Lean and Green
Manufacturing Buyer's Guide

TEC's 2009 Guide to Lean and Green Manufacturing

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Lean and Green Manufacturing Buyer's Guide: Lean, Green, and Everything in Between

Introduction: The Economic/Environmental Challenge

There's no doubt that the current "economic climate" and "climate change" are hot issues—no pun intended. In fact, we hear the two phrases global economic crisis and green initiatives a lot lately. The economy is in a downturn and the planet is in peril. That's a conundrum if we've ever seen one, but it doesn't have to be.

The fact that we are going through an economic crisis does not necessarily have to have a negative connotation. Crises often result in positive outcomes, such as innovation or new business opportunities. Even in the midst of a financial crisis, businesses are still booming for the most part. Adding "green" to their business equation shouldn't change that. In fact, some of those businesses have discovered that profit and green go together in more ways than one, as we'll see later on in this report.

There are many factors to consider in "greening your business"—too many to mention in a 47-page document. Our aim here, however, is to drive home the point that reducing waste and creating efficiencies within your daily operations (through implementing sound policies, processes, and technology) can make a difference—not only to the environment and the economy, but to your bottom line as well.

One of the biggest problems surrounding "green" is that it's a very gray area to many—including businesses. As citizens of a community, we still struggle to figure out which waste product goes in which color box. Does it go in the blue box, the green box, or the garbage bin? So, imagine the difficultly businesses have when there's pressure on from all sides to "do what's good for the environment." Where and how do they begin this enormous undertaking?

In this lean and green buyer's guide, we'll discuss some of the challenges that companies are facing in light of the changes to the economy as well as the pressures of "going green." We'll talk about some of the high-level changes your business can make, with a focus on operational efficiency and on how lean and green practices can both lead to the same result: efficiency equals sustainable business.

We will also feature information about some of the vendor offerings targeted at companies looking to adopt or improve their "green business strategies." The products covered in this guide address various areas within the scopes of both "lean" and "green," including lean manufacturing, environmental management, operations management, compliance regulations, and more.

We've included customer success stories to illustrate how product lifecycle management (PLM), enterprise asset management (EAM), and enterprise resource planning (ERP) solutions have helped companies like yours deal with their environmental concerns. For your convenience, there is also a vendor directory to assist companies that are looking for a "sustainability enabling" solution.

We hope this report will provide you with enough insight about the current state of the market—with respect to both lean and green—to help you start making a few decisions about how your company can make a change for the better. We think you'll find this guide a useful tool for determining which type of solution is best suited to your company's business model and particular needs.

State of the Market: Lean and Green

Today's need for sustainable development (economic, social, and environmental) is increasingly affecting how organizations do business. But the areas of environmental and corporate responsibility are still relatively new to businesses as concepts that drive value. And even though these concepts are rapidly growing in importance, many organizations are still in the early phases of adopting an approach that provides measured results.

The state of market in "green" is improving—albeit at a very slow pace—as organizations learn the value of integrating environmental thinking into their operations, and find more and more ways to align green thinking with their business strategies and goals.

This need for change affects businesses, municipalities, government, and resource-extractive industries like manufacturing. Some of the major influences affecting these organization's environmental sustainability decisions are regulations and standards, competitive position, and public confidence. In fact, there is a great deal of reputation at stake, since public consciousness towards environmental issues is growing.

Today's stakeholders (customers, investors, etc.) want to put their money into companies that are sustainable. If businesses don't take an interest in the environment—and their impact on it—it reflects very poorly on their interest in their bottom line. The current economic situation being what it is, companies cannot afford "bad press," and it's in their best interest to realign their business strategies to include environmental awareness. Equally (if not more) important is the fact that green initiatives have a high return on investment (ROI) and end up paying for themselves through cost savings on resources, energy, carbon taxes, etc.

