Operating in today’s fast-changing and highly competitive industrial environments requires radical efficiency improvements. Machines delivered to end users must use less resources, provide better operational insights, and maximize the return on investment. Fortunately, smart technologies, applied across the entire machine life cycle, can easily increase efficiency, with benefits for both OEMs and their customers.

Efficiency redefined
As a pioneer in smart automation technologies, Schneider Electric always looks at efficiency from a number of different angles.

• **Machine efficiency** covers machine design and assembly, as well as operation and maintenance
• **Operator efficiency** means simplified access to more contextual information and guidance for better operational decisions
• **Resource efficiency** is the optimized use of assets, energy, and employee time when building or operating machines

Optimizing machines in these three areas enables both OEMs and end users to be more efficient: do more, quicker, and with less waste, increasing the profitability of their businesses.

**How to improve efficiency in machine design**
Greater efficiency in machine design and assembly requires smart engineering. The first step is to use software and application templates to reduce machine engineering time. Machine automation and control systems based on ready-to-use templates have a modular structure that helps prevent errors, reduces costs, and enables flexible adaptation to evolving customers’ needs. The templates can also be reused for similar projects in the future.

The design phase is the best time to ensure machine compliance with safety standards by incorporating safety control solutions into machine design as well as testing, and performing risk analysis and assessment.

Efficient machine design should also include motion control solutions to enable high machine performance right from the start. Faster, more precise motion control increases machine productivity through greater speed, accuracy, and ease of adjustments and helps reduce downtime.

Finally, open communication standards, such as Ethernet (Modbus TCP) or serial (Modbus/RTU), should be implemented. This enables
smooth machine communication, interaction, and integration throughout its life cycle.

**Machine operation made easier**
An intuitive interface is key to more efficient human-machine cooperation as it enables operators to better and more quickly understand the current machine status and make decisions more effectively.

The HMI’s screen design can be standardized with customized colors and animations, to better suit different tasks such as setup, monitoring, and diagnostics.

Also, remote access to comprehensive information on machine status and its performance significantly enhances machine efficiency.

**Efficient machine maintenance**
Thanks to advanced diagnostics embedded in smart machines, machine operation and maintenance are easier and more efficient. By monitoring both their components’ status and environmental conditions, smart machines can optimize their performance for more reliable and flexible manufacturing.

In addition, detailed data on machine condition facilitates implementation of preventive maintenance. Regular interventions, scheduled to minimally impact production, help avoid unexpected component failures and downtime. Remote access capabilities make it possible to examine equipment and perform an intervention from any location, saving the costs of team dispatch.

Some maintenance interventions can be performed quicker, involving less employees on the spot. QR codes placed on machines can facilitate access to machine documentation on mobile devices, and augmented reality technology can be used to guide a service person step by step through maintenance procedures.

**Doing more with less**
Resource efficiency is also driving change in industry. End users are looking for solutions that decrease production costs, are compliant with environmental regulations, and support sustainable businesses. By offering more efficient machines, which use less energy and other resources, OEMs can gain a competitive advantage on the market.

Motors and drives account for more than two-thirds of industrial electrical consumption. Reducing energy use by optimizing the motor size, switching to high-efficiency technologies, and applying variable speed drives can bring a significant increase in machine efficiency.

Automation solutions also impact energy efficiency. Proven, efficiency-boosting programming algorithms and the right automation architecture, contactors, HMIs, and controllers can all help reduce W.A.G.E.S. (water, air, gas, electricity, steam) costs.

Thanks to the solutions for measuring and monitoring energy consumption throughout the machine life cycle, a rise in power use can easily be detected. Comparing the data tracked through diagnostic tools with the benchmark value allows the operator to take a quick action in order to get back to optimized energy consumption and efficiency levels.

**More efficiency for any business**
Smart technologies are the future of industry. Applying them to machines enables the evolution of key industrial processes for more efficient manufacturing. Thanks to innovations at every level of machine development, OEMs can optimize their operations, reduce costs, and achieve greater profitability. With future-ready machines both OEMs and end users can do more, more quickly, and with less waste. Both today and tomorrow.