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Reducing Costs Across the Service Lifecycle in 2020

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WHITE PAPER

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Service teams are constantly challenged to cut costs and gain efficiencies, yet this is seldomly straightforward. There are high levels of complexity in service networks and costly physical resources required to optimize them. However, service organizations understand capturing even fractional percentage improvements in key metrics such as truck rolls, first-time fix rates (FTFR), and asset uptime, can generate millions in operational savings. Many have successfully recognized these efficiencies with traditional methods but have reached a point of diminishing returns.

Technology is powering high value service use cases to drastically reduce extensive labor, asset, part, and customer costs across the service lifecycle. Three impactful areas to cut these service event costs include low-touch remote resolutions, empowering technicians for unprecedented levels of field service efficiencies, and enabling customer self-service initiatives. While these service paths can generate massive cost savings internally, they can externally unify the supply chain and strengthen customer relationships.

Service teams face constant pressure to cut costs across the service lifecycle

Service lifecycles and networks are remarkably complex, creating an ongoing challenge for teams to gain visibility and manage daily operational activities. Within this complexity are an array of costs that service teams are constantly aiming to reduce; IDC cites reducing service-related costs as a top three service driver facing teams.

The full cost of service across labor, assets, parts, and customers

The countless direct and indirect service costs span the organizational value chain, but can be summarized as labor, assets, parts, and customers.

- **Labor costs** associated with service largely revolve around the technician. This includes training, logistics-based performance (skillset, proximity), dispatching (truck rolls), and managing on-site service tasks. These technician activities are interlinked in how they impact service costs; ineffective training of a new technician can impact their in-field performance and result in lower first-time fix rates.
- **Asset costs** are mainly for maintaining sold products' uptime in the end user's environment. The manufacturer could have issued service-level agreements for warranties with contracts to maintain uptime or compliance, where there can be stiff penalties for downtime.
- **Part costs** are associated with asset costs because they are fundamental to replenish the deployed asset and prevent or remediate its downtime. There are also massive cost saving opportunities to optimize the inventory of spare parts and consumables across warehouses, stock locations, and dealerships. The stakes grow with complex products whose uptime is critical such as airplanes. Spare parts and labor are estimated to represent 77% of total field service costs.
- **Customer costs** may be considered indirect to the manufacturer or service team but there are massive operational implications for any product downtime or loss in asset efficiency. Dissatisfactions with the service of products can directly impact customer-centric costs including net promotor scores and churn rates.

Leveraging technology for service visibility cuts these costs

For many companies, visibility into service networks is limited, costs are difficult to trace, and operations are reactive. For example, 17% of manufacturers report still using a break/fix service model for their products, even though downtime can reach more than $260,000 an hour in some industries and technology exists to drastically reduce this.

Leveraging technology to manage, optimize, and predict events throughout the service lifecycle can drastically cut costs. Gaining this predictive visibility for even slight percentage improvements in service metrics like first-time fix rates, generates significant cost savings for massive service teams.

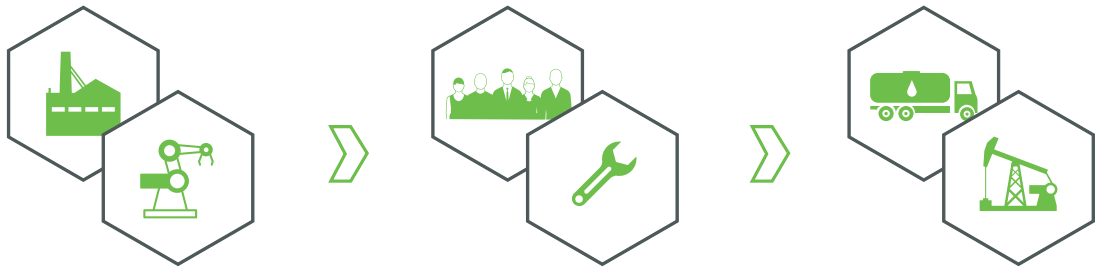
Case Study: Digital Transformation for Service Optimization

CASE STUDY: **MAJOR EQUIPMENT MANUFACTURER**

A major manufacturer of power equipment fueled its service network by streamlining dealership networks and the end users they service.

