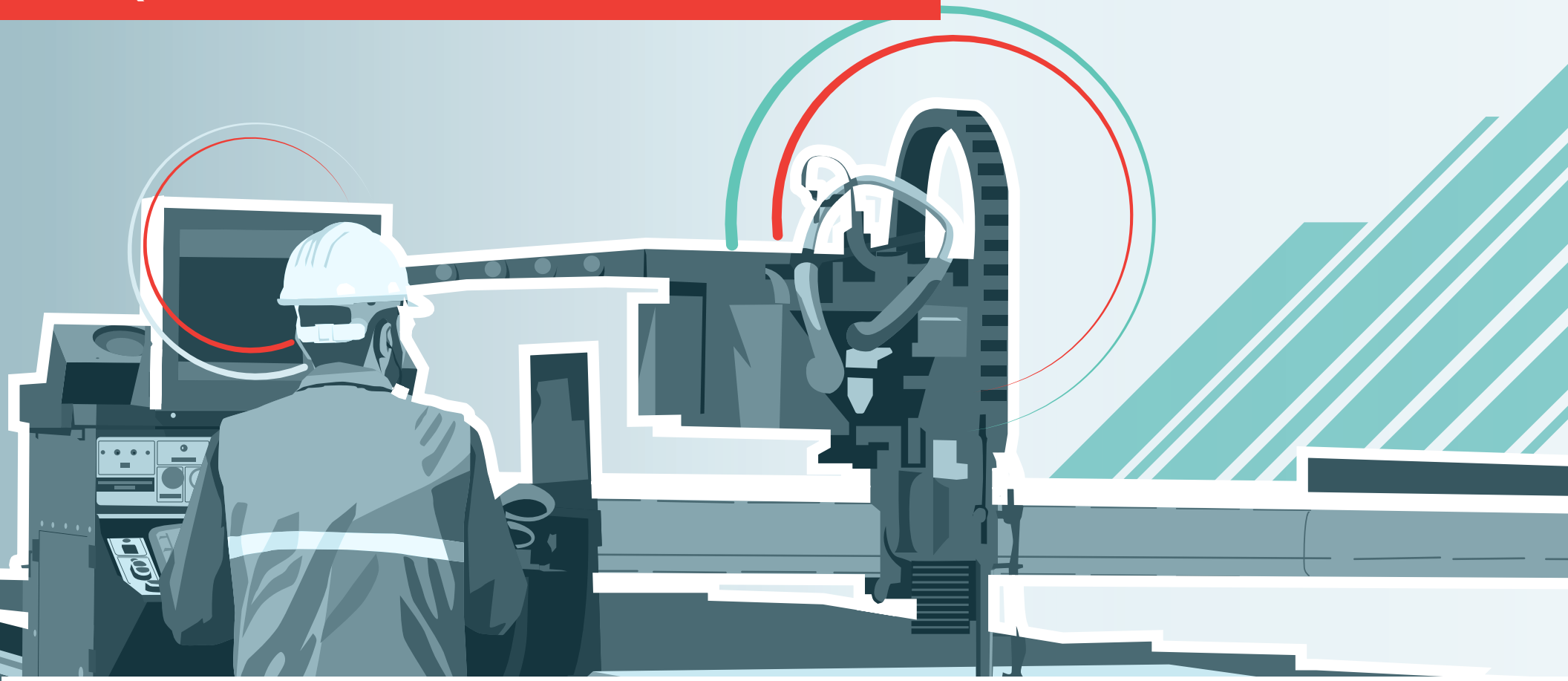
CONNECTED SERVICES FOR INDUSTRIAL EQUIPMENT

