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TOP 5 BENEFITS FROM INCORPORATING FACTORY MANUFACTURING SUSTAINABILITY INITIATIVES

WHITEPAPER

OVERVIEW

Sustainability is often pigeonholed as a purely "green" initiative. Manufacturers feel pushed to implement sustainable processes to comply with governing and other regulatory bodies and to appear a good corporate citizen. However, sustainability offers reliable short- and long-term cost savings that benefit your bottom line, irrespective of current financial responsibilities or the current political climate.

This white paper will look at five benefits that can result from incorporating sustainability initiatives into your production processes. It will also look at the way these "Top 5" benefits work together to improve your overall efficiency, enhance your factory's productivity, and boost the "green" in your bottom line, while strengthening your standing as an environmentally responsible corporate citizen.

INTRODUCTION

ERP systems can be grouped into "tiers" that generally identify Sustainability, the practice of continuously measuring and improving business efficiencies with a goal of reducing energy usage, raw material waste, and lowering costs, looms large over most manufacturers. In a 2012 survey of production trends sponsored by Packaging World and DuPont[1], more than 50% of respondents agreed sustainability would be the top factor driving the packaging industry in Europe and North America within the next 10 years. More recently research firm Gartner wrote:

> Sustainability is the most important and emergent issue for the coming decade…deliver[ing] value to organizations and their key stakeholders in a number of ways, ranging from the relatively low value of compliance and reputational risk mitigation, to the higher- value (and more tangible) benefits associated with the positive impact on brand perception, operational efficiency and innovation. As such, sustainability initiatives and business operations are not mutually exclusive…and business and supply chain leaders, IT executives, and the IT industry in general must pay attention.[2]

Although the social, political, and environmental attributes ascribed to sustainability are laudable, too many manufacturers are approaching the change reluctantly or reactively as a "have to do." They fail to consider how these processes could substantially raise revenues and profits, both in the short- and long-term. In fact, the aforementioned Gartner survey acknowledges that "a majority of companies are deferring any significant investment" in sustainability initiatives, largely because of recent lower energy costs.

Even if you can envision ways that a factory-wide sustainability initiative could benefit your company, the concept is so all-encompassing that you may be unsure where to begin. Therefore, our experts have designated five key areas where sustainability practices work to improve business operations, generate measurable business value, and bolster growth. These practices also help you to save money, regardless of how other costs, such as fuel or raw materials, may fluctuate over time.

1. CAPITAL OPTIMIZATION

Given the capital you have invested in your equipment, you want it all to work as efficiently as possible. Instead of running, say, eight lines at 60% utilization, it may make sense to move toward running fewer lines closer to 100% utilization. You also want to improve your production yields, maximize the raw materials used in production, and minimize waste.

Recent data suggests manufacturers spend up to 40% of their operating costs on maintaining factory equipment alone.[3] Equipment downtime causes this percentage to spike even higher. In order to improve overall equipment effectiveness (OEE), you need the ability to measure utilization thresholds in real-time and then compare those numbers over given periods of time. This helps determine the optimal production rate levels for your operation, how human error and production inefficiencies affect those measures, and whether changes in efficiency are resulting from equipment glitches or human error.

Total Productive Maintenance, or TPM, is a well-known methodology used to optimize the OEE of factory equipment.[4] TPM takes a holistic approach that unites production and maintenance roles so that operators may take proactive, preventative actions to eliminate or reduce what is known as the Six Big Losses:

1. Unexpected breakdown losses
2. Set-up and adjustment losses
3. Stoppage losses
4. Speed losses
5. Quality defect losses
6. Equipment and capital investment losses[5]

The United States Environmental Protection Agency (EPA) estimates most companies will improve their OEE by 15-25% within three years of adopting sound TPM practices.[6]

In addition to TPM practices, better plant utilization through "Sustainable Production" processes also works to eliminate wasted runs and the extra energy to support production runs. Gartner defines Sustainable Production as:

[1] *"2012 Survey of Future Packaging Trends." (DuPont, 2012)*
[2] *"Hype Cycle for Sustainability, 2014." (Gartner, August 2014, 3-5)*
[3] *Burgoon, Ecktman & Wright. "Combined maintenance, energy strategies can boost productivity and cut costs." (Plant Engineering, November 18, 2012)*
[4] *"Lean Thinking and Methods." (EPA.gov, November 10, 2011)*
[5] *"TPM — Total Productive Maintenance." (LeanProduction.com, 2013)*
[6] *"Lean Thinking and Methods." (EPA.gov, November 10, 2011)*

> [T]he creation of intermediate or finished products using processes that conserve energy and natural resource inputs. It also limits (environmental) waste while balancing organizational performance and outcomes across economic, environmental and social criteria for the short to long term.[7]

Jacobson offers several examples of Sustainable Production projects to implement on the factory floor, including:

- Investments in enabling technologies like smart machines to improve asset utilization, process and materials efficiency and operational decision making in areas like Enterprise Asset Management, Manufacturing Execution Systems (MES), and operational intelligence.
- Models showing the impact of production changes on raw material and energy input costs and consumption.