Today's environmental challenges in business are vast, and range from financial burdens (such as rising energy, input, and transportation costs), to waste disposal and regulatory issues (minimizing/reducing waste), to accountability and sustainability—which can make the decision to go green both complex and convoluted.

In order to drive operational efficiencies, organizations must look at their current operating processes, determine what their future sustainability objectives are, and then fine tune them so they are aligned with one another. Even the most green-minded companies struggle with better ways to inject green practices into their business. Often it's a matter of adopting lean principles, which—for manufacturers—aid in reducing inventory and waste, and shortening production cycles. For all companies, including non-manufacturing organizations, lean principles help to reduce costs and increase operational efficiency. Technology also plays a key role (see figure 1).
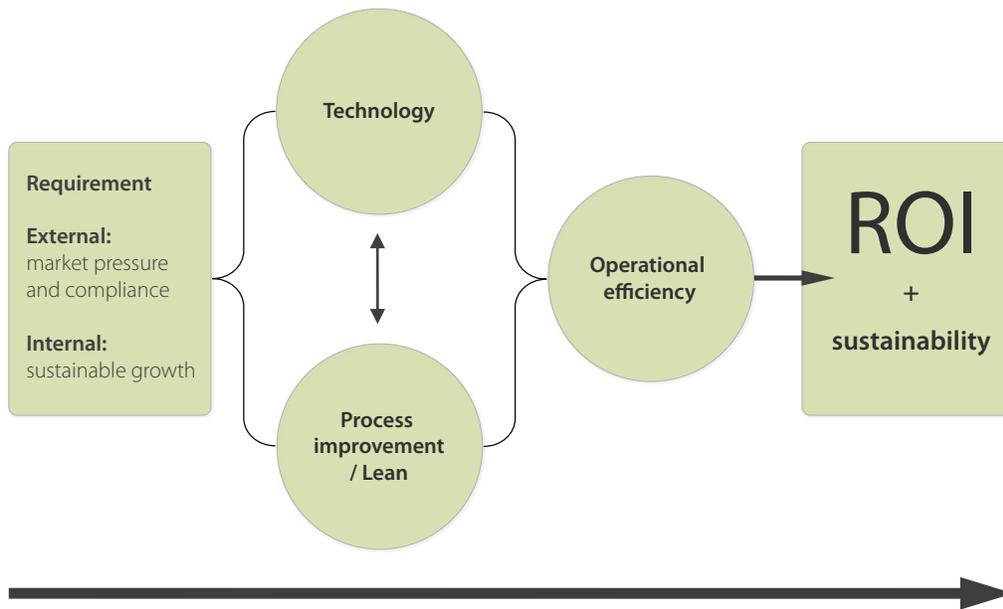

Figure 1

From an efficiency perspective, pollution is a waste of resources. Green initiatives seek to eliminate waste (either at the source or before it hits the external environment). Thus, green is efficient, and efficiency demands innovation, which eventually provides a competitive edge to companies . The same thinking applies to lean.

Every individual on earth will be affected by the green initiatives taken (or not taken) by businesses—both now and in the future. So, what are companies doing today to stay on top of global economic issues and environmental challenges?

In the following section, I will identify three major business issues (and pains) that companies are currently facing, and discuss ways in which these organizations can effectively deal with them.

Regulatory Compliance

Adhering to Standards

What is a standard? According to the International Organization for Standardization (ISO), a standard consists of "documented agreements containing technical specifications or other precise criteria to be used consistently as rules, guidelines, or definitions of characteristics, to ensure that materials, products, processes, and services are fit for their purpose. "But it's important to remember that standards are relative to specific industries and often to particular companies (e.g., a buyer may request ISO 14001). A standard is not necessarily the best—nor the only—way to go greener. It's only a part of the "green equation."

During one conference, I heard an ISO auditor say that "if we wanted to certify concrete-made lifejackets, we could—as long as the process was well documented and efficient." The standard is in place for a very specific, sometimes isolated purpose, whereas green initiatives should be adopted based on a perspective of responsibility (i.e., not compromising actual or future resources used in the process, product, and service).

