

ADVANCED TECHNOLOGY SERVICES, INC.
DRIVING VALUE TO MANUFACTURING PLANTS WITH
WORLD CLASS MANAGED EQUIPMENT SERVICES



A Frost & Sullivan White Paper

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**Advanced Technology Services, Inc.**

Advanced Technology Services (ATS) improves the productivity and profitability for many of the world's most respected manufacturers through the managed services of production equipment maintenance, information technology and spare parts repair. Born out of the need for American manufacturers to remain competitive in a fast changing global economy, ATS is the recognized leader in outsourced production equipment maintenance. For more information, visit ATS' website at www.advancedtech.com.

Objective

This whitepaper discusses the inherent benefits and solutions associated with implementation of an outsourced maintenance services program. It also provides a brief summary of ATS' best practices and value propositions within the outsourced maintenance services space.

Introduction

"The first question you have to ask [when considering outsourced maintenance services] is...is it a core or context activity?' It would be hard for any manufacturer to say that their maintenance operation is core..your customers aren't paying you any more or any less because you run your maintenance operation or someone else runs your maintenance operation." *President of a major industrial equipment supplier*

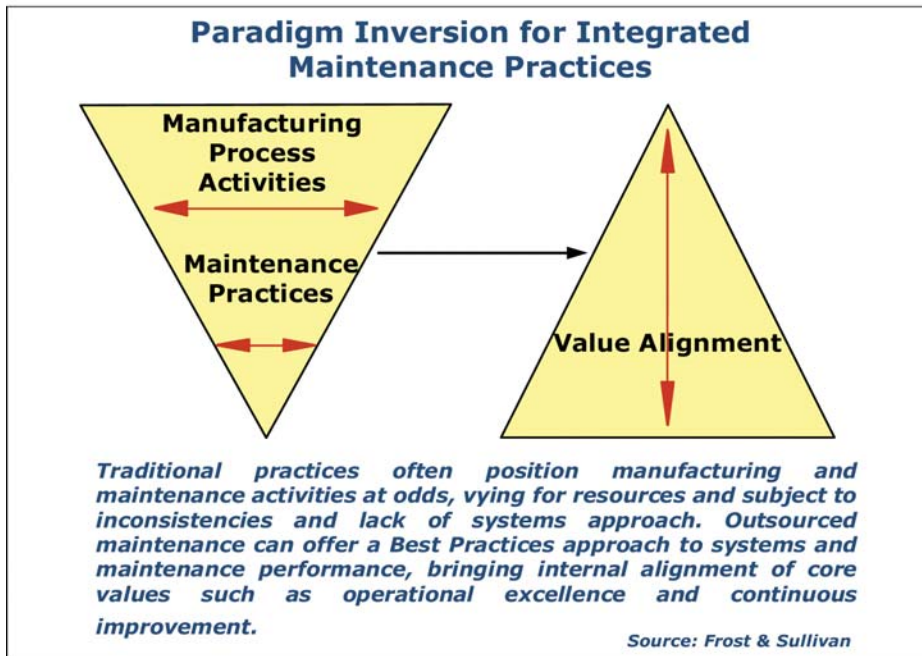
It has likely never been more challenging to be in the manufacturing space. Globalization, economic recession, labor shortages, mature markets where growth means stealing market share and products can be differentiated more effectively with soft issues like delivery time than with product features— these factors (and more) challenge companies daily, all the way to the plant floor.

A critical concept that is increasingly being used to evaluate manufacturing floor operations within the context of the greater organization is that of core competency. The basic definition of a core activity/competency is that it provides direct value to the customer. If it does not, it is a context activity and is a lower priority for resources than core activities. As plant managers look at having to do “more with less” while still driving increasing value to customers, they see merit in concentrating on core competencies and shedding context activities. Outsourced equipment maintenance services then pops up on their radars.

While the factors mentioned above certainly contribute to the trend in outsourced services, there are three critical manufacturing plant challenges that are highlighted in this document. The challenges are competition, compliance, and collaboration, with accompanying value trends (the underlying motivation behind all key actions to achieve an optimized production process.) In this whitepaper, we will discuss these challenges, what are best-in-class solutions, and how ATS represents a “best practices” partner approach to challenging plant issues.

