Life Is On Schneider Electric

A holistic approach to motor management optimization

Five key steps for optimized motor management to improve application performance, while reducing energy usage and overall costs.

Executive summary

Schneider Electric believes that motor management optimization can increase long-term sustainability while improving motor application performance, cost savings, and energy efficiency.

Our motor management solutions are based on five key steps that are core to almost any motor application, but with a unique twist. Our offering is based on an integrated, holistic methodology which combines technology, products, expertise, and services.
This customer-centric approach, which results in an optimized solution for your specific motor application, can save you up to 80% of design time on engineering and show you how to cut energy usage and CO_2 pollution.

The impact of a holistic, optimized motor management solution

High-powered electric motors are critical care assets for industrial operations, but they are also substantial consumers of electrical energy – in a plant, for instance, they can use up to 90% of the facility's electricity.

With an effective design, engineering, and management of motor applications, efficiently run motors can significantly contribute to a company's sustainability, its energy usage, and CO_2 emission reductions. It also can help optimize an application's performance, productivity, reliability, and safety, all of which leads to less unplanned downtime and fewer plant stoppages.

Holistic motor management solutions can deliver benefits such as[1]:

- 20% improvement in motor availability
- 50% reduction in motor down time
- 4x faster recovery after an unexpected stop.

In addition, with optimized motor management, companies can expect to achieve up to a 20% return on investment costs with optimal voltage levels, and up to a 30% reduction in solution costs with the proper design engineering.

Five key steps to optimized motor management

Schneider Electric's strategy for optimized motor management focuses on successfully controlling and protecting motors maintaining power quality and driving proactive and predictive maintenance.

These objectives can be achieved through the five integrated steps – application analysis, motor control, motor protection, power quality, and asset management – outlined in Table 1.

Table 1

The five steps of optimized motor management

Five Steps to Optimized Motor Management				
1. Motor Application Analysis	2. Advanced Motor Control	3. Motor Protection and Control	4. Optimal Power Quality	5. Asset Management
Analyze application needs and verify motor and control compatibility	Select motor control to ensure starting feasibility and operating mode	Define suitable protection and integration in the industrial control system	Maximize energy efficiency by guaranteeing power quality	Assess motor management over time to maximize uptime

[1] Observed results from customer implementations

Our approach: Customer-focused, integrated, and holistic

As Figure 1 illustrates, our optimized motor management solution includes everything from design and commissioning to operation and maintenance, along with products, expertise, and services. What makes our offering unique is the added value we deliver through:

- **Customer-centric focus.** Our comprehensive motor management solutions – from design and implementation to management – are tailored to your specific motor application, process, safety and electrical requirements.
- **Holistic architecture.** Our solutions bridge your automation and power architectures in order to increase motor drive train efficiency.
- **Purposefully engineered integration.** Our design process helps you digitally unify your motor control, automation, and energy systems for greater energy efficiency and better asset management.
- **Simplified design and product selection.** Architectural design and product selection are critical, and we simplify this process with tailored design and selection tools.
- **Optimized performance and maintenance.** And finally, we include comprehensive asset performance management in our solutions to improve asset reliability, maintenance, and operation.

