

The bottom line is that regulations are an unavoidable requirement for doing business in almost any jurisdiction in the world. Advances in technology that have been geared toward meeting the demands of a stricter regulatory environment (See Sidebar: Motoring Ahead) will help industrial producers navigate the compliance realm, but will be optimized only if they are applied with the appropriate applications expertise. In fact, the misapplication of a pump (e.g., incorrectly sizing the pump for its job) will likely lead to far greater energy consumption than can be saved from improvements in motor technology.

Expectations for Resource Stewardship

A phrase that has gained in stature over the past two decades in all forms of business is "corporate social responsibility," or CSR, which is commonly characterized as "business practices involving initiatives that benefit society." An article in the June 18, 2016, issue of the *International Journal of Business and Management* titled, "Corporate Social Responsibility and Consumer Buying Behavior in Emerging Markets,"[4] highlighted that "consumers now want companies to behave ethically in addition to providing quality product[s]..."

The obvious implication is that those companies that are perceived to be inattentive or irresponsible stewards regarding shared resources (e.g., community water supplies) risk a political and social backlash that could impact the company's standing and ability to do business in the communities in which it operates.

Therefore, it shouldn't be surprising that a report from Harvard Business School titled, "The Impact of Corporate Social

Motoring Ahead

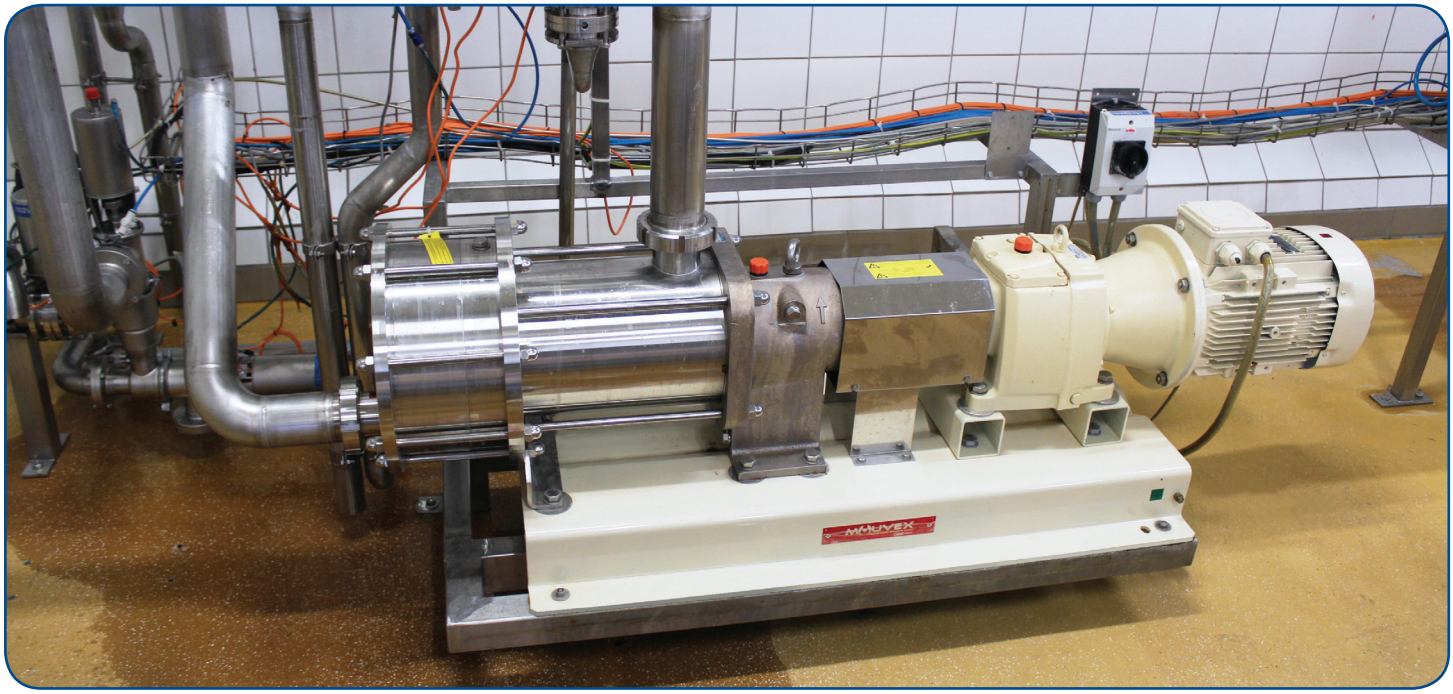
The evolving design and operation of motors presents a specific example of how next-generation technology can help manufacturers lower their energy usage, meet environmental-responsibility thresholds and reduce operating costs.