Value alignment signifies that an enterprise, both within the four walls and outside of it, is working towards a common goal. The goal could be different for different businesses: profit, availability, or production. The key reality is that everyone has a role, and the overall goal cannot be achieved without value alignment, not just within the enterprise but also across the entire supply chain. This includes the equipment maintenance practice, the performance of which can materially affect key production and customer service metrics. Chart 1.1 illustrates the concept of value alignment as it pertains to integrated maintenance practice and philosophy.

Chart 1.1: Shift to Alignment in Values and Practices



Best in class maintenance services can provide an efficient alignment of maintenance practices with the overall organizational paradigm of excellence.

Challenges in the Manufacturing Sector

Chart 1.2 illustrates the key customer challenges and value trends. Frost & Sullivan believes the 3-C framework very clearly articulates the challenges faced by manufacturing organizations the world over.

Chart 1.2: Key Customer Challenges and Value Trends



Source: Frost & Sullivan

Competition

An intense competitive scenario is now commonplace due to globalization and the need to deliver shareholder value, continuously innovate and manage cost pressures. The intensity of this environment has increased the drive to and importance of lean manufacturing and optimization. As manufacturing operations strive, in the current challenging economic climate, to “do more with less”, there is significant pressure to scrutinize every cost and drive a constant higher value component to customers. An explanation of the value trend for the challenge theme of competition is given below.

Lean Enterprise

Competition has intensified across manufacturing verticals. Inefficiencies in workflow and technical or human error resulting in unplanned downtime have a negative affect on product quality, operating and lifecycle costs, customer service, and, ultimately, profits. Operational excellence has thus become a prime mantra, as the highly competitive nature of the market makes it crucial that companies find ways to improve existing products and introduce new products while managing costs. Incorporating lean manufacturing, reducing the time it takes to get product to market, and utilizing a process that has the flexibility to adapt to a company’s changing needs are all ways to address this challenge.

This excellence in operations can be achieved through elimination of waste and a culture of continuous improvement, both key attributes of a lean culture. An integral part of this overall fabric of excellence in a manufacturing organization is the maintenance process and function. Increasing pressure on margins compels manufacturers to restructure their operations and ‘to do more with less’. There is a constant pressure on the production department to reduce operational costs. There is a need for implementing lean and flexible concepts within the manufacturing sector which extends beyond the plant floor and through the supply chain. The concept of eliminating resource (both human and capital) spend that does not directly drive more value to the customer is one that ideally pervades the entire value chain and ultimately out to the end-user.

“Suppose your production goes down 25%...you’ll make appropriate activity reductions but uptime is as critical as it was before.”
Operations Director, manufacturing plant

The Role of Maintenance Practices in a Lean Culture

Maintenance processes and practices are important factors in the overall concept of lean and total quality. Indeed, as the concepts of lean manufacturing have become an integral part of the manufacturing space, the idea of lean maintenance has followed logically after the fact. While there are varied definitional scopes for the term “lean maintenance”, most agree on several critical characteristics:

- It is proactive in nature, not reactive
- It is built on systematic, repeatable processes practiced consistently
- It utilizes robust, all-encompassing data monitoring and analysis schemes that allow informed decision-making that has a direct, measureable impact on equipment performance metrics
- It is not viewed simply as a discreet program, but as part of a total enterprise-wide dedication to an overall asset management system
- It extends beyond the shop floor to include areas such as inventory management and training, and extends through the supply chain

An effective lean maintenance program complements a lean production culture by direct positive contribution to the key lean tenets of elimination of waste and continuous improvement. Best practices used in maintenance programs contribute to both sides of the return on assets equation: optimized equipment performance can increase revenues while mitigating the need for capital investment to increase output.

Compliance

The compliance challenge can span a spectrum of issues, from government/agency regulations, to safety issues, to customer spec and quality demands, to data records of production processes, to environmental regulations—the list is long. The consequences of compliance failure are also well known, ranging from something fairly benign such as a warning, escalating through a spectrum which could include loss of a customer, fines or injury to human resources. Non-compliance can also bring extreme pain in the form of plant closures and extensive negative public attention for the product and company involved.