- The OEM embedded Industrial Internet of Things (IIoT) technologies into its products to gain visibility, which derivatively impacted critical service and operational KPIs for its dealership and end user. This also offloaded service-related costs (warranty, total cost of ownership, truck rolls etc.) from its outstanding liabilities.
- The dealership improved the customer relationship by increasing asset uptime and optimizing service delivery costs through equipping technicians with critical repair insights for severity, proximity, skillset, and remediating actions required.
- The end user operating a mine in a sub-zero environment improved the reliability, availability, and uptime of mission-critical assets.

While the service network can take many different complex forms, this example illustrates the mutually beneficial impact and largely untapped potential of gaining visibility across the service lifecycle.



OEM

- Lower service costs & liabilities
- Strengthen channel relationship

DEALERSHIP

- Optimize service delivery costs
- Reinforce customer relationship

END USER

- Improve reliability, availability, and uptime of mission-critical assets
- Gain operational visibility & predictability

Three strategic service paths CxOs can take today

Reducing costs are top-of-mind for every CxO, yet the cost's source is unique from industry-to-industry, or even company-to-company. Some companies are struggling with extensive transportation and labor costs from a sizeable service team completing routine maintenance on widely dispersed assets. Some companies have low first-time fix rates on deployed machines, compounding labor, downtime, and customer-explicit costs like churn. Some companies have expensive truck rolls from deploying highly skilled, but in short supply, expert technicians to perform complex maintenance procedures. Some could have massive in-house support organizations required to constantly resolve customer problems and maintain product uptime.

There are innumerable components making up the cost structure of service organizations. CxOs should prioritize reducing the most pressing and highest cost component that is detrimental towards achieving efficiencies and limiting growth opportunities.

PTC has identified three trending strategies that forward-thinking CxOs are implementing to reduce their service costs today:

- Resolve service issues remotely
- Equip technicians with the right tools, parts, information, & skills
- Enable customer self-service

Given the unique business situation, one or a mix of these service cost levers will be applicable to lean on.

Remote resolutions drastically increase service profitability

While technicians will always be key in service, there are massive gains to be had from optimizing their work and time today. Truck rolls are usually the highest service cost; averaging between $150-$500 per service event, but for some companies with complex, timely, and resource-intensive repairs it can reach up to $1,000 per instance. This is prevalent for companies with complex industrial equipment and higher service unpredictability, creating longer first visit repair times (4.4 hours) and higher percentages of incidents on site (48.9%) than other verticals (Enterprise IT is 2.3 hours, 26.2%).

Travel (fuel, time, method) and labor (wages, skillset) costs can pile on for service teams with thousands of technicians. Even with these high-cost consequences, this truck roll process hasn't been fully optimized in many organizations; the 'No Fault Dispatch' (NFD) industry rate stands at 17-20%, where technicians make the costly trek to the asset's location to only find there is 'no fault found' (NFF).

Say there is a service team fleet of 200 technicians that completes 600 truck rolls per day (technicians average 3.2 jobs completed per day), which costs an average of $500 for the truck roll and creates a total operating cost of $300,000 a day. If the 'No fault dispatch' rate is 20% for these 600 visits (meaning one-fifth of the visits were unnecessary), this would amount to losing $60,000 a day and $15.1 million a year (assuming there are 252 working days). Even if this hypothetical example is at the aggressive end of assumptions, most will agree driving minor improvements in service efficiency metrics such as NFD, can drive massive cost savings (if the NFD rate was 15%, the team would lose $45,000 a day and $11.3 million a year).

Service Scenario: 'No Fault Dispatch' Rate	Results
NFD Rate	**15%-20%** of **dispatches** were **unnecessary**
Total Sunk Costs	**$45,000-$60,000 Daily Sunk Costs** **$11.3-$15.1 million Annual Sunk Costs**

Assumptions: 200 Technicians complete 600 Truck rolls per days,
For 252 working days a year. $500 cost per truck roll.
Total Daily & Annual Operating costs: $300,000 & $75.6 million

Resolving these issues remotely through innovative technologies including the IIoT will substantially reduce costs across manufacturers' fleets of products and the service teams adhering to them.