THE EMERGING APPROACH TO INDUSTRIAL EQUIPMENT AFTER-SALES SERVICES



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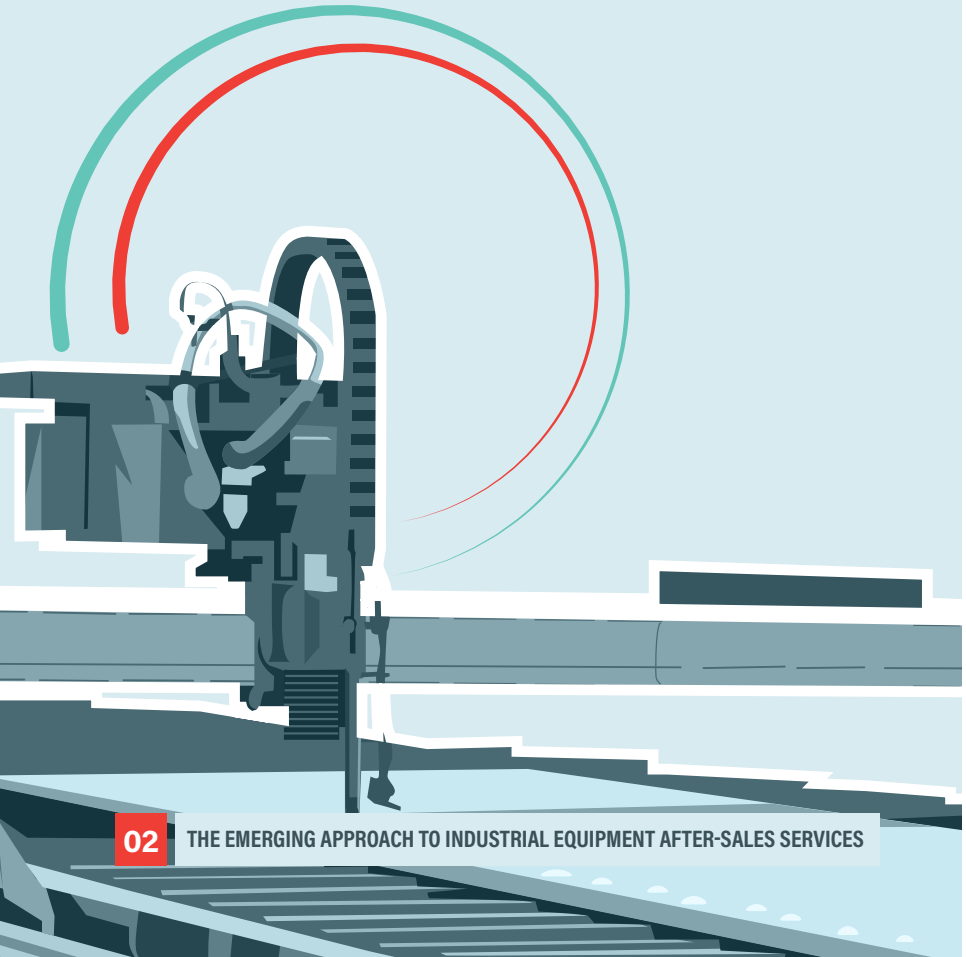

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Drivers of Change

In an increasingly competitive global marketplace, companies face significant pressure to maximize production to meet demand. This pressure makes it essential to maintain a high level of overall equipment effectiveness (OEE). As a result, strategies and initiatives that maximize equipment availability, equipment performance, and product quality are critical to today's manufacturers.

Industrial equipment manufacturers have an opportunity to deliver the OEE levels that customers require in today's landscape—in the form of equipment-as-a-service (EaaS) and connected services business models. These models rely on technology-driven approaches that provide industrial equipment companies the real-time insights required to improve their service mechanisms and ensure greater productivity for their customers. As a result, customers gain an important competitive advantage in the race to market, and industrial equipment makers benefit from the transformation of their after-sales service approach.

EaaS and connected services models have other benefits as well. They can minimize the number of service calls industrial equipment manufacturers make, and extend equipment life, which improves the sustainability of their service operations. Such models can allow those companies to reduce the impact of workforce shortages on their after-sales service teams, become more competitive in the after-sales market, and mitigate the impact of supply chain disruptions. In addition, customers today are mostly seeking operational expense investments, which makes the ongoing contractual agreements on which EaaS and connected services models rely more appealing.