There are a number of standards and tools that are shaping the landscape for future green initiatives. They include green standards such as Canada's Clean Air Act, the United Nations Framework Convention on Climate Change (UNFCCC) Kyoto Protocol, and environmental performance evaluations (EPEs); tools such as integrated product policies (IPPs), life cycle inventories (LCIs), life cycle assessments (LCAs), material flow management tools; and certifications such as the US Green Building Council's Leadership in Energy and Environmental Design (LEED) and the International Organization for Standardization (ISO) 14000, as well as research institutes like the International Institute for Sustainable Development (IISD) and the Canadian Standards Association (CSA). In the meantime, these standards and tools can be causes for concern for businesses that haven't yet started down the road to greener pastures.

ISO 14000 Standards and Environmental Management Systems (EMS)

Practices such as an environmental management system (EMS)—a set of processes and practices that enable an organization to reduce its environmental impacts and increase its operating efficiency—are helping pave the way for organizations. This tool allows businesses to better identify and manage their environmental responsibilities, as well as measure and report on their results.

Adopting EMS is one way of measuring a company's environmental footprint, and it is recognized by the ISO 14001 standard. It's important to remember that international standardization is market-driven, and based on strictly voluntary involvement. Three sets of tools that are important in implementing an EMS are life cycle assessment, environmental performance evaluation, and environmental labeling.

According to a 2005 article in Solar Today's Chair's Corner entitled "The Future's So Bright," by Tom Starrs,

> … the electricity industry is the single largest source of industrial pollution in the world, and one of the largest sources of greenhouse gas emissions. Over 80 percent of the world's electricity and 90 percent of US electricity comes from nonrenewable fossil and nuclear sources.

Companies are getting cleaner and more efficient, but only incrementally.

As such, organizations must adopt methods to reduce their carbon footprint. Here are just a few ways this can be accomplished.

Waste management:

Turning garbage into ethanol, which can be blended with gasoline (reducing greenhouse gas emissions from vehicles); turning waste materials that contain carbon into a synthetic gas and then into liquid fuel.

Tracking greenhouse gas (GHG) emissions:

Accurate tracking of GHG emissions is an important part of assessing overall environmental performance. In March 2004, the government of Canada announced the introduction of mandatory reporting of GHG emissions by major emitters. By providing a more precise picture of the sources and amounts of Canada's GHG emissions, mandatory reporting will contribute to the development, implementation, and evaluation of climate change and energy use policies and strategies.

In the State of Green Business 2008 report, author Joel Makower remarks that

> There is insufficient data to show how companies are doing, in aggregate, to move the needle on issues like climate change, toxics reduction, water conservation, and resource efficiency. In a few cases, it's nearly impossible to tell whether indicators of progress are moving forward or backward. Where we are able to measure, the verdict is mixed: Companies are getting cleaner and more efficient, but only incrementally, and many of the gains are offset by the ever-growing economy. So, while greenhouse gas emissions per dollar of economic activity may be dropping, the growing economy means those emissions are largely unchanged.

While many of today's companies are seeking to improve their environmental—and overall—performance, there are scores of others who have not yet jumped on that bandwagon. On the other hand, for larger organizations, adopting sustainable practices and adhering to environmental regulations and policies is now becoming an essential part of their business strategies.

The new US political climate will also have a direct impact on how businesses will deal with going green, both within the US and globally. With President Barack Obama at the helm, change is imminent. During his Governors' Global Climate Summit speech in 2008, then President-elect Obama stated

"
For larger organizations, adopting sustainable practices and adhering to environmental regulations and policies is now becoming an essential part of their business strategies.
"

My presidency will mark a new chapter in America's leadership on climate change that will strengthen our security and create millions of new jobs in the process. That will start with a federal cap and trade system. We will establish strong annual targets that set us on a course to reduce emissions to their 1990 levels by 2020 and reduce them an additional 80 percent by 2050. Further, we will invest $15 billion each year to catalyze private sector efforts to build a clean energy future. We will invest in solar power, wind power, and next generation bio-fuels. We will tap nuclear power, while making sure it's safe. And we will develop clean coal technologies.

