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New pressures are rising for industrial and resource industries such as mining, cement, and oil and gas. Turning these pressures into competitive advantages will require more intelligent use and management of power resources.

The Role of Energy in Advancing Industrial Process Performance and Transformation

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AT A GLANCE

WHAT'S IMPORTANT

- Enterprises are faced with becoming more productive while navigating the energy transition.
- Power-, performance-, and process-focused technology initiatives are often pursued in silos.
- Instrumentation of power systems and unified approaches to digital transformation are necessary to achieve the full potential business value of power-, performance-, and process-focused technology initiatives.

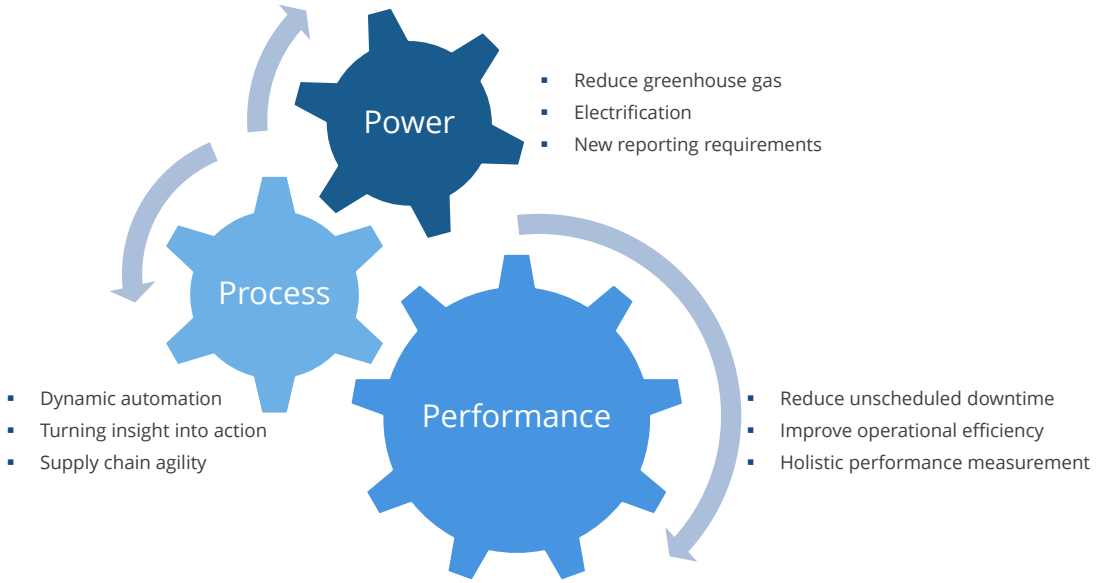
Introduction

Companies in industrial verticals such as manufacturing, oil and gas, utilities, and mining and minerals are pursuing the next wave of digitization with the goal of becoming more resilient. This resiliency takes many forms, but fundamentally it requires the collection and analysis of new and existing forms of data to drive improved decision making and improve the impact these industries have on society. New demands on industrial enterprises include the following:

- Sustainability must be addressed at every level of the organization. According to IDC's 2022 *Energy Transition Survey*, 61.9% of metals and mining companies have specific target dates for achieving net-zero carbon emissions, yet 41.1% do not have specific year-by-year plans to do so. In industrial operations, this means moving to electric-powered processes from coal and other sources that emit high levels of greenhouse gases. The energy transition also requires operations teams to maintain productivity and satisfy new reporting requirements while becoming more energy efficient.
- Asset life-cycle management must become more holistic, moving from reactive to prescriptive capabilities that optimize asset health and reduce unplanned downtime. According to IDC's *Worldwide IT/OT Convergence Survey*, the average cost of unscheduled asset downtime in mining operations is over $270,000 per hour in lost labor, lost productivity, and other costs — the highest of any of the industrial verticals surveyed. Enterprises in this industry must now combine and analyze operational and asset data to predict and prevent this unplanned downtime.
- The demand for resiliency in operations means being capable of dynamically optimizing automation processes to improve efficiency and performance. While many organizations have been pursuing data and analytics initiatives for some time, they now need to prove ROI by turning these insights into action in production environments.
- Value chains must become agile and flexible to respond swiftly and efficiently to changing market conditions on both the supply side and the demand side. This is fundamentally an exercise in becoming leaner and more predictive in supply chain processes to avoid inventory shortages or bloat.

All these demands require the implementation of new initiatives in the areas of power systems and usage, operational performance capabilities, and process execution as shown in Figure 1. Thoughtful integration of these initiatives and the technologies that support them is needed to capitalize on any potential synergies and reach full value. To achieve these goals, enterprises not only must consider the individual use cases but also must ensure there is a unified information and integration platform across operational activities — from engineering, construction, and procurement (EPC) to operational process execution and asset maintenance. Only through the ability to integrate across these activities and deliver multidimensional analysis will companies be able to achieve true transformation at scale.