While this punitive aspect of “enforcing” compliance has long dominated the general mindset in industry, a change has been noted over the last decade. Industry benchmark companies in a wide variety of segments have realized that, if compliance is a given—it is not negotiable, it is not going away, it is part of doing business—then the approach to compliance should not be a achieving a punitive target, but should be transformed into a process of business operation that takes the organization to the next level in performance. Achieving compliance provides the groundwork, the foundation of performance levels. From this position, top industry performers streamline processes and systems to produce sustainable practices, including everything from equipment and system performance to customer service levels to unprecedented visibility into financial performance and effectiveness. These companies have realized that they can move beyond just compliance by driving business value with systematic asset management and adoption of best practices. A concerted effort to view compliance more as a business opportunity rather than a

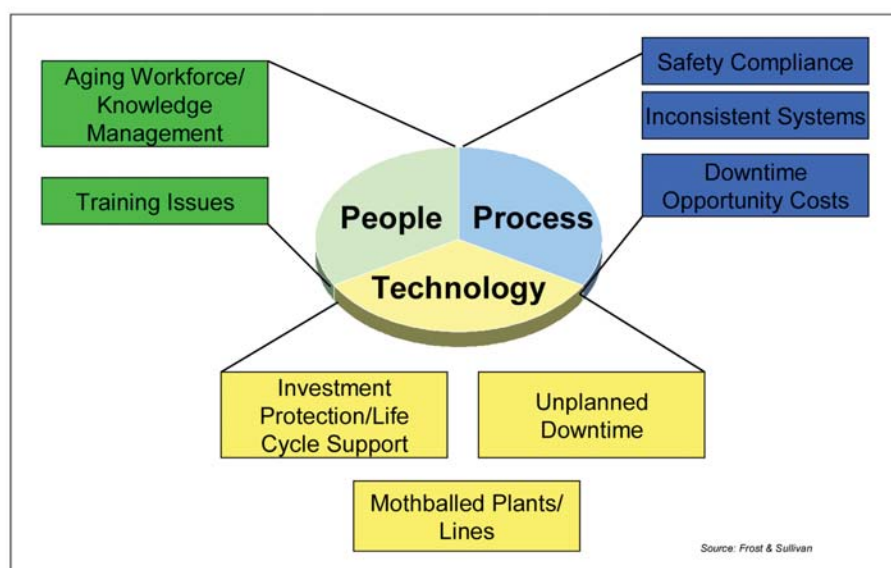
challenge to meet regulations differentiates leading innovative manufacturers.

Managing Risks

Risk Factors: People, Process, Technology

Chart 1.3 outlines selected risk factors in the areas of people, process, and technology. While this is not an exhaustive rendering, important selected issues in the equipment maintenance space are shown.

Chart 1.3: Risk Factors—People, Process, Technology



People Risk

As it pertains directly to effective maintenance programs, there is obviously significant risk involved in the aging manufacturing workforce. Not only will mass retirements negatively affect the sheer numbers available to perform maintenance activities; there is also the loss of knowledge base that comes with it. The ability for plant managers to provide adequate staffing numbers and to have a high level of confidence that incumbent knowledge is managed to the greatest benefit of the organization can present significant challenges.

Part of knowledge management also includes the issues surrounding training. Having the proper training infrastructure, keeping training updated, opportunity costs associated with training, and the ability to have effective expertise to cover a broad spectrum of equipment and concepts are key challenge factors.

The ability to mitigate risk associated with maintenance staff levels and knowledge is expected to become more important over the next five years as personnel shortages

become more pronounced. Procrastinating on implementing a solution that evolves with the status of staffing levels promises a compromised maintenance program at some point.

Process Risk

Process risk includes several key factors, including safety compliance, inconsistent maintenance and support systems, and downtime opportunity costs.

The subject of safety encompasses both maintenance technician safety, and the general safety of plant operators and operations. Technician safety is a function of proper training, proper job assignment, and good plant environment stewardship, among other factors. Maintenance staff typically has some level of danger inherent in their jobs given the equipment and materials (caustic fluids, etc.) they must constantly deal with. The costs of not providing needed resources so that technician safety factors can be properly administered are very high from a health, well-being, and even a potential litigation standpoint.

Poorly maintained equipment can also jeopardize the safety of the larger pool of production employees. Millions of dollars a year are awarded in lawsuits based on workplace safety issues. Not only is this a direct cost to the firm, there is the associated negative publicity and ripple effects in areas such as community goodwill, the ability to hire qualified workers, and perceptions of product quality and effective production processes. This is again outside the capital costs associated with equipment repair, downtime, loss of production, and so forth.