Tax incentives, education, and energy efficiency technology are just some of the main issues on the minds of Obama's Energy and Environment Team. In fact, he's promised to invest billions towards these initiatives over the next 8 years.

With today's customers and investors demanding that more companies do the "right thing," some organizations are seeking out initiatives that can best suit their needs with minimal disruption to their operations. Standards such as ISO 14000, when used in conjunction with properly aligned goals and management commitment, can help organizations improve their corporate performance.

The bottom line on regulatory compliance? Be sure that your company executives and C-level managers are informed about what regulations are out there. Because some regulations are voluntary and others are imposed, it's important to know which ones will affect your business and which ones should be adopted to generate long-term value. Don't turn a blind eye. Green initiatives—while something of a fad—are not going away any time soon. By adopting a proactive approach to environmental compliance, you're creating a sustainable competitive advantage for your company.

A Question of Money: The Financial Burdens of a Green Business

Moving towards greener operations isn't easy. In fact, for some companies, doing so may not represent an economic benefit—at least, not initially. There are definitely some financial implications and risks involved in greening a business, especially from a purchasing viewpoint. But with the rising costs of energy, raw materials (including steel, glass, paper), and transportation, some companies are willing to take those risks. Demonstrating the value of sustainability to executives—well, that can be a little more challenging.

Determining the total cost of ownership (TCO) of implementing green initiatives—including the hidden costs related to sustainability—is often the difficult part. Some of the questions that company executives often ask:

- How will these changes affect my business financially?
- How can we embrace sustainable practices while maintaining our bottom-line productivity?
- Will the transition cause disruption to my operations?

I'm sure you'll agree that these are all very good and legitimate questions to ask, and you have probably asked them yourself at some time or another. What organizations must bear in mind is that the longer they take to start making the transition, the more expensive and more challenging the transition will be (due to the rising costs of materials, etc.). By creating a realistic high-level strategy proposal, and then translating it into a language that executives can understand (i.e., measurable savings: dollars and cents), you are more likely to get their buy-in from the get-go.

Case in point:

I had the pleasure of attending last year's Association for Operations Management (APICS) Conference, and sat in on a session given by Burt's Bees president and chief executive officer (CEO), John Replogle. After the 2-hour session was over, I walked away—even more convinced than before—that sustainable businesses can and do exist. Taking care of the environment is a number-one priority at Burt's Bees—and an inherent part of how it does business. Through its Environmentally Conscious Organization Bringing Ecologically Empowered Solutions (ECOBEES)—a group of volunteers that help develop company-wide initiatives—Burt's Bees has been able to successfully integrate green culture into its people, its processes, its operations, and of course its products. As you can imagine, transparency for Burt's Bees is not a problem. To learn more about the company's initiatives and how your organization could follow suit, I've included a copy of Burt's Bees Social and Environmental Progress Report 2008 here.

With the economy in a downturn, it's more important than ever for businesses to look toward cost-effectively achieving greater business results, while minimizing their environmental impact. For most companies, the goal is to become more efficient—while still earning profits. But the motivations behind these goals can vary—well beyond financial concerns. Some of these include

- economics: marketing and brand image
- strategic initiatives: competitive differentiation
- efficiency: lower operational costs through lean initiatives
- ethical reasons (these areas are somewhat difficult to evaluate)
- external pressures: anticipation of laws
- societal pressures: public opinion; peer pressure
- other motivations: culture, mission statement, and employee motivations

The bottom line regarding the financial implications of green? Investing in green can help turn your cost center into a profit center—even though it may not seem that way initially. How you get there depends on how much you're willing to change your current practices. You may also want to investigate federal, state/provincial, and local initiatives that provide financial

incentives for environmental efforts. There are also programs that can offer extensive hands-on assistance for corporate environmental efforts. Even banks are beginning to offer more loan options for businesses that use them for the purpose of sustainable development. Through strategic planning and research—and with stakeholder buy-in—creating a sustainable business can be accomplished.