While processes based on Sustainable Production principles demand substantial and systematic changes, as well as "significant technical capabilities to model 'what-if' scenarios," Jacobson writes the overall benefits are high, especially relative to the business risks involved.

TPM and Sustainable Production are just some of the many paradigms available to boost OEE. Both offer a starting point you can then leverage to improve the ways your equipment is maintained and repaired to minimize downtime, maximize output, and end bottlenecks during the production process.

2. PAPER REDUCTION

If you still rely on paper to document and organize the way your factory is run, you're courting inefficiencies on multiple levels. Paper monopolizes space that would be better utilized by machinery or employees; physical paper, toner, ink, and associated hardware wastes money that could be better used to invest in other areas of the business; even modest reduction could mean significant cost savings. Finally, paper-based management often leads to human error.

LNS research associate Greg Goodwin writes that migrating to a paperless system offers benefits that go far beyond the obvious ones mentioned:

> [C]onsider the amount of paper that can pile up between orders, schedules, reports, work instructions, as well as the associated annoyance and frustration of dealing with and disposing of these stacks…[W]hen you consider the dynamic nature of a shop floor and the number of stakeholders that need to collaborate and share information to be successful, the improvements that paperless manufacturing can deliver extend to several operational areas and have the potential to fundamentally transform operations.[8]

Not only is paper documentation time consuming to produce, it proves difficult to sift through when pulling connected data and trends. Considerable time, sometimes weeks are eaten up sifting through paper-based data, causing delays in operational and plant improvement capabilities. Finally, valuable human asset time and effort is wasted sifting through paper-based data when they could be used focusing on more important continuous improvement capabilities.

In contrast, a paperless workplace improves efficiencies across the board, reducing cost, time and labor needed for optimal efficiency. In addition to the obvious cost savings, a paperless workplace improves operational flexibility and responsiveness by enabling employees to collaborate on reports and other documents without having to worry about whether they are working from the correct version. Employees also may find the information they need for a given task without having to skim through mountains of paper.

Meanwhile, the positive environmental message you send by reducing your reliance on a limited resource will only enhance your reputation with customers, and that goodwill should not be underestimated.

3. SCALABILITY

When you optimize your production machinery OEE and update to a paperless system, the ability to scale production improves. You can add capacity and onboard employees in an efficient, profitable manner. Meanwhile, better utilization equals better output per unit of input, which enables efficient and effective scaling within and among plants and lets you add new production lines without capital additions.

However, you can take supplementary measures to improve your scalability. Adopting "Lean Manufacturing" strategies will help you target additional areas within your factory where waste may lurk. "Lean" production systems are predicated on building organizational efficiency by attaining greater production despite consuming fewer resources. Its overall value arises from focusing

[7] *Jacobson, Simon. "Hype Cycle for Sustainability, 2014." (Gartner, August 2014, 41-43)*

[8] *Goodwin, Greg. "6 Reasons to Move Toward a Paperless Manufacturing Operation." (automation.com, July 14, 2014)*

on management systems, waste reduction techniques, and business results.[9]

Lean Manufacturing was developed in the late 1980s when the aptly named Taiichi Ohno, founder of the Toyota Production System, was frustrated by Toyota's production inefficiencies relative to German and American car companies.[10] Ohno came up with seven muda (roughly translated as "unnecessary waste") that prevent manufacturers from reaching peak productivity:

- Overproduction
- Waiting
- Unnecessary motions
- Transporting
- Over processing
- Unnecessary inventory
- Defects

Ohno determined that by striving to eliminate such wasteful actions, you could produce significantly more product while minimizing supply chain complications, thereby increasing business value often to a startling degree. Much like TPM, lean manufacturing focuses on ways to reduce friction in the production process by focusing on visible bottlenecks and outdated manufacturing conventions.

Although some Lean Manufacturing processes require advanced technology and planning to achieve, many of them are surprisingly straightforward to deploy. For example, overproduction problems may be minimized just by pivoting your mindset from traditional notions urging you to create additional product to justify the expense of your machinery and people on your production line in favor of consuming fewer raw materials.

You minimize the risk of finding yourself with excess inventory or material which is then disposed as waste. You can also reduce unnecessary activity by redesigning your factory floor layout so that production line workers can complete their tasks without having to, say, trudge to the other end of the production room. When you use your floor space more efficiently, you end up saving money on space, cooling, heating, and other related costs.[11]

In a report written by a multidisciplinary group of professors at Indiana University, several large manufacturing companies were interviewed about their sustainable manufacturing initiatives. One company saved $7 billion over a 15-year period, despite growing 40% during that same period of time. Meanwhile, another company interviewed for the report successfully reduced its manufacturing footprint from 15 million square feet to 5 million square feet while increasing company revenues. With this reduced footprint, the company saved on cooling and heating costs and reduced its "real estate needs."[12]

4. PREDICTABILITY AND PREVENTION

In order to set up predictable production outcomes, you need two things:

1. The ability to set production thresholds that alert your employees in real time whenever something is amiss.
2. The ability to measure and document KPIs over specified periods of time to gauge efficiencies throughout the production lifecycle.