FIGURE 1: ***Key Pillars of Industrial Digital Transformation***



Source: IDC, 2022

The Power Play

In certain continuous process industrial environments such as oil and gas, the role of the power system in improving asset health and productivity is well understood. In hybrid process industries, such as mining, minerals, and metals, the opportunity to improve asset health and productivity is significant because certain pressures such as electrification bear down more heavily. But with the new competitive requirements, this understanding must be extended to all industrial sectors. The following examples illustrate the impact that integrating power, performance, and process technologies and initiatives can have on industrial organizations.

Power

Companies are facing pressure to develop and advance environmental, social, and governance (ESG) initiatives that transition production environments away from carbon-heavy energy sources to greener sources while reducing overall energy demands. According to IDC's 2022 *Energy Transition Survey*, 42.1% of metals and mining companies reported that "lack of good data on energy usage/CO2" is a significant barrier to meeting their CO2 reduction goals. Achieving ESG goals requires visibility into new and existing energy systems to monitor usage. Analysis that combines energy system data and

production data can result in the identification of opportunities to both reduce energy usage and improve the process more broadly. Importantly, this correlation between power and process can ensure energy systems themselves are not malfunctioning and leading to loss. Meanwhile, 71.5% of mining and minerals enterprises surveyed believe IT/OT integration and related technology initiatives are either significant or critical to meeting their sustainability goals.

The value of combining process and power data can be seen in the example of a waste management plant that integrated data and control systems in operations across both power and SCADA and then analyzed the combined data set in the cloud. This approach was reported to have simultaneously positioned the company for effective visibility and reporting into ESG performance and eased the implementation and management of both systems.

Performance

Integration of data and analysis across power systems and asset management processes has multiple potential benefits for performance. Some 80% of industrial respondents surveyed by IDC reported that operational efficiency initiatives are critical or important to the success of their energy transition plans. Traditionally, failures in power systems produce significant downtime and carry a high mean time to resolution as reliability engineers in operations are often poorly equipped to diagnose and address electrical issues. Integrating predictive asset management of power assets into broader asset management programs means operators can deliver root cause analysis on electrical systems themselves and deliver predictive maintenance capabilities to those assets to call in appropriate experts proactively. This is even more essential in the context of electrification, which places more electrical-based assets in more mission-critical roles in operations. This in turn increases the use of distributed energy resources such as solar, which carry their own set of maintenance needs.

For example, in a remote mining operation powered by distributed resources or generators, an operator may unknowingly restart a tripped motor when the spinning reserve is too low, resulting in an unexpected blackout. Only through greater visibility and understanding of these power systems could this incident be avoided.

Asset performance management (APM) is also growing more holistic to become more predictive. Central to APM initiatives is the development of digital threads that draw in all salient data about an asset across its life cycle. The greater the connected body of knowledge about an asset, the more accurate and actionable the resulting analytics are. This connected body of knowledge is referred to as a digital thread. A significant gap in the digital thread for many industrial enterprises today is a lack of information about electrical systems that either power critical assets or are embedded within them.

Consider the case of a top South American mining company that set out to reduce or eliminate tailing dams to diminish their environmental impact and improve worker and environmental safety. These dams typically fail as a result of poor understanding or management of the overall tailing process. Expanding asset management practices beyond instrumentation and automation devices to include the electrical system represents a key contribution to decreasing unplanned downtime caused by electrical failures and gaining overall visibility and process improvement that will help the company achieve its broader objectives.

Process

Industrial automation is becoming more flexible, with greater levels of containerized applications running on control hardware and more embedded analytics in the control loop. The nirvana state is to have a living digital twin constantly taking in data about the process and optimizing setpoints to meet a variety of metrics of interest. A critical component missing from these digital twins today is power data.

The following hypothetical ROI calculation highlights the synergy between power, performance, and process. In mining operations, it is common to run flight conveyors that are over 15km long, carry 10 tons of material an hour, and consume 8MW of power. However, mining companies often lack the ability to monitor power systems. Where they do, power and process data are separate from each other and from performance management.

Pursuing a comprehensive strategy to integrate across power, process, and performance management activities could allow companies to see significant returns. Instrumenting and connecting electrical and asset management capabilities with a unified performance management system enable energy usage to be measured and root cause analysis to be performed to identify inefficiencies by correlating asset and performance data. This type of correlation is not possible, or is very labor intensive, without integration. The business value of an integrated strategy includes improved energy efficiency, reduced asset downtime, and enhanced worker safety — all while yielding simplicity through unified management in a single control room.

Moving to the use of one control system for both power and mechanical asset orchestration can also drive capex savings. These savings come from the reduction in hardwiring and network infrastructure costs. Utilizing a common automation platform to orchestrate both also reduces cost compared with separate systems. For mining companies, a holistic approach that spans process, performance, and power technologies can compound the business value experienced by each area.

Across all these new use cases that integrate power management capabilities, companies may find themselves in one-off integrations and implementations. This piecemeal approach increases the technical burden for those responsible for the integration and management of the systems and makes it difficult to scale and sustain these efforts over time.
Once enterprises understand the breadth of energy management capabilities necessary to achieve full ROI from each set of initiatives — power, process, and performance — it becomes clear that a unified approach is preferable.