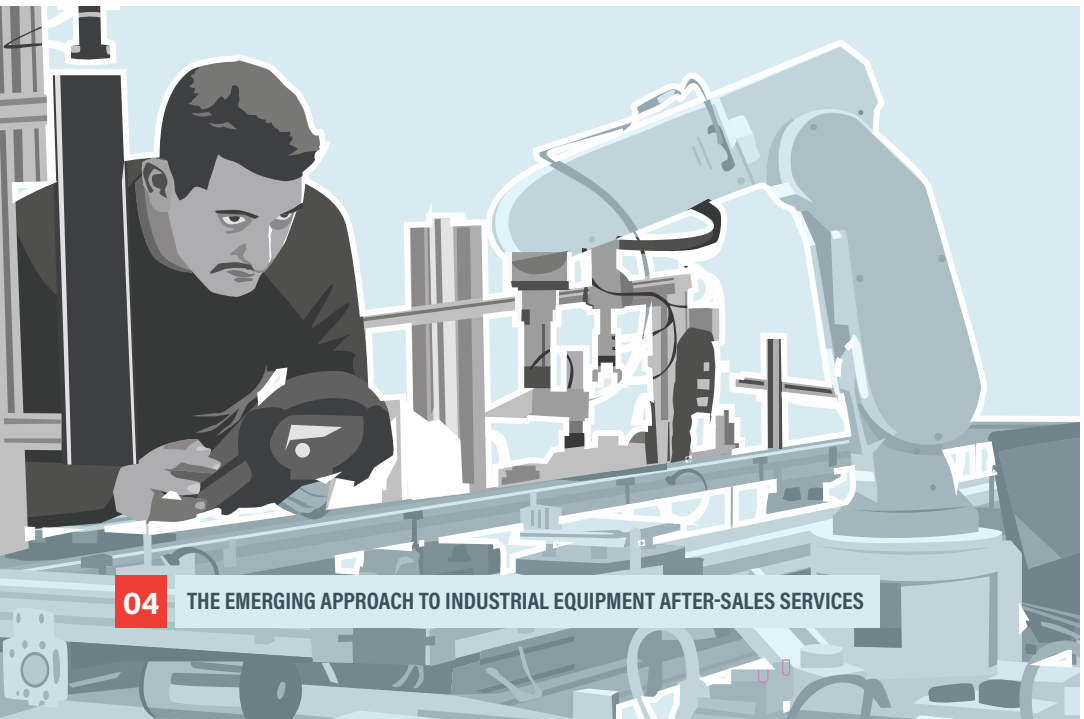
The Traditional Approach to Service

Maximizing OEE is, of course, not a new concern for industrial equipment manufacturers or their customers. Industrial eqiupment companies have historically used maintenance contracts to specify how after-sales service will be rendered. These agreements place responsibility for equipment service and maintenance on the industrial equipment maker. In some cases, warranty clauses do not allow the equipment owner to make repairs themselves.

Under these agreements, when equipment fails, the customer contacts the equipment manufacturer, reseller, or service provider which performs the required service or maintenance. But in most cases, the customer only knows that a failure has occurred once the machine has stopped working properly. Often, the customer must rely on the manufacturer, which likely has no real-time insight into the equipment's performance, to identify and address the issue.

It can take a while to identify the problem and the parts required for repairs, every minute of which is lost production time. Under such a system, customers can be subject to long, unexpected shutdowns that wreak havoc on efficiency and output. Even if customers' machines are equipped with sensors to gather performance data, they often lack a process for collecting, organizing, and applying the data to prevent future failures.

As a result of these difficulties, customers and equipment makers alike are recognizing the value of connected services and EaaS models, which place responsibility for outcomes such as equipment uptime and throughput on the equipment manufacturer.



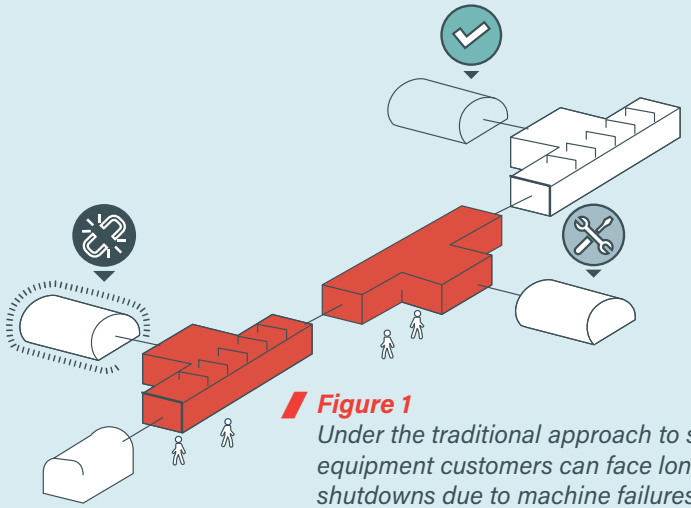


Figure 1
Under the traditional approach to service, industrial equipment customers can face long, unexpected shutdowns due to machine failures.