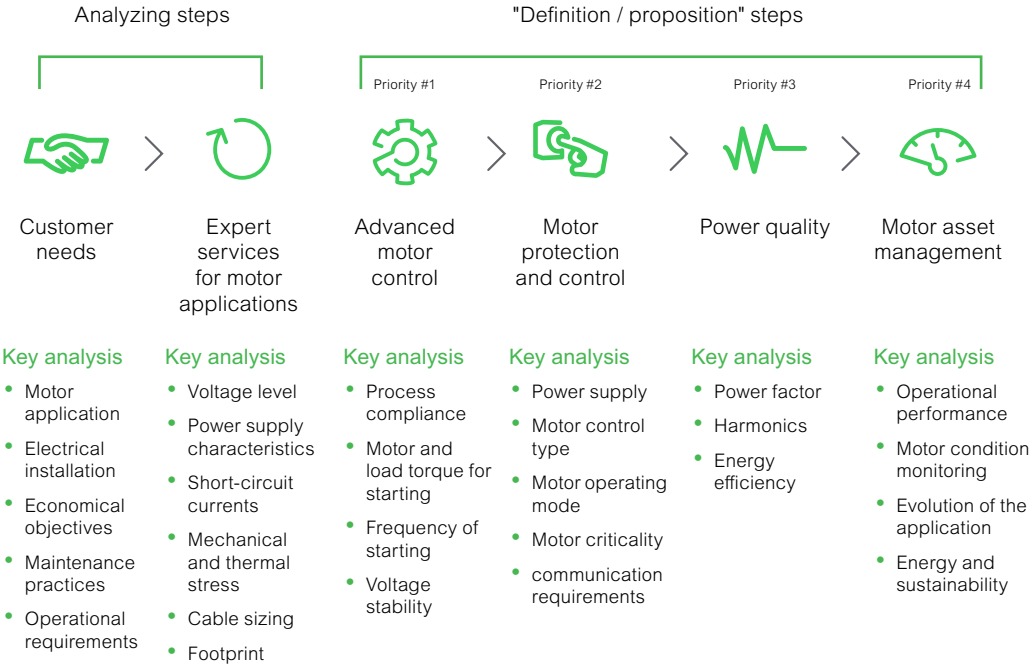


Figure 1
Our holistic motor management approach includes comprehensive analyses, factors, and assessments

Start your journey by optimizing your solution design

The design of your motor management solution combines optimal motor operation with lower installation costs which ensures the least possible impact on the electric installation and the environment.

To simplify this process, we created a number of online tools, including the EcoStruxure Motor Management Design.

The EcoStruxure Motor Management Design tool combines extensive power system engineering calculations and component selection, integrating all the design aspects of your application in one place to help you build a complete motor management architecture.

Using EcoStruxure Motor Management Design tool can you save up to 80% time in the "what if" analyses that are necessary to ensure you are making the right decisions. It allows you to:

Validate a motor management solution based on your company's requirements and project objectives for the application.

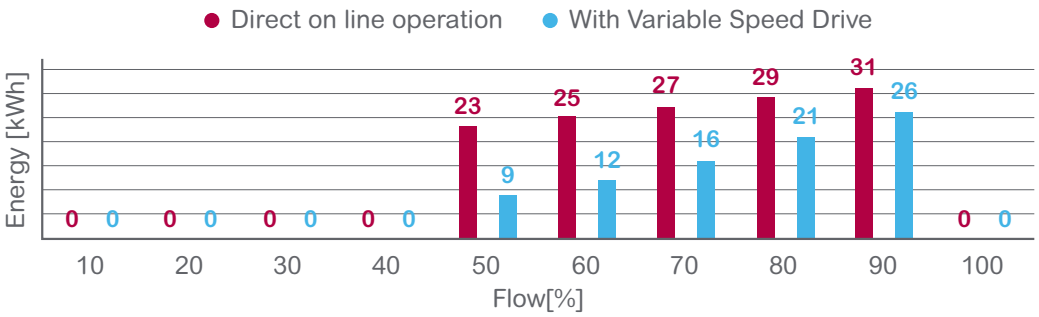
- Calculate a comprehensive solution with motor and network analyses with minimum data.
- Compare simultaneously results for power system values, motor starting feasibility, starter setup options, power quality, and energy usage.
- Facilitate solution decision making and choice of compatible solution components.
- Analyze potential for energy savings, payback period, and environmental pollution reduction.

Discover the potential: energy savings, payback, pollution reduction – and more

Here is an application example of how the EcoStruxure Motor Management Design tool for pump applications with small motors.