Safety experts agree that consistency in maintenance programs from different standpoints, including routine timing of activities and standardized processes for activities is important. This also includes consistency in data recording, reporting, and archiving to insure knowledge retention and accurate communication over time. Moving a program from reactive to proactive, from merely adequate to best practice level, requires change of current state/thinking (learning), benchmarking, and then instituting organized methods of achieving continuous improvement. This process is not possible without a sound, consistent data foundation on which to build best practice planning.

Downtime opportunity costs are a deeper issue than may be considered at first glance. There is the obvious issue that unplanned equipment downtime stops production, but there are many ripple effects from this that must be taken into account when looking at the total downtime cost. Production cessation means the strong likelihood that quotas will not be met, which may mean late delivery to a customer, and potential associated penalties. There is the loss of productivity (labor cost) of idled line workers. And, this is not just figured in a simple dollar per hour of downtime. What must also be taken into account are incremental activities (inspection, set up, supervisor having to spend time re-assigning employees rather than doing his job) that would not have been undertaken if the line was running normally. Additionally, one also needs to factor in that, to make up for the loss of production, "X" dollars more of product than originally forecast will have to be sold to

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cover costs. While models for determining cost per hour of downtime vary, it is not unusual to see that the cost of unplanned downtime or machine failure is quadruple the dollar amount (or higher) of planned downtime.

Technology Risk

Asset Management (AM) includes long-range planning, proactive maintenance and operation, life cycle costing, and capital needs planning that include a true cost-to-benefit analysis.

AM includes several key elements:

- Setting and monitoring performance and service standards.
- Building a company structure which facilitates a mindset and practice of least cost optimization.
- Using systems that track, report on, and help manage AM (information systems, asset inventories, etc.).
- Using tools that accomplish reliability analysis and life-cycle costing (using estimates of key parameters such as cost of asset operation, maintenance, and replacement/retirement).

The Life Cycle Cost (LCC) concept is tied in strongly with that of AM. LCC has been characterized as an optimization process that minimizes the total cost of owning and operating infrastructure assets while continuously providing appropriate levels of customer service. If it is agreed that manufacturers have both a financial interest and a quality of service interest in minimizing cost and maximizing performance, then it follows that they should manage their assets to hit both of these targets. AM and LCC can provide an integrated platform to achieve these goals. Reaping the benefits of these practices requires, however, the proper processes and systems to map out, monitor, and realize improved performance.

The cost of unplanned downtime is well documented, and is a risk on the technology side of the equation as well as on the process side. Activities that mitigate risk of unplanned downtime—regular service schedules, properly trained technicians, robust data collection, tracking, and reporting systems—can contribute value directly in improving production metrics.

In the current economic downturn, some companies have shut down (“mothballed”) production lines or even entire plants. Though not being used, these investments must be protected to maintain asset life and value, and full operational capabilities. This is the case

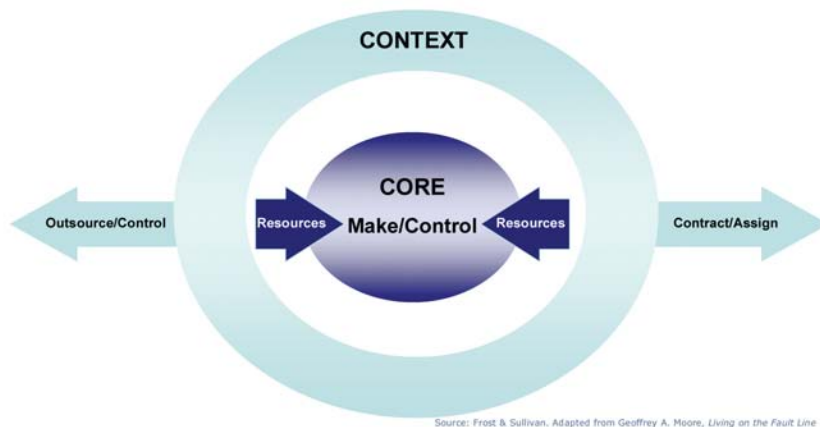
whether they are restarted at some point, or sold off. The ability to achieve proper maintenance levels may be compromised with reductions in staff that usually accompany production cessations.