To address the operation of motors and how best to improve it, the International Energy Agency (IEA) created the Energy Efficiency End-Use Equipment (4E) working group, which consists of representatives from 12 countries: Australia, Austria, Canada, Denmark, France, Japan, Korea, the Netherlands, Switzerland, Sweden, the United Kingdom and the U.S.

In late 2015, the 4E group released a study, "Energy efficiency roadmap for electric motors and motor systems,"[10] that indicated that since 1995, "efficient motors have gained an increasing share of the global market, assisted by a framework of international standards that classifies motors according to their energy efficiency."

Motors were placed in one of four classifications – E0 (least efficient), E1, E2 and E3 (most efficient) – which created a common technical platform that underpins national policies that are targeted at increasing the implementation of high-efficiency motors in manufacturing operations. The four classifications form the basis of minimum energy performance standards (MEPS) that are now inherent to most advanced economies, as well as to many developing nations. The global sales of motors that fall into the two most-efficient classifications – E2 and E3 – accounted for roughly 70% of all motor sales in 2015, after standing at less than 10% of market share in 1995.

This is significant because the IEA expects that the market for motors is expected to expand by 2.5% annually through 2019, which will create opportunities for the further introduction of higher-efficiency motors into both mature and developing countries and markets. However, as the IEA notes, the impact of more efficient motors on overall market efficiency is gradual due to the motor's extended operational lifetime. To speed up the increase in overall efficiency, several countries are considering regulations that will enforce MEPS by encouraging the early retirement of inefficient motors.



A Mouvex® SLS Series Eccentric Disc Pump being utilized for the transfer of carbonated-beverage bases by the Coca-Cola Hellenic Bottling Company in Dunaharaszti, Hungary.

Responsibility on Investment Recommendations,"[5] revealed that "recent research shows spending money on corporate social responsibility is no longer seen as a detriment to a company's profitability. Stock analysts now view such expenditures as essential to a company's long-term brand and value."

In short, to improve their CSR standing, more and more companies are investing additional time and resources toward incorporating new technologies, changing operating practices and even adjusting business strategies in order to better assuage the corporate-responsibility demands of the buying public. Indeed, these resources can only be optimized by developing and applying expert knowledge of the business, its systems and the local environment in which it operates. Businesses that develop and use this knowledge will help satisfy the needs of the public while achieving positive outcomes in resource stewardship.

The Solution

So how do industrial manufacturers address the challenges of price volatility, regulatory compliance and resource stewardship, and still successfully achieve their business goals? Many companies are turning to technology for assistance.

In a February 2013 article titled, "The Dawn of the Smart Factory,"[6] *IndustryWeek* magazine detailed a looming manufacturing nirvana known as the "Smart Factory." This factory of the future will be "a paradise of efficiency where defect and downtime, waste and waiting are long-forgotten issues of a long-forgotten age." The driving force behind this phenomenon would be plant managers and chief intelligence officers who work together to create a seamless blend of data and production that will "illuminate every turn of every machine, every cut of every blade, every move of every piece in its global dance to deliver."

While the hyperbole in this article is heavy, the article's basic premise was echoed in a 2015 study by MarketsandMarkets, a publisher of premium market-research reports. In its piece titled, "Smart Factory Market by Technology, Component, Industry, and Geography – Global Forecast to 2022,"[7] MarketsandMarkets researchers found that the smart-factory market, in terms of value, is expected to reach $74.8 billion by 2022, with a compound annual growth rate (CAGR) of 10.4% between 2016 and 2022.