Solving service issues remotely drives significant cost savings

Keeping the technician home is the most cost-effective resolution to service requests. Resolving these issues remotely increases service profitability by reducing the associated labor (truck rolls), asset (warranty, penalties) and customer (downtime) costs.

Historically, it has been challenging to significantly reduce these costs without insight into the deployed product. For example, the average cost to replace a failed product component such as a sensor during a warranty period is $350, which includes labor costs for administrative personnel processing the claim,

the physical service repair, and sourcing the supplier parts. However, 50% of reported 'failed components' by customers during the warranty period are later determined to have 'no fault found' (NFF) creating a sunk cost.

Complex products with several operating components also need to analyze the entire system's performance to lower future NFF rates. For example, a pressure spike in a hydraulic pump causing a leak may not be a failure of a single component (seal, sensor, pump etc.) but a system-wide failure of these combined components interacting with each other.

By using remote resolution technology to illustrate products, components, and systems are performing as intended, companies significantly reduce dispatches and derivative labor costs. These are a few examples within a massive opportunity to impact the service cost structure through remote resolutions and technology innovation.

Growth in smart connected products drives the need & opportunity for Remote Service

Smart, connected products (SCPs) are becoming increasingly pervasive in industrial environments; Capgemini estimates 50% of manufacturers now have connected products. With SCPs, manufacturers and service teams are beginning to peer past the traditional 'point-of-sale' transaction and into the black-boxed customer environment their products operate in.

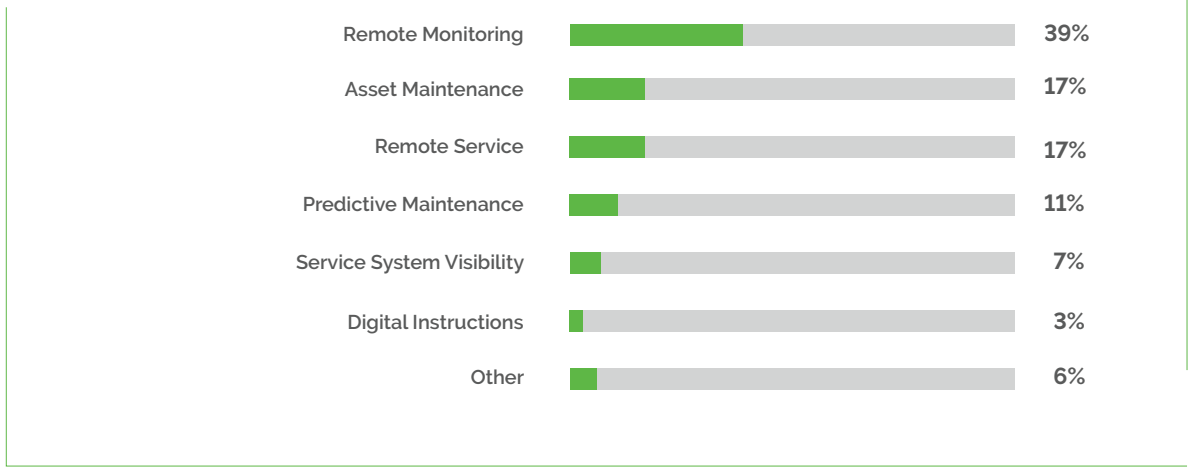
Embedding IIoT connectivity to-and-from this massive base of legacy and new assets in-the-field is underpinning cutting-edge applications and use cases driving service value today.

Remote Monitoring of deployed products is the foundation for future service

Remote Monitoring or 'remote condition monitoring' connects, collects, and manages real-time IIoT data from machines, equipment, and other heavy-industrial assets out in the field. According to PTC's State of Industrial Internet Things research, Remote Monitoring is the top use case (21% of respondents) for smart connected products and for IIoT use cases in Service functions (39%).