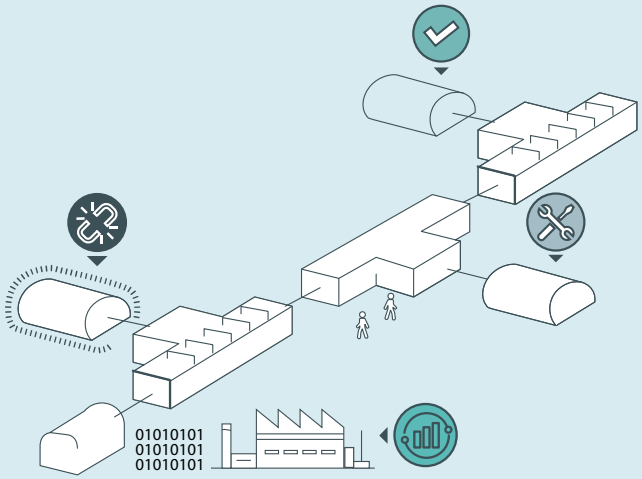
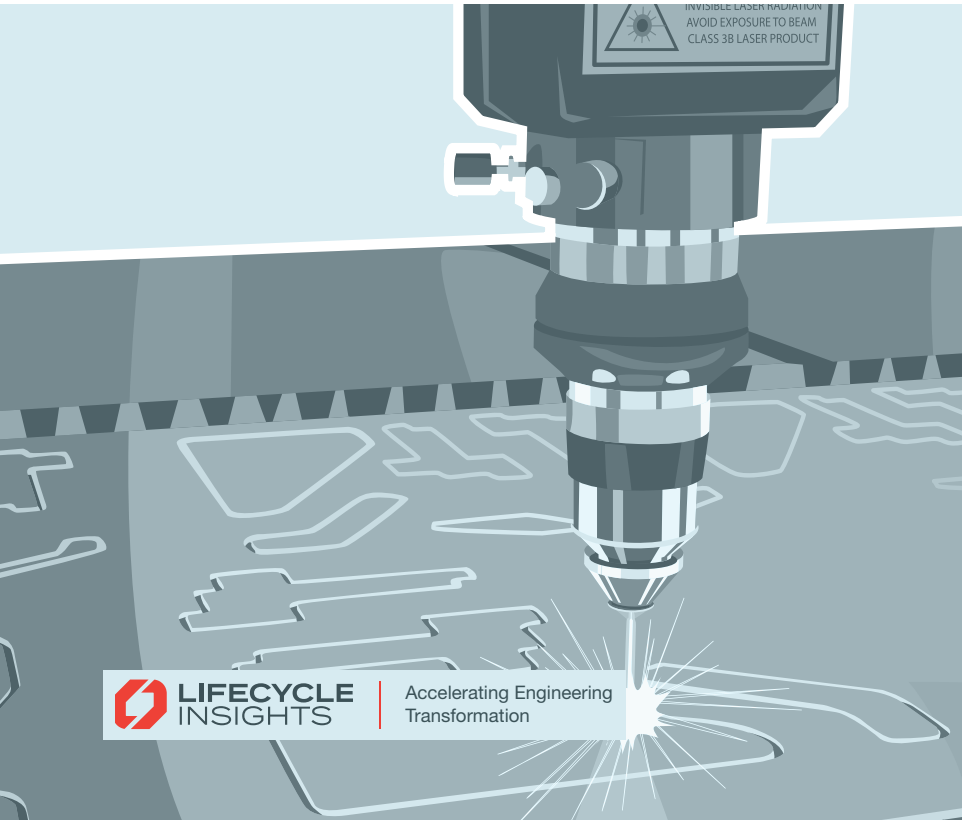


Figure 2
Under the connected services and EaaS model, equipment manufacturers have incentives in place to detect and repair machine failures quickly.