While there are other factors in the manufacturing environment that contribute to risk, the people, process and technology factors discussed here are certainly among the most compelling. As enterprises calculate and plan for risk mitigation across the expanse of the entire business, the maintenance program must be part of the equation.

Collaboration

The general concept of outsourcing has traditionally focused on a “contractor” mentality in which the buyer contracted a third party to perform some activity assigned to them. There is a mentality of separation between the two entities, with the contractor firm and employees viewed as “outsiders” by the served entity. In some cases, the relationship may be characterized as even adversarial. However, given issues in the manufacturing space such as looming personnel shortages and the need for highly efficient equipment performance (as it directly affects costs and customer service), this paradigm is changing. The prevailing trend is for outsourced providers to move from an “assigned contractor” status to a “collaborative partner” status. Relationships are moving from transactional or procurement based to partnership based. Chart 1.4 illustrates this concept with the core vs. context competency model. Some context activities may be assigned, as they are not deemed important enough to need some degree of control. However, in the outsource scenario, some degree of control is implied, which necessitates a close relationship with the contractual partner.

Chart 1.4: Core vs. Context Competencies—The Key Driver for the Outsourcing Decisions



This paradigm shift is also important in the equipment maintenance program function in that, besides the basic need to have a smooth running plant floor—both machine and human—the outsourced maintenance staff will be 1) working closely, physically and expertise-wise, with internal machine operator staff and 2) the service provider must, by necessity of performance expectations, have deep knowledge of key proprietary aspects of the customer's process and key performance indicators. This requires a huge degree of trust, transparency, and clear communication between customer and outsourced service provider. This level of collaboration goes beyond assigned contractor status and exemplifies the partner level relationship that optimizes returns for both parties. This shift is one of the key value trends motivating activity to address the collaboration challenge.

Two other value trends for this challenge/trend include the quest for operational excellence and issues around parts sourcing. Meeting the collaboration challenge with a strong focus on integrated teamwork is a powerful way to drive operational excellence. Continuous improvement and process optimization will not flow consistently from a plant floor staff that is disorganized, does not communicate effectively, and does not have robust, consistent systems in place to achieve both production and maintenance goals. As discussed previously, characteristics of a lean equipment maintenance program (proactive, systematic repeatable processes, integration through the value chain) define a culture that is highly integrated, cooperative, and works with the overall organizational mission in mind.

This issue of supply chain systems is also a critical implication for overall asset management systems. A key piece of overall performance in maintenance activities is the ability to efficiently access consumables, spares, and repair. The lack of a robust, easily identifiable and accessible supply network can directly affect program goals, including machine uptime and continuous improvement.

In our ongoing research, Frost & Sullivan has identified several important factors as industry best practices in the managed equipment services area, including:

- The expertise to re-engineer or remanufacture out of date or out of warranty parts for specific customer equipment
- Knowledge of and connection with a global supplier network, including OEMs and independent sources, for a highly robust supply chain, including the ability to find and track unique or niche suppliers of specific components
- The ability to source, through this network and its own internal expertise, troubleshooting and maintenance technical support across a broad array of equipment types

These practices exemplify the collaboration philosophy as it extends beyond the bounds of the organization.

The changing relationship of outsourced service providers to trusted partner status drives the solution to the collaboration challenge. With both internal and outsourced teams focusing on core competencies yet integrated in their approaches, processes, and mission, best practices levels can be achieved across the organization.



ATS' Value Proposition—Recognizing and Responding to Challenges

The service provision spectrum in outsourced maintenance is considerable. At the lowest level, it is a transactional activity in which a maintenance technician goes to a client site to perform a discreet activity. At the highest level, it is a collaborative partnership that goes beyond discreet activities to assist customers in asset systems management, optimization of life cycle costs, and continuous improvement of machine performance. Frost & Sullivan's ongoing research in manufacturing and outsourcing best practices has found ATS to be a best practice services provider at the highest level.

The company's comprehensive services offering includes:

- Factory maintenance: ATS' "Four Walls Maintenance" Program is the gold standard in managed equipment services. Its provision of comprehensive turnkey services include parts management, certification, reliability analysis, and standardized performance metrics
- Industrial parts services—
 - Calibration
 - Component repair: technicians are trained in root cause analysis, and can repair or re-engineer parts onsite, or in the company's state-of-the-art repair facility. Component repair history is tracked to determine repetitive repair situations. ATS covers a wide breadth of machine components for repair, from electronics to controls to motors and valves.