Figures 2 and 3 show the application of a 30kW one motor driving a pump at rated speed and the result of energy saving analyses by operating at variable speed.

Motor Management Design Tool Example	
Industry: Mining	
Motor Application	30 kW 400 V VSD Centrifugal Pump Application
Project Selections	
Energy Savings with a Variable Speed Drive (VSD)	
Main Motor	30kW/400V with an efficiency rating of 96.7%, rated power factor of 0.87
Pump	Efficiency 87%, throttling control
Economic	Total investment 3.75k€, energy price 0.12€/kWh (France)
Annual energy savings using a VSD	37% / 6k€
Payback period	0.6 year
Pollution Reduction	Carbon Dioxide (CO_2): 49.9t/y



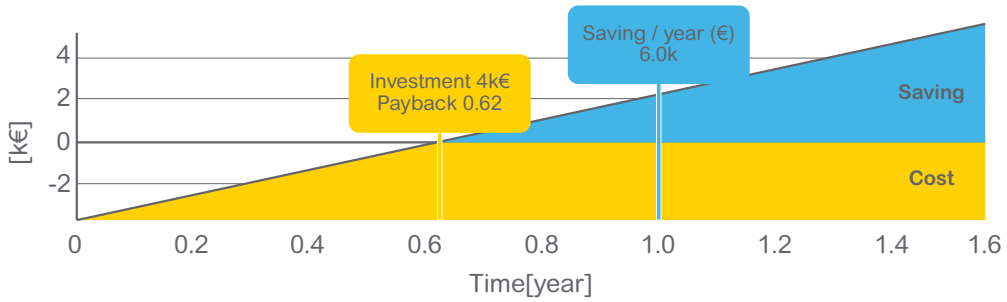


Figure 2

Motor management optimization for a pump application

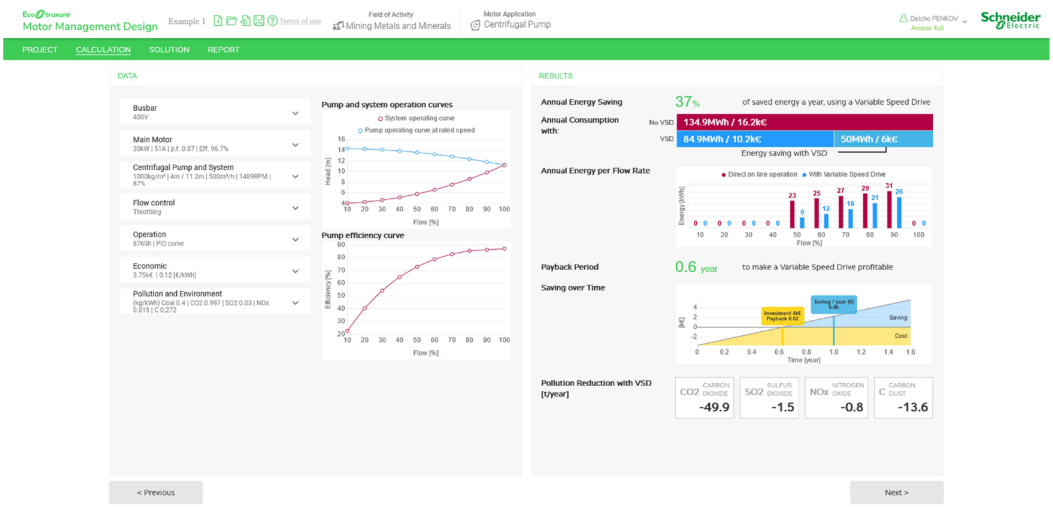


Figure 3

Case presentation in the application

This first analysis shows the benefits of using a VSD in this application instead of a constant speed operation.

To further the analysis and explore other options, the scope can be extended to see how modifying the motor control can impact the rest of the installation immediately connected to the motor (Figure 4). The motor is part of a process, where multiple other motors are connected to the same busbar and fed by the same transformer. The evolution of the motor control to a VSD can affect the power quality management, as VSD are loads generating harmonics.