A New Approach to Service

Connected services and EaaS service models allow equipment manufacturers to deliver better outcomes for their customers, improve equipment lifespans and sustainability, and maximize after-sales revenues. For customers, these models deliver the high level of OEE required to remain competitive in today's market.

Both service models accomplish these objectives by giving equipment manufacturers real-time visibility into their equipment's current performance while simultaneously allowing them to use real-world data to predict when the equipment will require service. The manufacturer, which retains responsibility for maintaining and servicing the equipment under these kinds of agreements, can then schedule and perform maintenance before failures occur, minimizing surprise downtime and maximizing output. If a surprise failure occurs, the equipment's data allows technicians to identify the source of the error and determine which parts are required for repairs without stepping foot inside the customer's facility.

This reduces the number of physical trips technicians must take. It also increases the efficiency of sourcing parts, thereby tempering the environmental impact of equipment maintenance. Extending the equipment's lifespan through more effective service practices reduces waste as well.

Though connected services and EaaS can provide customers with similar benefits, there are important distinctions between the two. Either model may be ideal for a given customer, depending on the state of their digital transformation efforts.

Equipment-as-a-Service

Like other "as-a-service" models, EaaS reimagines the customer's relationship to the product—industrial equipment, in this case—that they use. Instead of purchasing the equipment outright, the customer contracts with the original equipment manufacturer (OEM) to use the equipment. The details of these contracts can vary, but the OEM takes responsibility for equipment service and outcomes. The customer pays the OEM based on agreed-upon performance markers like the total hours of uptime and the number of units produced.

EaaS agreements rely on the use of digital solutions that can collect equipment data and share it with the OEM in real time. The OEM then organizes and analyzes the data on the customer's behalf. When the data indicates a potential issue with the customer's OEE, the OEM can respond proactively and limit service disruptions. Under EaaS agreements, OEMs can improve their service and maintenance processes and customers enjoy increased productivity. EaaS agreements also protect customers in the rare case that a long or unexpected shutdown occurs because the customer's costs are tied to equipment performance. If the OEM's equipment is unable to meet the performance levels stipulated in the contract, the customer's costs are reduced in kind.

Every industrial equipment company strives to provide value to its customers, and every customer desires more uptime, increased productivity, and faster repairs. The EaaS model offers a path to achieving those goals. Of course, OEMs cannot simply shift their business model at will; these agreements require buy-in from both OEM and customer. For their part, OEMs must not only share the advantages of EaaS agreements with customers, but also evaluate the new model's impact on their profitability.

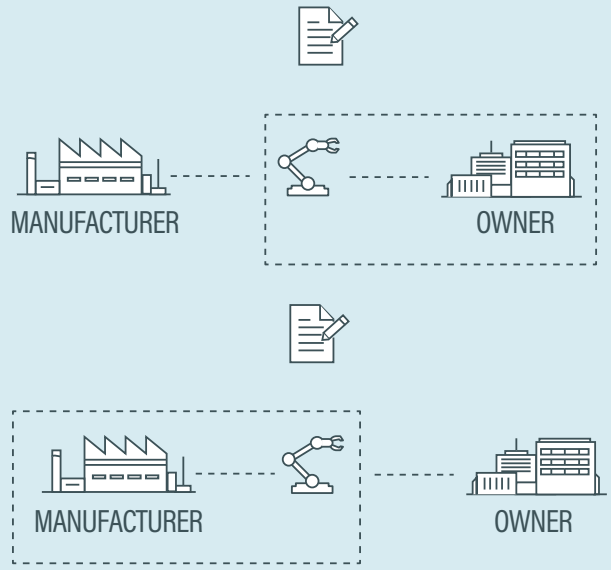


Figure 3
Under EaaS, the industrial equipment manufacturer still retains the ownership of the machine though it is used at the customer site.