This visibility into the current status and properties of deployed products provides powerful foundational software application building-blocks to layer-on management, diagnosis, access, and control capabilities. Initially aggregating performance data from deployed assets through remote monitoring creates a baseline to run powerful analytics and trigger remote actions.

WHICH USE CASE IS MOST APPLICABLE FOR THE APPLICATION BUILT ON THE THINGWORX PLATFORM? (SERVICE FUNCTION ONLY)



Survey of PTC customers, FY 2020 Q1 n =99

The Remote Service use case further embodies this 'take action' layer where bi-directional over-the-air software package updates and troubleshooting capabilities can greatly lessen the need to dispatch a technician, especially for trivial tasks. Service teams can set condition-based alerts and automate actions based on product data fluctuations in energy, hours of operation, telemetry, system failures, temperature, and log files, among others. Service leaders expect a 57% increase in remote service activities in the next 12 months to further minimize service response times.

bell howell

Bell and Howell are cutting costs and solving problems before its customers know they exist through remote monitoring and predictive service. The company had previously lacked visibility and connectivity into its 30,000 industrial assets deployed across its customers locations. Incorporating real-time machine data into the service process workflow improved off-site remote machine maintenance handling by troubleshooting 63% of service tickets and on-site technician efficiency by increasing first-time fix rates to over 90%. Bell and Howell's 'Insights-as-a-Service' customer self-service program will leverage these IIoT-enabled insights to further empower its customer's technicians and lessen the need for Bell & Howell to hire additional service staff.

Shift to Predictive Service creates even greater cost savings

Innovations in artificial Intelligence and analytics are allowing manufacturers and service teams to more accurately and timely predict service events. Historical asset data and increasingly IIoT-generated performance data can feed predictive analytics models, which generate remote service actions without an end customer even knowing. This Predictive Maintenance for Service use case is growing and IDC predicts by 2021, 90% of manufacturers will leverage real-time equipment and asset performance data to self-diagnose issues in advance and trigger a service intervention to avoid unplanned downtime. Predicting and addressing these problems before they become failures can reduce post-event costs including complex maintenance activity, truck rolls, and part replacement.

Elekta

Elekta's cancer and brain disorder machines serve over one million patients annually in more than 6,000 medical facilities. The Swedish manufacturer implemented remote service to resolve 30% of machine issues remotely and uses predictive analytics to carry out 600 annual preventative service actions annually. The powerful results included saving over 1200 clinical hours for treating patients by avoiding downtime and cutting truck roll costs by reducing one-third of technicians' travel time. Predicting machine failures allows for Elekta's medical facility customers to have higher rates of uninterrupted treatments and remote resolutions enable Elekta to lower its own service labor costs.

Empowering technicians with the 'right stuff' increases field service efficiency

While remote resolutions are saving millions in truck roll costs, manual service interventions still occur. Remote resolutions are most effective when dealing with a homogenous asset install base where troubleshooting and repair processes are well documented and easily executed.

However, the more diverse and complex an installed base, the more a service organization must rely on experienced technicians for on-site visits. This is a common daily operating procedure for industrial companies with complex maintenance tasks that must scale for thousands of heterogeneous assets- some dated and some newer- deployed across geographies.

Many OEMs have longstanding deployed products operating in their customer's installed base with useful lives of more than 20 years. In many cases a more experienced technician is needed to perform a complex service action on this dated piece of equipment. However, service teams have a decreasing skills talent pool; 70% claim they will be burdened by a retiring workforce in the next five to ten years. These skills gap effects will likely magnify with the highest internal challenge facing service teams currently being the skillset & quality of their workforce (40% of Service organizations) and workforce engagement & retention (37%).

With products becoming more complex and customized for customer-centricity, this 'service complexity' dilemma grows in proportion. Companies in the industrial equipment vertical are challenged with these complex maintenance procedures and report longer first visit repair times (4.4 hours) and higher service unpredictability (48.9% incidents on site) than others.