- Repairable Parts Management Program: a comprehensive service that covers maintenance inventory issues, establishes cost savings goals, increases productivity and drives costs out by increasing MTBF, facilitating equipment utilization, and lowering component repair costs.
- Legacy components: the current economic downturn has directly and significantly impacted manufacturing production, which has, in turn, caused plant managers to put off new equipment purchases and opt for repair. But what if the needed parts are out of production or hard to find? ATS provides repair services for a variety of these components with its internal staff of experts.
- Information technology solutions: in addition to world class managed equipment services,ATS also provide a suite of services to assist companies in managing their IT infrastructure, including maintenance, security, dashboards, and more.

The scope of product services offered by ATS is a key differentiator for this company in the outsourced services space. But the true test of market leadership is not just in the promise—it is in the consistent delivery of solutions that measurably positively affect customer manufacturing performance. It is in the ability to address key challenges faced in different types of manufacturing plants with a reliable, proven system that helps solve the key challenge issues presented in this document, including competition, compliance, and collaboration.

Solutions to the Competitive Challenge Theme

ATS supports the drive to lean enterprise by bringing expertise in a variety of areas.

- Elimination of waste: This is a key tenet of a lean organization. Not only does it mean initially establishing a waste reduction target, but it is continuous evaluation and reduction of waste, which is also a continuous improvement activity. ATS brings value in this aspect through a variety of activities, including parts inventory tracking, effective parts supply chain management, and elimination of cost of non-core activities from customer payrolls.
- Quality by Design/maintenance industry best practices: Quality goes beyond product metrics—best systems have quality designed into all phases. Quality by design means understanding customer needs (basic level, performance level), developing metrics and goals, and driving continuous improvement through industry best practices. ATS brings industry best practices and a collaborative approach to listening, evaluating, and then executing based on customer need.
- Quality of Service/Uptime/Service Level performance: Regardless of percent utilization, number of shifts equipment is running, or the general economic climate, uptime is still critical. The ability to show improvement in and maintenance of high uptimes, decrease in unplanned downtimes, and consistent performance in promised service levels is critical. ATS gets high accolades from its customers in these areas.
- Continuous Optimization/Improvement: One of the primary comments that ATS' customers make is that they demand continuous improvement as an overall benchmark for program success. This has many facets, including reduction in parts spend, uptime trends, labor utilization, among other factors. ATS is able to consistently deliver continuous improvement to its customers year on year—this success is reflected in their consistent contract extensions.

"ATS has definitely contributed to an improvement in our on-time delivery..." Plant manager for a major supplier of aerospace components

Solutions to the Compliance Challenge Theme

There are many points at which an enterprise is potentially at risk on compliance issues. In this case, we are taking a broad definition of the word "compliance" in that it applies not just to the usual definition of adherence to regulatory statutes (e.g., food and beverage sanitation compliance), but also to compliance to norms that help ensure a safe work environment and a workplace compliant to quality demands such as Six Sigma or "lean". ATS' solutions for mitigating people, process and technology risks are direct hits to this challenge.

People risk revolves largely around availability, flexibility, and knowledge levels of staff. ATS uses a multi-pronged approach to the availability issue by resourcing potentially from displaced customer technicians, through an active partnership with colleges for training new technicians for the future workforce, and through its own aggressive recruiting program. The flexibility component is key especially in a volatile economic environment where demand for labor can fall rapidly and dramatically. ATS has the ability to scale down or up quickly and efficiently to meet appropriate staffing demands. Finally, ATS' ongoing training programs ensure that maintenance staff is fully trained, training is refreshed appropriately, and technician knowledge resources are appropriately deployed.

Process risk includes safety compliance, inconsistent maintenance and support systems, and downtime opportunity costs. ATS has embedded a culture of safety in its technicians' attitude and performance. Not only are technicians practitioners of safe activities, they enable a culture of safety in the greater plant environment. Inconsistencies in performance and systems—potentially a major roadblock to continuous improvement and operational excellence—is rendered a non-issue with ATS' deployment of its proven, standardized processes and data systems. Costs of downtime are also mitigated when the service supplier can deliver less downtime, more uptime, and increased MTBF in an overall platform of continuous improvement, lean and 6 Sigma. ATS performance in this area has made it a leader in the industry.