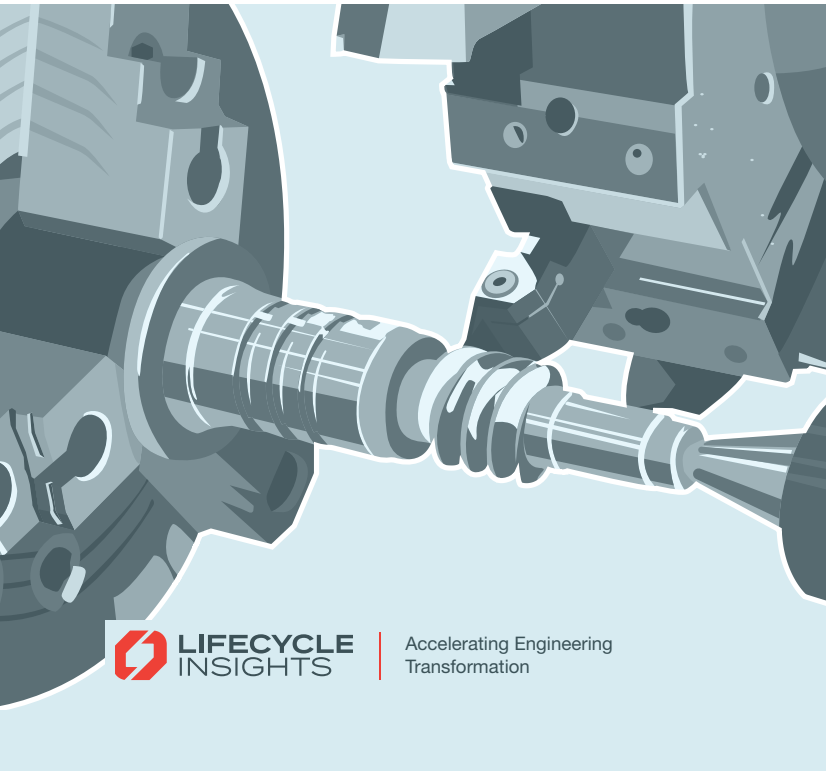
Connected Services

The connected services model offers industrial equipment manufacturers advantages like those of the EaaS model, though the mechanics of the models differ. In the connected services model, customers purchase industrial equipment from the OEM as normal and assume responsibility for its service and maintenance.

Though the connected services approach does not tie customer costs directly to OEE like the EaaS model does, it does provide similar benefits. Once the equipment is in operation, users leverage sensors connected to the machine and an internet-of-things (IoT) platform to collect operational data.

They can then use artificial intelligence (AI) and machine learning (ML) to continuously analyze the data to identify inefficiencies and potential failures, predict maintenance needs, source parts, and conduct repairs quickly in the event of a surprise failure.

Organizations that adopt this model must collect and analyze equipment data themselves. It is thus essential that they establish processes for doing so and have personnel, such as data scientists, capable of interpreting and applying that data. For organizations that may not be permitted to rely on external partners to manage equipment service and maintenance (or that simply prefer to do so internally), the connected services model is likely a better fit than the EaaS model.



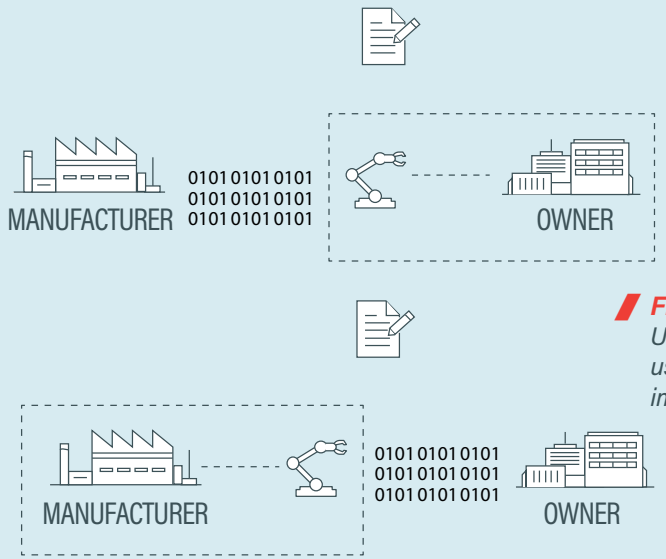


Figure 4
Under connected services, equipment users leverage sensor data and IoT to improve the OEE of their machines.