"The emergence of smart factories can be seen from the period of change toward cohesive control of the machineries, processes, and resources with local intelligence," read the report. "The increasing focus on saving energy and improving process efficiency, along with the integration of engineering and manufacturing by the adoption of IoT (the 'Internet of Things') is expected to foster the growth of the smart-factory market."

While the smart-factory operating principles promise to be a boon for industrial manufacturers who implement them, they will raise the complexity of the operation, which poses its own set of unique challenges. In fact, according to strategic-management consulting firm A.T. Kearney's "How Much Does Complexity Really Cost?"[8] survey of the top 30 companies in Germany, a reduction in operational complexity would boost earnings by more than €30 billion and increase earnings before interest and taxes (EBIT) by 3% to 5%.

The ultimate challenge for a manufacturer is to learn how new technologies can improve his or her operations and find the best, most efficient way to extract the benefits. This must be done while simultaneously not allowing the inherent complexities of these new systems to hinder or raise the cost of business processes. This is where the accumulation and deployment of applications expertise becomes immensely critical.

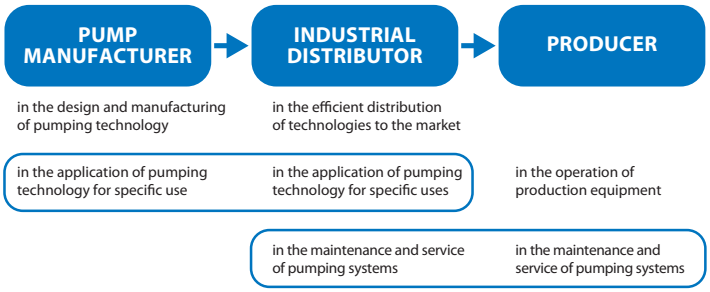
In fact, Skip Giessing, President of DXP Enterprises' Rotating Equipment Division, a company that has been supplying industrial pumps since 1908, sees no reason that the demand for and importance of applications expertise won't continue to grow in coming years.

"I believe there will be an increased demand for outstanding supplier applications expertise as suppliers and manufacturers work together to tie technology to process-equipment networking, proactive health monitoring and reliability," he said. "The huge customer spend reduction will come when all the key equipment within a manufacturing plant is interconnected and 'talking with one another' and adjusting to changes, etc. Customers will need to know and understand how changes affect equipment performance and reliability and how and what to do in order to maintain maximum productivity through reliable uptime and equipment efficiency."

So, what exactly is applications expertise? At its most basic level, it is:

- Specialized knowledge pertaining to the use of certain products in specific conditions. This knowledge can be used to create better business outcomes and, therefore, be the foundation for gaining a competitive advantage. As the complexity of the production system increases, the value that can be unlocked from applications expertise also increases.