The effects on truck rolls and first-time fix rates are significant; 25% of all service calls require at least one additional visit to solve customer needs with the 'dispatch of an unqualified technician and the absence of the right part or tools' being primary reasons why.

Spare parts and labor are estimated to represent 77% of total field service costs.

Service teams cite the most important metric in focus is first-time fix rate (52% of Service Council respondents agree), yet the industry standard rate remains at 75% . If an organization applies this 75% FTFR benchmark to its 600 planned complex daily service visits costing $500 per truck roll, this would mean only 450 service visits resolved the problem the first time and a $75,000 loss in unsuccessful truck rolls. However, this cost can compound as additional more-experienced technicians must take time away from their own work to rectify the service issue.

Service Scenario: FTFR	Results
First-time fix rate: 75%	Only **75%** or **450 (of 600) service visits** were **successful** the **first-time**
Total Sunk Costs	**$75,000 Daily Sunk Cost** **$18.9 million Annual Sunk Cost**

Assumptions: 200 Technicians complete 600 Truck rolls per days,
For 252 working days a year. $500 cost per truck roll.
Total Daily & Annual Operating costs: $300,000 & $75.6 million

Ensuring the technician is successful the first time inhibits cascading costs from follow-up truck rolls and even customer churn from product dissatisfaction. To do this, service teams are equipping the right technician, with the right skills, tools, parts, and information to solve the service problem at hand. Technologies including service lifecycle management (SLM) and IIoT are more accurately providing the root cause of a problem while augmented reality (AR) is proving an innovative hands-on means to service the equipment in the field.

Initial understanding of the service issue through Root cause analysis improves FTFR

Service teams will significantly decrease their FTFR if they dispatch an underprepared technician to repair complex equipment without an accurate predefined set of tools, replacement parts, and insight into the problem they are going to fix. To lessen service unpredictability and complexity, service teams will preemptively identify exactly what they'll need to successfully resolve the problem the first time on-site. Specifically, technicians must be aware of the skillset and tools they need to resolve the problem, replacement parts and consumables to replenish the product, and information (product manuals, service instructions) to complete the task. This service information must be up to date, inclusive of any upstream engineering design changes and digestible through accurate and in-context work instructions.

Understanding the 'root cause' of issues in the field replaces these service dispatch assumptions with real-world facts. IIoT provides more granular asset health information such as anomalies or failures of a specific component, for service teams to issue remediating repairs. Service Parts Management systems ensure that the right part is available at the right time and place to resolve the service issue.

With this root cause analysis and predictivity in the service lifecycle, less time is wasted on the backend finding information and tools for the technician. This greatly reduces truck rolls and FTFR costs associated with sending an unprepared technician into the field. Over 46% of service teams are expected to implement root cause analysis and predictive alerts to trigger field dispatch with greater accuracy of triage and diagnosis over the next 12 months.

25% of all service calls require at least one additional visit and 'dispatch of an unqualified technician and absence of the right part or tools' are primary reasons why.

Equipping and empowering the service workforce with digital tools

Train junior-level technicians to heighten workforce knowledgebase

Most training programs are insufficient at providing new workers with the skills they will need to succeed in their roles. This is a result of dated training methods, not a lack of trying, and certainly not a lack of investment; annual United States training expenditures reached $88 billion in 2018.

Out-of-context training classrooms with burdensome paper-based manuals simply do not translate well into real-world service work. Only 12% of workers apply skills from training to their jobs and the estimated total loss from ineffective training to a business is $13.5 million per 1,000 employees.

The most effective way for workers to learn, develop skills, and complete tasks is through 'Just-in-time learning' methods where the right information is provided to the right employee in context to the physical environment.

> 70% of Service teams will be burdened by a retiring workforce in the next five to ten years and 37% face internal workforce engagement & retention challenges

Augmented reality is the emerging technology to deliver this method throughout the learning lifecycle:

- Product visualization & demonstration provides more interactive classroom training.
- On-the-job virtual work instructions overlay in-context digital information including step-by-step sequences reducing cognitive distance.
- Remote assistance connects experts to junior-level field personnel to quickly solve in-the-field complex problems.