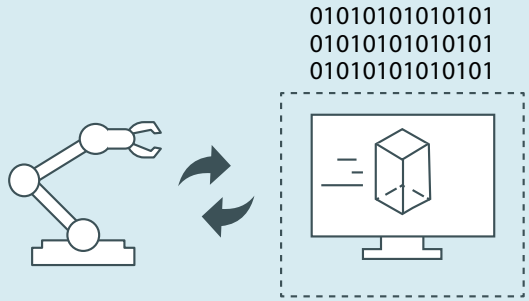


Figure 5
A comprehensive digital twin provides an organization with a wealth of operating data.

Digital Twins: A Key Enabler

Digital twins are detailed digital representations of physical products, processes, or systems that mirror the design and behavior of their physical counterparts. These representations are composed of data, such as product lifecycle management (PLM) data and computer-aided design (CAD) models, as well as data collected directly from their physical sibling. The result is a valuable tool with numerous applications, including simulation, testing, and maintenance.

Though a digital twin can be used in isolation for a particular application, such twins can be expanded to reflect the entire product lifecycle from creation to disposal and allow users to ensure that it aligns with their goals at every stage. These more comprehensive twins, sometimes called virtual twins, can provide organizations with a wealth of information about how a design change will affect a product's performance during testing, or reduce the materials required to manufacture it. These twins can offer these kinds of insights during the design process, before a prototype is even created. Similarly, such twins used to represent processes allow users to assess the value of potential changes without disrupting the existing process.

The insights digital and virtual twins provide allow organizations to shorten product development cycles, improve product quality, create more innovative designs, and reduce costs. In addition, they are a key enabler of EaaS and connected services business models for OEMs and their customers.

The Benefits of Digital and Virtual Twins

No matter which after-sales service model industrial equipment companies favor, digital and virtual twins allow them to provide a high level of value to customers while maximizing their own after-sales service revenues and margins.

By leveraging both models and data, digital and virtual twins offer more accurate insights into equipment performance for OEMs using an EaaS model with customers. Customers with a connected services model can use these twins to glean those insights themselves. In either case, digital and virtual twins enable users to maximize the benefits of new after-sales service models by reducing equipment downtime and ensuring higher levels of OEE. This improves output and helps customers bring products to the market more quickly.

Digital and virtual twins can provide additional value when they mirror production lines or even entire manufacturing setups. Users can maintain the equipment on these lines more effectively and can also use the digital twin to evaluate how changes to the equipment affect the line's efficiency and the sustainability of production. Because these adjustments can be evaluated and optimized without touching the physical equipment, no production time is lost.

For customers, digital and virtual twins lead to more efficient, more environmentally friendly processes, reduced costs, and better products. For OEMs, they help facilitate after-sales service approaches that make these outcomes possible.

Summary and Conclusions

A highly competitive global marketplace has manufacturers seeking ways to maximize OEE, control service costs, and bring new products to market more rapidly. OEMs, meanwhile, must find ways to deliver on these goals by offering alternatives to traditional service agreements. At the same time, OEMs must evaluate and prepare for these new models' impact on their businesses.

- Traditional industrial equipment after-sales service models can be inefficient, resulting in lengthy, unplanned periods of downtime, unpredictable costs, and a more significant environmental impact than those of newer models.
- EaaS and connected services models improve on traditional after-sales service agreements by using real-time data to help improve OEE by predicting maintenance needs, allowing for making more timely repairs, and minimizing costly unscheduled disruptions.
- With the EaaS approach, OEMs retain responsibility for equipment service and maintenance. They monitor equipment wear and performance data to inform service decisions. Customer costs are contractually tied to agreed-upon metrics, such as equipment uptime and output, so the customer pays a rate commensurate with their use of the equipment.
- With a connected services model, customers purchase equipment from an OEM and assume responsibility for its service and maintenance. Customers monitor equipment data with an IoT platform and analyze the data using AI and ML. They then use this analysis to service and maintain the equipment more efficiently.
- Digital and virtual twins—virtual representations of physical products, processes, or systems—play an important role in enabling OEMs and their customers to adopt an EaaS or connected services model. These twins allow users to mirror the behavior of their physical counterparts, improving OEE and the equipment maintenance process while making production lines and manufacturing more efficient.

EaaS and connected services models improve on traditional after-sales service agreements by using real-time data to help raise OEE.

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