Shared Expertise Across the Value Chain

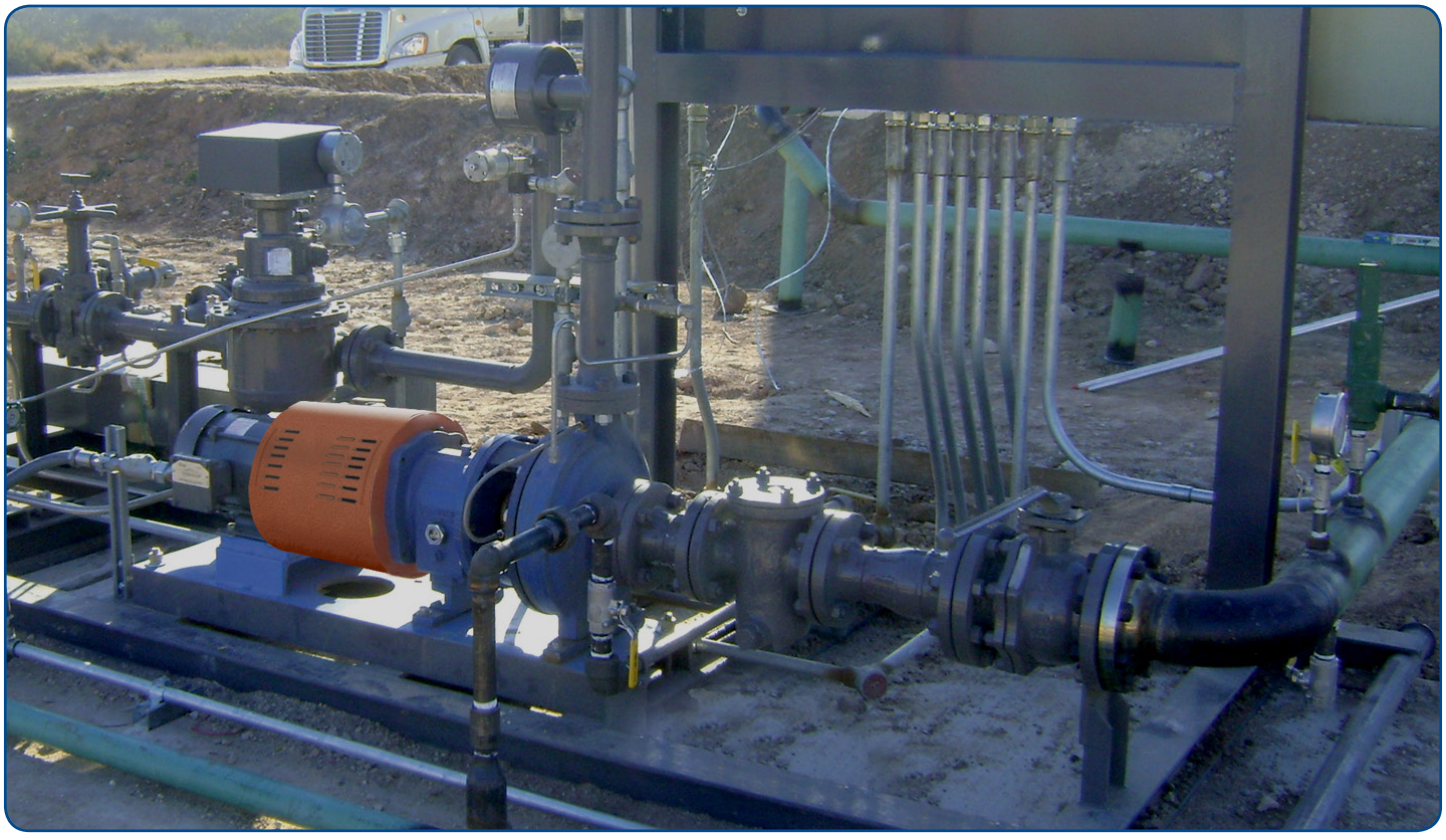


As the graphic above illustrates, the type of expert knowledge varies across the value chain, so there are ample opportunities for increased collaboration among pump manufacturers and distributors, and among distributors and end users, to strengthen expert knowledge and enhance value creation for all involved parties.

Tools For Managing Costs

To better understand how applications expertise can help the operator realize the importance of improving equipment productivity, efficiency and effectiveness[9], ExxonMobil produced a Technical Help Desk Tip that spelled out the ways to improve what it called "Overall Equipment Effectiveness," or OEE. OEE is measured as a ratio of a plant's actual output compared to optimal output, using the equation:
OEE = Availability x Performance x Quality, where:

- **Availability** represents how frequently a machine is



A Griswold™ 811 Series Centrifugal Pump in action during a Leased Asset Custody Transfer (LACT) operation in the Eagle Ford shale play in Texas.

available for its intended use, which can be affected by equipment failure, unplanned maintenance, material shortages and changeover times
- **Performance** is a measure of speed loss, or the number of units a machine is rated to produce per hour versus the number of units it actually produces
- **Quality** represents the amount of scrap material produced by a particular machine, with rejected materials, products that fall short of quality standards and any items that require rework all affecting overall quality

The conclusion in the article is that the operator "can realize significant efficiency gains by calculating OEE for particular pieces of equipment throughout the plant." Doing this will also make it easier to identify where particular pieces of equipment are operating to expected standards and norms for efficiency and reliability – and makes the operator aware of the areas where operational improvement will result in the greatest recovery of efficiency.