Elevating a workforce's skillset provides a broader base of workers to solve more complex problems. This higher skilled workforce can greatly reduce time to resolution (57% of service teams cite as a problem), improve first-time fix rates, and decrease correlating costs for servicing complex machinery.

Augmented reality elevates these skills both in-and-out of the training room, with the following use cases illustrating the technology's real-world impact.

Replace paper-based service instructions with Augmented Procedural Guidance and Parts Identification

Many organizations still rely on paper, which on its own creates a costly footprint but also consequently creates bottlenecks for the transfer of information. 78% of manufacturers leverage outdated and ineffective work documents, diminishing standardization and quality.

Service complexity is growing from more sophisticated products in the world requiring synchronized service manuals and procedures, which isn't a paper-friendly process. Scaling these paper-based service methods for organizations with thousands of complex assets in-the-field is costly for the organization and ineffective for the technician.

Augmented Procedural Guidance (represents 27% of State of Augmented reality research service use cases) manages relevant content to overlay in-context step-by-step service instructions to perform processes, repairs, and the assembly of parts. Quickly putting a 3D service instruction guide in the technician's field-of-view generates faster actions and negates time spent looking for service information.

sysmex

Sysmex is a global manufacturer of blood and urinalysis equipment with 10% of its revenue coming through service. The medical OEM recognized making its service technicians more effective in the field was needed to reduce its medical equipment downtime and optimize labor costs. Sysmex replaced paper-based manuals with AR step-by-step work and service instructions, which empowered technicians with accurate, up-to-date, and in-context information. Technicians can fix problems faster, which has reduced Sysmex's mean time to repair and increased first-time fix rates.

With continuous advancements in artificial intelligence and computer vision, augmented reality will recognize intricate products and parts to provide detailed service guidance on a massive scale. Augmented Parts Identification can portray the 3D replacement part and its associated ordering information (part number, description, price, availability) to the technician.

Leveraging emerging technologies including augmented reality to replace paper and other traditional information transferring mechanisms will greatly improve the technician's effectiveness and related time-to-resolution metrics.

Capture and scale service workforce expertise with remote assistance and knowledge transfer

With a workforce growing closer to retirement, it is increasingly important to capture and scale service expert's domain knowledge. AR can be used to instantly connect remote experts to field personnel for over the shoulder support and real-time collaboration to solve complex or unexpected service problems. This Remote Assistance use case that provides on-the-job support is the service problem AR is best suited to improve first-time fix rates, according to 72% of Service teams.

TOYOTA

Toyota's production staff oversees the installation of new manufacturing lines and maintenance of existing ones. The automotive OEM physically sends staff to operations across the globe for this important process. Implementing Remote Assistance allowed Toyota to reduce physical travel (eliminating four onsite visits a month per section manager) and downtime costs with its production staff remotely resolving factory installation and maintenance issues.

Rapidly transferring knowledge and expertise also come through capturing workflows to create digital content, such as standard operating procedures. Using AR to capture and transfer knowledge can enable rapid documentation to new or existing workers for training or real-world service guidance. AR provides a new method to capture this field service data and integrate it with service team's current IT infrastructure, which 50% of service teams cite as currently a significant internal challenge.

GLOBALFOUNDRIES

GlobalFoundries faced significant production bottlenecks from a lack of detailed standard operating procedures across its facilities. This paper process inhibited worker productivity and drove up training costs. The major semiconductor manufacturer implemented augmented reality as the standardized and scalable platform to deliver work instructions from captured workflows across its several locations. This implementation reduced scrap and rework costs by 25%, accelerated training on-ramp time by 40%, reduced documentation authoring time by 50%, and decreased unscheduled downtime by 25%.

Enabling higher levels of customer self-service

Many manufacturer's products operate in mission-critical environments. This could be hematology analyzer machines in a hospital, diaphragm compressors in wastewater treatment facilities, or power equipment in arctic circle mines. Stringently maintaining asset uptime in these challenging settings is fundamental to operations and downtime is estimated to reach upwards of $260,000 per hour. With a few hours of downtime, these costs can quickly snowball into the millions and even more for end users with thousands of assets across their operations.