Technology risk presents in numerous ways, including maintaining the asset value of mothballed plants/lines, maintenance or replacement of out-of-production parts/machines, accidents due to improper equipment maintenance, inconsistent maintenance performance, and lack of predictive maintenance (which means higher probability of failure rather than planned downtime for repair). ATS' extensive suite of maintenance practices, re-manufacturing and re-engineering capabilities, and proven standardized, consistent processes and performance assist customers in technology risk mitigation every day.

Solutions to the Collaboration Challenge Theme

There are several key aspects to collaboration as it applies to the outsourced maintenance scenario:

- The importance of the extended value chain (parts suppliers' network), and the critical nature of the efficiency and depth of this network for efficient plant maintenance
- Tight collaboration between the maintenance service provider and the operators/staff of the customer organization to achieve optimal effectiveness of the team. Operational excellence cannot be driven by a group of outsiders trying to impose standards in a vacuum. Operational excellence and continuous improvement results are driven by a synchronized effort between service provider and customer team
- A spectrum of service offerings that allow operational excellence to be driven through the system/process, not just "fixing machines", which is a limited solution

ATS addresses each of these key areas through both its expertise and its philosophy of customer relationships. It is an organization that operates with the integrated team philosophy at a true partnership level.

ATS' Value Proposition – A Customer Case Study

It is one thing to talk about service level expectations, and another to actually deliver measureable results on a consistent basis. This case study highlights an ATS customer that, through ATS' integrated team approach and maintenance performance best practices, has achieved significant results.

"ATS' expertise makes sure that my machine uptime is up, it continues to improve, and that overall maintenance costs go down year over year. That's all I care about—they help me make more and reduce my cost..."
Operations Manager, Large Discreet Manufacturer

A manufacturer conducted a detailed core vs. context evaluation, and decided that maintenance was not a core competency. The business case was built by evaluating all aspects of the maintenance operation, including labor costs, inventory investments, repair parts and machine parts, and then looking at machine downtime and other efficiency metrics to determine if the investments were effectively placed. Determining that this was not an optimally managed program, the decision was made to consider an outsourced provider.

ATS was brought in to provide a full complement of maintenance services based on its strong core competency in these services, its focus on sound production principles such as

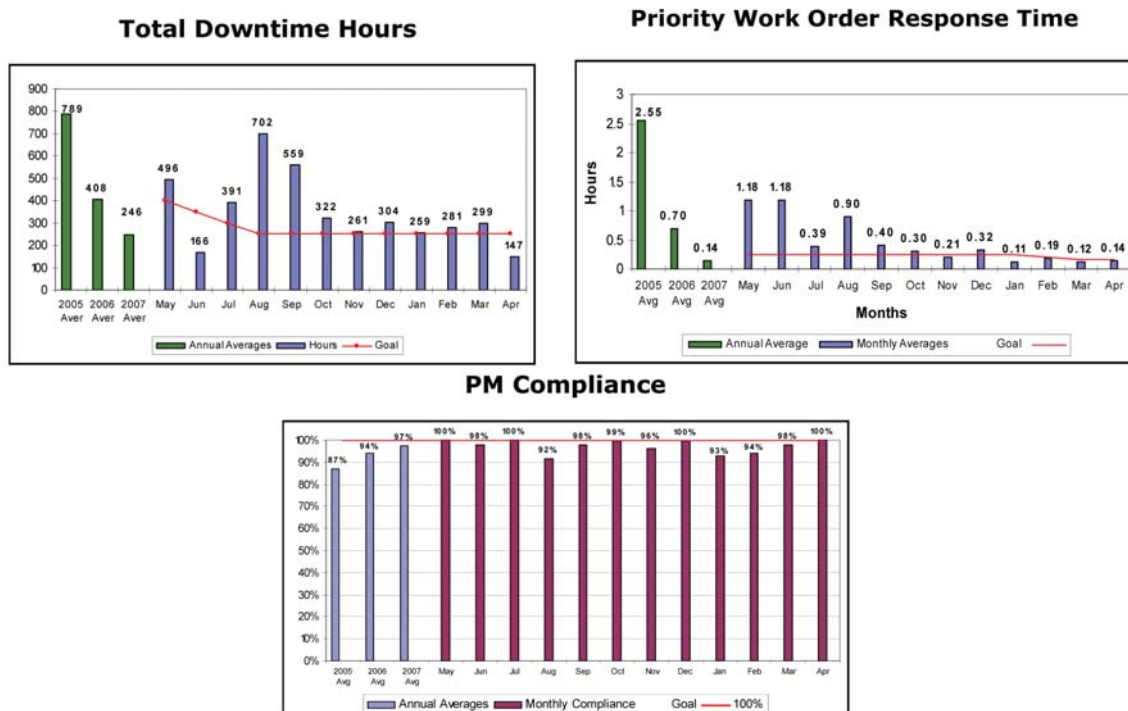
lean and 6 Sigma, and the flexibility and depth of its talent pool to provide the needed types of expertise.