Another useful tool for operators is the total life-cycle cost (LCC) model for pump technologies. Many factory managers consider only the up-front capital cost of a pumping system in their decision process, which can end up being a costly choice for their business in the long run. According to the Hydraulic Institute's "Pump Life Cycle Costs: A Guide to LCC Analysis for Pumping Systems" manual, which it developed in conjunction with Europump, "the single most important factor in minimizing a pumping system's LCC is proper pumping system design." (See Sidebar: Determining Pump Life-Cycle Costs)

Other design factors that impact the pumping system's total LCC include pipe diameters, lengths, bends, elbows, fittings and valve types, which can increase friction loss; correct sizing of the pump, wherein selecting a larger pump than necessary just "to be safe" will result in the pump operating away from the best efficiency point and requiring more energy consumption; the use of throttling valves to control flow rather than pump speed; and application requirements such as flow rate head pressure and fluid viscosity. These are all areas where applications expertise can aid the designer and installer of the system. In fact, for this reason, many manufacturers look to third-party distributors, consultants or pump manufacturers for help in system design and pump selection.

Conclusion

Industrial manufacturers may feel that they are being bombarded from all sides when they are confronted with growing demands to better confront and control energy-price volatility; meet the strict tenets of expanding regulatory-compliance legislation; and satisfy both the public and their customers who are ratcheting up expectations regarding improving environmental stewardship. While these responsibilities can be daunting, they are also a significant – and necessary – part of the cost of doing business in today's manufacturing environment.

Manufacturers must satisfy these demands while simultaneously running a profitable business. With that in mind, it's becoming increasingly apparent that the manufacturers who will be successful in the future will be the ones who develop and utilize applications expertise, especially when selecting critical pumping technologies and systems. To do this, industrial manufacturers and their channel partners – the distributors, consultants and engineering firms that work hand-in-hand with them– are committing to building appli-

Determining Pump Life-Cycle Costs

According to the Hydraulic Institute manual titled, "Pump Life Cycle Costs: A Guide to LCC Analysis for Pumping Systems,"[11] LCC analysis takes into consideration the cost of purchasing, installing, operating, maintaining and disposing of all of the system's components during their operational lifetime. To this end the Hydraulic Institute has created an equation that identifies and quantifies all parts of a pumping system's total LCC:

LCC = Cic + Cin + Ce + Co + Cm + Cs + Cenv + Cd

Where C = a cost element, and

ic = initial cost or purchase price (e.g., of the pump, system, piping, auxiliary equipment, etc.)

in = installation and commission

e = energy costs

o = operating costs (the labor costs for normal system supervision)

m = maintenance costs (e.g., parts, worker hours, etc.)

s = downtime (loss of production)

env = environmental costs

d = decommissioning

These costs should also include the costs associated with any applicable loans, depreciation and taxes.

When used as a tool for comparing alternative solutions, the LCC process will indicate the most cost-effective one within the limits of available data. When applying the evaluation process, or selecting pumps and other equipment, the best information concerning the output and operation of the plant must be obtained if a true picture of the total LCC is to be achieved. Using bad, incomplete or imprecise information will result in an incorrect assessment, which will be of limited benefit to the operator. While the LCC process will not guarantee a particular result, it does allow plant personnel to make a reasonable comparison between several unique alternatives.

A View From The Field

For more than 100 years, Houston, TX-based DXP Enterprises, Inc., which began life as the Southern Engine and Pump Company back in 1908, has served its customers by focusing on product expertise, technical service, and maintenance, repair, operating and production (MROP) supply-chain management. Skip Giessing, President of DXP Enterprises' Rotating Equipment Division, provided his views on how applications expertise can be used as the foundation for selecting the proper pumping technology and systems.

Question: How would you define applications expertise, in your own words?

Answer: Applications expertise is the ability to properly choose, size and configure the right product for any specific customer application. This means taking into consideration customer specifications and requirements, customer preferences, pump performance, energy consumption, reliability, ease of installation and cost.

Q: To what extent does your company amass and utilize expert knowledge in order to service your customers?