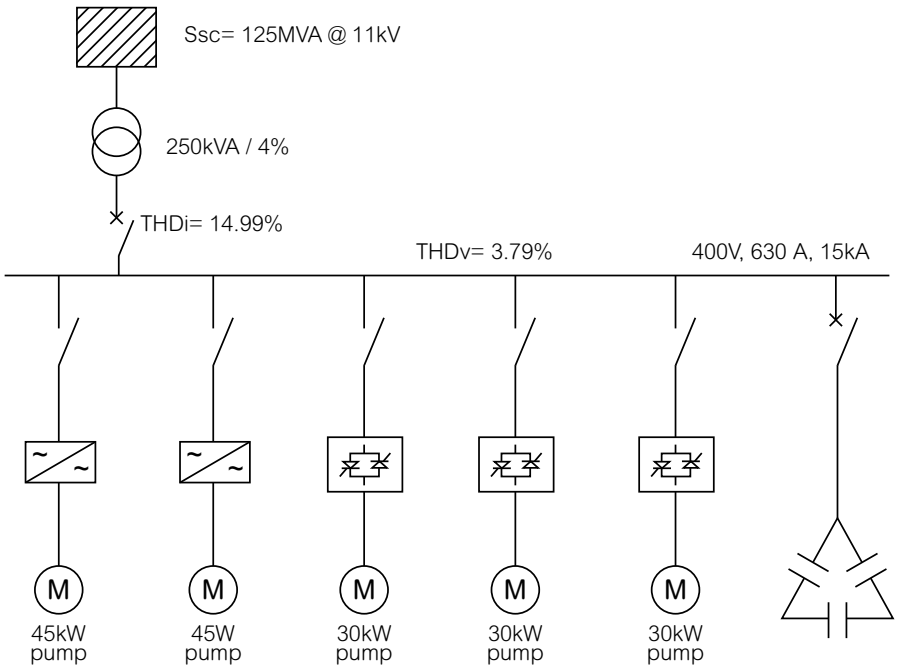


Figure 4
Initial system design

The case evolves as shown on Figure 4:

- 3 x 30kW motors controlled with soft-starters (one of them was considered for the energy saving)
- 2 x 45kW motors in parallel, controlled with a VSD
- Transformer of 250kVA to feed these loads
- Harmonic pollution in voltage of 3.79% and in current of 14.99%

The analyses of the potential for energy saving for these motors have shown a return on investment in 0.6 years, equivalent to approximately seven months. The intention is then to replace the three soft-starters with three VSDs and maximize the energy saving in their operation.

In this case, it is necessary to run a power system analysis, which is performed automatically by the tool. The system parameters change and the harmonic content increases to 5.63%, from 3.79%. A usual limit is 5%, so one solution is to add an active filter, or simply to move only two of the three motors with VSD operation. Figure 5 shows the option to keep the full energy saving with an active filter.