Year over year for three plus years, the customer reports:

- Decreased machine downtime
- Decreased response time
- Increased first time quality (FTQ)
- Decreased labor hours per unit

In one year, the customer logged over one half million dollars in 6 Sigma savings and a parts cost savings goal of over \$20,000. An ATS manager even enjoyed the unprecedented achievement of being the first contracted employee to successfully complete the customer's 6 Sigma green belt training program. The following graphs represent actual data representing several key metrics.

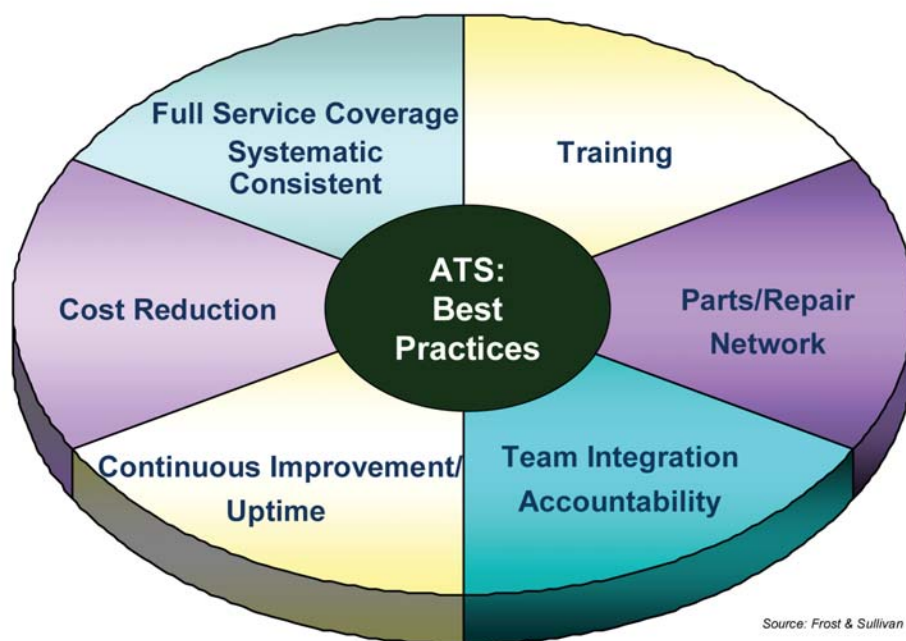
Chart 1.5: ATS Customer Case Study—Actual Metrics Showing Change Trends in Downtime, PWO Response Time, and PM Compliance



Conclusion

The challenges facing the manufacturing space today have forced companies to closely scrutinize costs in every corner of the organization. This scrutiny has reached equipment maintenance programs, where the challenge is not just to cut costs, but to drive value into the manufacturing process by increasing key production metrics such as uptime and downtime. As we have seen in both theory and practice in this document, bringing industry best practices in a systematic, consistent way, with deep equipment expertise and a partnership mentality, can bring significant benefits to the plant floor.

Chart 1.6: ATS Industry Best Practices



Source: Frost & Sullivan

ATS delivers the industry’s most complete array of services and expertise available in the outsourced maintenance industry. As a result, its customers are realizing the benefits of a proven maintenance methodology that helps mitigate risks, optimize machine performance, and drive the overall lean enterprise.

“ATS, in the current economic scenario, has served as a very good business partner. They know our business, their management asks the right questions, and when we have to make change, they do it. Having them closely tied to our operation creates a true balance of understanding and value creation.” *Operations Manager, Transportation Manufacturing*

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