When you can predict input consumption needs, output yields, and giveaway, among other things, you can reduce the amount of raw materials and waste, plan for equipment maintenance at times when production lines are not as busy, and prevent downtime from occurring, among other advantages.

Too often, however, the discovery of a given problem is contingent on anecdotal evidence or worse, through a glitch that places employees in a reactive, firefighting mode. Expecting employees to manage multiple data points is a significant organizational burden, Gartner states. Gartner recommends adopting Sustainable Performance Management (SPM) tools and processes, which provide "roll-up reporting, analysis, and business intelligence" to internally monitor the production floor:

> SPM [offers] a more holistic view of sustainability across your organization…[by]… focus[ing] on…operational performance…Maximizing the business value associated with sustainability — both internally and externally — is critically dependent on access to high-fidelity, high-cadence, sustainability-related data…Costs associated with investment in SPM technologies are likely to be rapidly outweighed by efficiencies in sustainable information management.[13]

[9] *Bergmiller, Gary, PhD & McCright, Paul PhD. "Lean Manufacturers Transcendence to Green Manufacturing." (University of South Florida, 2009)*
[10] *Gram, Markus. "A Systematic Methodology to Reduce Losses in Production with the Balanced Scorecard Approach." (Horizon Research Publishing, 2013)*
[11] *Kitchell, Shawn. "Lean Manufacturing Yields 'Green' Results." (Environmental Leader, January 2014)*
[12] *Carley, Sanya Ph.D. et al. "Success Paths to Sustainable Manufacturing." (Indiana University, October 2014)*
[13] *Mingay, Simon. "Hype Cycle for Sustainability, 2014." (Gartner, August 2014, 30-32)*

By automating the collection of this data, production workers no longer need to rely on hope, superstition, or hearsay to anticipate issues. Instead they can use this time to make adjustments on the fly. Moreover, the ability the slice and dice cumulative data into views that resonate with their responsibilities can aid them in developing more efficient ways to optimize overall OEE and scale operations.

5. IMPROVED EMPLOYEE OUTPUT

The aforementioned benefits discussed in this white paper can have a transformative effect on your staff. Given the wealth of sustainable processes and the technology to back them up, your employees can now focus on creative endeavors that add business value over the long term.

Indeed, sustainability initiatives depend on employee empowerment and collaboration to succeed:

- Using TPM principles as a guide, employees can set up and refine daily maintenance and repair tasks to minimize or eliminate sudden breakdowns of production machinery (OEE)
- Using a paperless system, employees can collaborate on scheduling plans, confident the document they are reading is the latest version—and one they can access from multiple terminals (Paperless)
- Using Lean Manufacturing as a guide, employees can limit the amount of raw material waste generated (Scalability)
- Using SPM-style tools, employees can make decisions on output yields based on trusted data points (Predictability and Prevention)

The Indiana University report highlights how sustainability measures can lead to a more engaged and satisfied workforce, quoting one of the companies interviewed:

> We learned a handful of years ago this kind of thing is important to employees. They care about the impact we're making, what we're doing on the environmental front, and we see it not only in comments and suggestions through our internal social network. We hear it every day in the hallways; they talk about the fact they're proud they work for a company that's made these types of impacts, and I think there is a retention aspect to it, especially when you consider the younger folks coming through the pipeline. They expect the companies that they work for to pay attention to the environment, to put a high value on sustainability. It's just an expectation of theirs now.[14]

Given that labor costs still make up the largest portion of any factory's budget, it no longer makes sense for employees to be bogged down by monotonous tasks better suited to automation and other technologies.[15] Sustainability's greatest contribution may well be the freeing of outdated industrial norms that view people as cogs in the machine in favor of leveraging the unique knowledge and capabilities each of your workers can offer.

CONCLUSION

Despite its "green" reputation, sustainability may be the most pivotal concept in facilities management going forward and one whose importance will only increase over time, as factories must make more happen with less. However, this development is a good one. Not only will sustainability benefit your bottom line in the short term and bring about environmental benefits to be proud of, it will unleash a level of productivity and ingenuity that was unimaginable even a decade ago.

If you've already begun to incorporate sustainability principles into your production lifecycle, give yourself a pat on the back. If you haven't, it is never too early to start.

Interested in learning more about Aptean? Please contact us at 1.855.411.2793 or email us at info@aptean.com.

[14] *Carley, Sanya Ph.D. et al. "Success Paths to Sustainable Manufacturing." (Indiana University, October 2014)*

[15] *Reynolds, Pat. "Targeting inefficiencies in manufacturing." (PackagingWorld, July 2013)*

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