In these high-stake operational situations, a degree of customer self-service is mutually beneficial for the OEM or service provider and the end user operating the product. By providing the end user operational intelligence of these assets, OEMs are offloading some service responsibilities and correlating costs, while the end user improves their high-value asset's uptime. The manufacturer can also offset expensive and inefficient truck roll costs by providing the end user with service information on trivial repairs and to predict future maintenance of their own assets.

Democratizing this asset intelligence and service information across the service lifecycle drives improvements in direct operating costs, while indirectly improving customer satisfaction and churn rates. Technologies such as the IIoT provide a method to power this emerging customer self-service model and the critical machines customers operate.

Customer self-service cuts costs for manufacturers and their customers

Without predicting when a failure will happen, the operation will stop, a repair will be needed and likely require a service provider and spare parts. Preemptively detecting these issues can greatly minimize impact to operations and lessen the exponential costs of downtime.

When OEMs provide customers with operational intelligence into their products, they can better predict service events to resolve issues remotely, schedule planned maintenance, and equip technicians with the right service information.

FLOWSERVE®

Flowserve manufactures pumps and seals that operate in plants and industrial facilities across the world. The manufacturer now offers customers condition monitoring, where through IIoT, they are provided real-time operational conditions of deployed pumps and seals. Flowserve can also leverage real-time sensor data for predictive analytics into deviating pump cavitation and vibrations to predict downtime. With condition monitoring and predictive analytics, the OEM can save its customers over $16 million of downtime day.

Manufacturers offload certain responsibilities and correlating costs

As previously analyzed, truck rolls and first-time fix rates take a significant toll on manufacturer's operating expenses. While remote resolutions and equipping technicians with digital tools can cut the expense on manufacturer's own financial statements, elements of these service methods can be outsourced to the customer or significantly cut.

Enabling a customer with certain service responsibilities can reduce manufacturer's costs for warranty and compliance, while improving customer satisfaction and brand loyalty. To do this, manufacturers must provide asset performance data and analytics to illustrate their product is operating as intended.

Warranty costs across a fleet of products from a failed component during a running period can cost millions yet 50% of reported 'failed components' are later found to have 'no fault found'. If a manufacturer provides the real-time performance data of assets and their parts through remote monitoring, they can quickly disprove customer warranty claims and long-tail processing costs.

50% of manufacturers have connected products and 90% will leverage real-time performance data to self-diagnose issues to avoid unplanned downtime by 2021.

Proving products are operating in compliance traditionally increases downtime costs for taking the asset offline and dispatching technicians to run tests. With remote monitoring, manufacturers can prove to customers and government agencies their products are within compliance parameters. For example, Sysmex leveraged IIoT data to prove to the FDA that their deployed products are compliant, reducing associated service technician intervention costs.

Howden

Howden is a manufacturer for air and gas handling with a company mantra of 'revolving around you'. The OEM applies this customer-centric mindset to its connected field maintenance program called Uptime. This program provides customers with real-time performance data of deployed assets and empowers them to resolve issues internally. Howden's program offloading service responsibilities to the customer is significantly reducing its own service activities including truck rolls, which generates $40 million in annual service cost savings.

Create service transformation in your organization

While the service lifecycle is immense and complex, this magnitude creates massive opportunities for efficiencies and cost savings. There are three paths that companies can take for service transformation today that tie directly to CxOs top-of-mind financial metrics depending on the costliest pain point:

- If excessive truck rolls, then remote resolutions
- If low first-time fix rates, then empower technicians
- If expensive downtime, then enable customer self-service

Organizations are aware that slight improvements in these metrics drive significant cost savings. Within these paths, successful organizations will identify the highest value use cases to find these improvements, immensely cut service costs, and generate quick service wins to build momentum from.

The time is now to drive transformative change across the service lifecycle and the technology to enable quick service wins provides a path to do so.

Discover how you can change the state of your service organization.

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July 2020

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