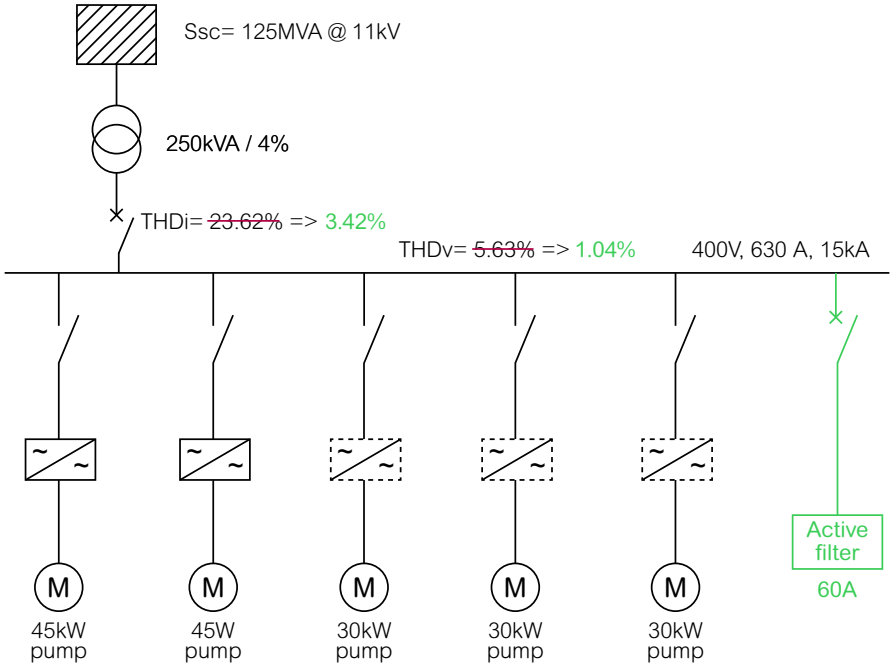


Figure 5

Updated power system with 3 x 30kW motors operating with VSD

All system values are calculated EcoStruxure Motor Management Design tool automatically with minimum effort using the full analyses path (Figure 6).

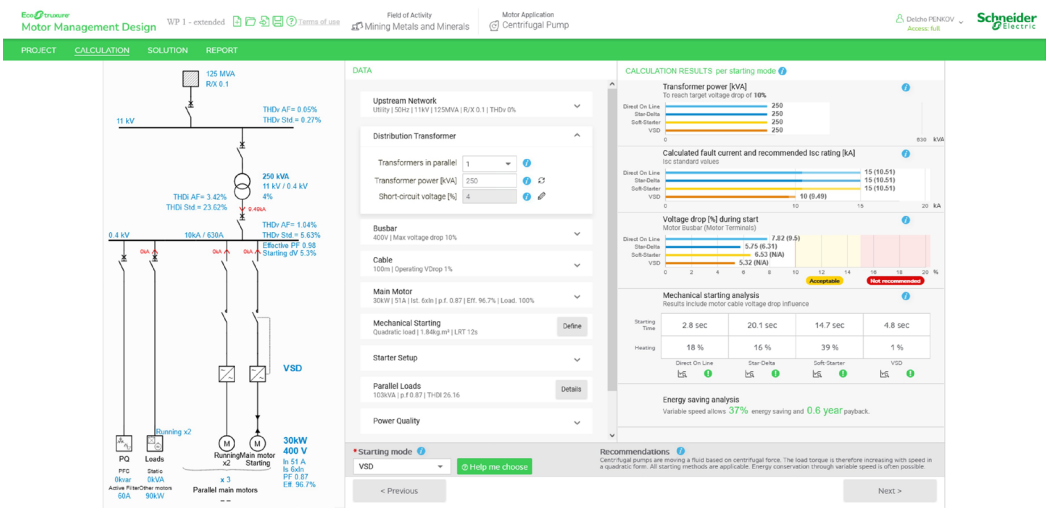


Figure 6

Full details of an optimized motor application within the EcoStruxure Motor Management Design tool

As a next step, the solution can be detailed as components within this application or using the EcoStruxure Motor Control Configurator for detailed options and accessories.

Test drive the EcoStruxure Motor Management Design tool yourself

To see for yourself what an optimized motor management solution can do for your company, visit our website and take a few minutes to complete these easy steps:

1. **Define your project.** Using activity and application type, you can select your project parameters.
2. **Compare options.** Next, compare starting modes and electrical network designs to see what best fits your company's requirements.
3. **Build your architecture.** Based on your selections, build your motor management architecture with recommended offers.
4. **Analyze your design results.** Once you have selected your architecture, you will automatically receive a thorough project report generated under your name that provides you with potential energy savings, investment payback schedule, and pollution reduction. The report can be circulated within your organization as a proof of concept of an optimization motor management solution.