Benefits

A unified strategy and integration approach across operational initiatives including power-, performance-, and process-related activities will provide the foundation for enterprises in the industrial and resource sectors to digitally transform and become more resilient. Benefits of such an approach include:

- Reduction of downtime by improving visibility and therefore predictability into the performance of both electrical assets and production assets and better coordination and cooperation across the teams responsible for maintenance of each
- Improved worker safety for those interacting with new energy sources and systems, particularly due to distributed energy and operations as well as electrification
- Baseline data to build an effective ESG program and the capabilities to implement change at the energy system level to meet ESG goals (Visibility is the first step to improving sustainability metrics.)

- More complete digital thread of assets and operations from engineering to maintenance, driving more accurate analytics in a host of asset and production optimization use cases
- Capex savings achieved by unification of control and orchestration systems for both hardware and software (Unifying power and process systems can result in the simplification of the overall technology footprint and cost savings related to networking, orchestration, and training.)

Considering Schneider Electric

Schneider Electric is a global leader in providing digital transformation capabilities for energy management and industrial automation. The company has over 120,000 employees worldwide with a multi-hub strategy that splits headquarters among Schneider's three primary regional markets: Europe (France), Asia (Hong Kong), and North America (Boston). Schneider's product portfolio is expansive, with energy and automation solutions tailored to home, datacenter, industry, and business environments across many markets. Annual revenue for Schneider Electric exceeded $34 billion in 2021, showing meaningful growth compared with 2020.

Schneider Electric's EcoStruxure Platform is the technology backbone of the company's Internet of Things (IoT) suite. The platform contains the data and application frameworks required to connect, build, and analyze operational data. It represents the integration and application development layer of technology that connects Schneider's local hardware and software capabilities at device and asset control and management levels with cloud-based applications and solutions targeted at specific use cases.

EcoStruxure Power and Process (EP&P) is an integrated, digitized solution leveraging the Schneider Electric and Aveva portfolios to enable business transformation across the entire project and asset life cycle. The EP&P solution seeks to integrate capabilities in process control systems and electrical systems with the goals of reducing capex and opex associated with each and providing enhanced capabilities across a broad range of use cases. More specifically, it aims to improve asset performance management of both energy and production assets, optimize energy processes including generation and utilization, and enhance visibility into operations across broader value chain activities.

Challenges

- Energy management control systems are adopted in continuous process industries such as oil and gas but are not generally in use in hybrid operations segments such as mining, minerals, and metals or other process manufacturing environments. These systems are often deployed independent of automation-, process-, and performance-related technologies. Integration of power and process systems is a new concept overall, and Schneider Electric will likely face challenges when building a business case for investment. Enterprise stakeholders need to educate themselves about the potential impacts of a unified approach so that they can demonstrate the potential ROI to executives.
- Companies today operate in heterogeneous and disparate technology landscapes. Integrating power monitoring and management capabilities may present novel challenges in environments that have historically not held these capabilities. OT landscapes that comprise a variety of vendor solutions will be difficult to align with this approach. Advisory and consulting from Schneider's industry experts may be necessary to overcome this challenge.
- For enterprises looking to add net-new capabilities around energy management, technology alone cannot overcome the cultural and skills-based gaps that exist. Change management strategies will be necessary to increase adoption and build momentum.

Conclusion

Companies with industrial operations must manage a variety of challenges and demands today, and they are looking to technology for solutions. For many, this search has been difficult due to the siloed nature of information and systems and the disjointed pursuit of new use cases and capabilities. The "better together" relationship between power, performance, and process technologies can help address these industry challenges more effectively when pursued with a unified approach. Energy sources and methods are integral to industrial processes, but they also face constraints. It will be imperative for companies to gain visibility and management capabilities that span energy, asset management, and automation systems to improve the business processes related to each.

The "better together" relationship among power, performance, and process technologies can help address these industry challenges more effectively when pursued with a unified approach.

About the Analyst

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Jonathan Lang is Research Director for IDC Insights responsible for the IT/OT Convergence Strategies practice. Mr. Lang's research focuses on digital transformation strategies in environments where operations technologies are deployed, including manufacturing, utilities, oil and gas, and healthcare provider settings. As IT capabilities redefine and extend the core value drivers of operations technologies, Mr. Lang's research examines strategies, road maps, and governance models to drive this convergence and manage the new data and processes it requires.

MESSAGE FROM THE SPONSOR

Digitization helps manufacturing, oil & gas, utilities, and mining and minerals operations become more resilient. Now it's time to digitally integrate systems on a grand scale. Unifying key functions simplifies systems components and mitigates information silos across a plant's lifecycle.

Unified electrical power management and process automation can deliver dramatic business results. Leveraging technology and industrial software throughout the value chain reduces costs while increasing productivity and sustainability.

Consider eight strategies to drive enterprise profitability through integrated process automation and power management:

1. Unified engineering and assets information
2. System design optimization
3. Unified simulation
4. Unified project execution
5. Unified power and process control systems
6. Integrated asset performance management
7. Process energy optimization and sustainability
8. Value chain optimization and agility

To learn how you can transform your business by integrating energy, asset, and automation systems with EcoStruxure Power and Process, read this eGuide.

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