A: DXP does this in three ways. First, we have experts that are centralized inside our sales staff at our headquarters in Houston who are available to assist any DXP branch location. This inside sales team is divided up into three different levels of expertise: basic, medium and high specification. Second, we have applications experts located locally at many of our larger branch locations. Third, we have a 24/7/365 Customer First Center located in Houston that can be accessed by any customer, anywhere in the world, at any time for assistance. All of these applications experts receive continuous training and from time to time accompany outside sales personnel on sales calls in order to make sure they understand their customers' needs completely.

Q: In what specific ways does this knowledge help create value (cost avoidance, failure avoidance, increased revenue, etc.) for your customers?

A: Customer-spend reduction and maximum reliability have become more important for the sophisticated customer. Revenue is a function of uptime, so unscheduled downtimes cannot be tolerated. Customers also seek to optimize the suitability of their equipment and reduce energy consumption as much as possible. Maintenance and operations budgets are also receiving much more scrutiny and solution providers like DXP are relied upon to continuously work with their customers to help reduce these costs. Finally, capital-spending specifications have become more detailed in terms of performance optimization and reliability, as well.

Q: With regard to applications expertise, how do you see the relationship between PSG® (the manufacturer) and your company (the distributor) helping to best deliver value to the end user (your customer)?

A: It starts with ample communication. Applications experts can help PSG make improvements to their products, ensuring that PSG stays in step with customer requirements. For example, this can take the form of product design and construction improvements, such as materials of construction and component redesign or upgrade, or the design of additional sizes or models that better satisfy customer needs. Applications experts are as much the Voice of the Customer as are the outside salespersons, repair and service experts, and the customer itself.

Q: To what extent does your company's pumping-system knowledge contribute to your firm's success in the market? What role does applications expertise play in your competitive advantage?

A: Customers are relying more and more on their key suppliers to help them meet their corporate goals and objectives. DXP relies on applications expertise as a key competitive differentiation. The experience and knowledge of expert application engineers, teamed up with outside sales engineers who also have applications expertise and a closer, more personal feel for customers' imperatives, motivations and preferences, ensures that DXP will always provide the customer with a tailored solution that is the best for his needs. Having this capability available 24/7/365 is another key differentiator.

cations expertise in their industries. This expertise, when thoughtfully applied to essential system challenges, can unlock significant value for the manufacturer and the end user alike. Therefore, companies that build superior applications expertise will create a significant competitive advantage in the marketplace in the future.

About the Author:

Nate Maguire is Senior Director of Business Development for PSG®. He can be reached at nate.maguire@psgdover.com or (909) 222-1309. Headquartered in Oakbrook Terrace, IL, USA, PSG is comprised of several of the world's leading pump brands, including Abaque™, Almatec®, Blackmer®, Ebsray®, Finder, Griswold™, EnviroGear®, Mouvex®, Neptune™, Quattroflow™, RedScrew™ and Wilden®. For more information on PSG, please go to psgdover.com.

References:

[1] "The New Normal," World Energy Council, January 2015
[2] "Energy Efficiency: A straight path towards energy sustainability," World Energy Council, January 2016
[3] "The Cumulative Cost of Regulations," Bentley Coffee, Patrick A. McLaughlin and Pietro Peretto, Mercatus Center at George Mason University, April 2016
[4] "Corporate Social Responsibility and Consumer Buying Behaviors in Emerging Markets," Irfan Butt, International Journal of Business and Management, June 18, 2016
[5] "The Impact of Corporate Social Responsibility on Investment Recommendations," Ioannis Ioannou and George Serafeimn, Harvard Business School, May 2014
[6] "The Dawn of the Smart Factory," Travis Hessman, IndustryWeek, February 14, 2013
[7] "Smart Factory Market by Technology, Component, Industry, and Geography – Global Forecast to 2022," Marketsandmarkets.com, April 2016
[8] "How Much Does Complexity Really Cost?", A.T. Kearney GmbH, 2007
[9] "Adding productivity with overall equipment effectiveness," ExxonMobil Corporation, March 14, 2016
[10] "Energy-efficiency roadmap for electric motors and motor systems," International Energy Agency, Energy Efficient End-use Equipment (4E) working group, November 2015
[11] "Pump Life Cycle Costs: A Guide to LCC Analysis for Pumping Systems," The Hydraulic Institute, January 2001