Want to reduce CO_2? Include an Altivar Process Drive in your design

Optimized motor management solutions are one of the key ways that your company can reduce CO_2 emissions, especially when you include a Schneider Electric Altivar Process drives in your design.

Our Altivar drives, which are next-generation variable speed drives (VSDs), are connected devices with built-in IIoT intelligence that can be customized to your motor application to increase performance for while improving safety and reliability.

Our Altivar drives can also help reduce power consumption and boost efficiency, with results such as:

- Up to 20% reduction in downtime
- 8% additional savings (over a standard drive)
- Up to 50% energy savings (over direct line motor starters)

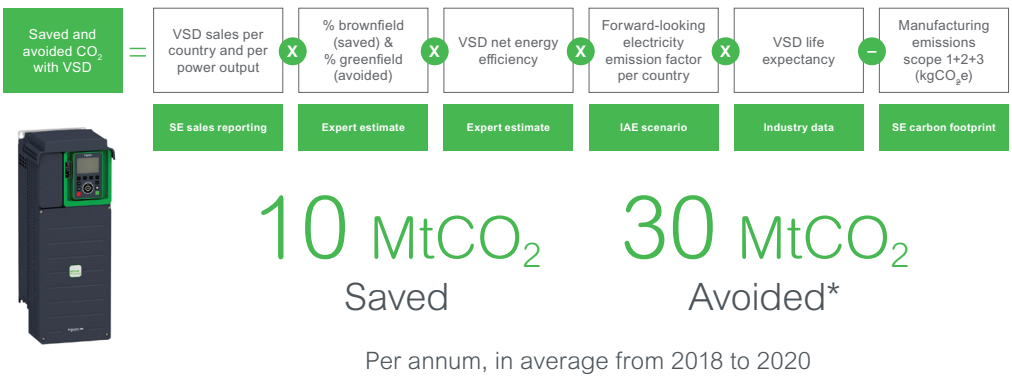


Figure 7

The potential energy savings using an Altivar Process variable speed drive

Table 2

Industry-specific benefits that can be achieved with Altivar Process variable speed drive

Altivar Process Drives	Water and Wastewater Management	Mining, Minerals, and Metals
Benefits	• Process monitoring for timely and informed decisions • Energy management for better energy awareness and sustainable performance • Asset management to protect the system and its service life time • Access from everywhere in accordance with rights and security as per ISA Secure / Achilles	• Predictive maintenance to manage machinery and help prevent workplace injuries or unplanned downtime • Real-time intelligence with accurate diagnostics, remote control, and remote services capabilities (thanks to embedded Ethernet web server systems) make your process safer and more efficient for a stronger ROI • Best application performance with multi-drive complete solutions for process cranes, roller conveyors, vertical roller mills, and others
Results*	• Up to 30% reduced energy consumption • Up to 25% increase operational efficiency • Up to 20% reduced total cost of ownership	• Up to 30% reduced energy consumption • Reduced CO_2 emissions

* Based on existing data; results may vary based on individual motor applications

Our Commitment to Sustainability

At Schneider Electric, sustainability is at the core of our purpose, culture, and business as we accelerate our contributions to a sustainable and inclusive world. We are on a mission to make industries of the future sustainable, agile, and resilient through open, software-centric industrial automation. Our EcoStruxure architecture and platform can unlock efficiency and help you meet demands while using fewer raw materials. We provide solutions that allow you to integrate global operations, reduce costs, and increase profit potential. We also help you deliver more resilience thanks to software that enables visibility, automation, and digitalization that gives you the ability to compete in evolving environments.

Learn more about Motor Management:

- Motor Management web page
- Process Motor Management
- EcoStruxure Motor Management Design
- EcoStruxure Motor Control Configurator
- Altivar Process Configurator

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