Greening the Supply Chain: How Lean Manufacturing Fits Into the Green Equation

> "While the basic principles of lean are widely known, many organizations are still struggling with the question of how to make the transformation to lean."

According to the US Department of Energy, manufacturing and transportation account for approximately 60 percent of energy consumption in the US. According to the Quebec Environment Department, in Canada the transportation sector produces the most emissions—accounting for a little more than 40 percent of the carbon dioxide, methane, and other gases that are contributing to climate change. Now more than ever, supply chains are playing a critical role in carbon emissions reduction.

If you're in the manufacturing industry, or if you are associated with manufacturing (e.g., as a supplier or distributor), you've heard all about lean principles, lean initiatives, or lean practices. While the basic principles of lean are widely known, many organizations are still struggling with the question of how to make the transformation to lean.

Lean Manufacturing toward Achieving Green

Products by their very nature are a burden to the environment. This includes material and energy use, production processes, distribution methods, recycling, and waste disposal. By identifying the different sources of pollutants (e.g., carbon emissions, waste, toxins) throughout the supply chain, organizations can better understand how to inject lean as well as green thinking into supply chain management (SCM). To be competitive in the global market, businesses must enhance their green manufacturing initiatives to strive for operational efficiency.

So, how are organizations doing this? There are several ways, but one of the best ways to start is with the product itself.

Life Cycle Assessment (LCA)

LCA is a tool used to identify and measure direct and indirect environmental, energy, and resource impacts associated with a product, process, or service. It is a method used for checking the facts about the environmental burden of a product—from its design through to production and then to its final disposal. LCA takes into consideration the air, water, and solid waste pollution generated when raw materials are extracted. It considers the energy used in

the extraction of raw materials and the pollution that results from manufacturing the product. It also accounts for environmental harm that might occur during the distribution and use of the product. Lastly, LCA examines how the solid and liquid wastes may affect the environment following final use of the product.

Lean Six Sigma

Many manufacturers are exploring lean Six Sigma as part of the green equation. As you may already know, lean Six Sigma is predicated on removing waste (e.g., materials, resources, manpower, and energy) and provides a comprehensive and reliable way to explore, prioritize, and plan opportunities for creating value through corporate environmental sustainability. For more information about lean Six Sigma, visit http://www.isixsigma.com/me/lean_manufacturing/.

The "5S" Philosophy

Based on 5 Japanese words that begin with the letter S, the 5S philosophy focuses on effective workplace organization and standardized work procedures. 5S helps businesses simplify the work environment and reduce waste—while improving quality, efficiency, and safety.

1. Sort (seiri): Organizing the work area, leaving only the tools and materials necessary to perform daily activities. When sorting is well implemented, the communication between workers is improved and product quality and productivity are increased.

2. Set in order (seiton): The orderly arrangement of required items so they are easily accessible for anyone to find. Orderliness eliminates waste in both production and clerical activities.

3. Shine (seiso): Keeping everything clean and tidy helps maintain a safer work area, and problem areas can be quickly identified.

4. Standardize (seiketsu): Creating a consistent approach for carrying out tasks and procedures. Orderliness is at the core of standardization and is maintained by visual controls such as signs and poster boards.

5. Sustain (shitsuke): Without sustaining the discipline and commitment applied in all the other stages, your workplace can easily revert back to being a mess.

So how does lean fit into the green equation? Some believe that lean equals green. But the truth is, lean is only a small part of the green initiative (see figure 1). How is green really measured? Is there one process, tool, or system that can do this, or is it a combination of the above?

Before we can assess this, we need to know what to measure. Remember, what gets measured gets managed.

Green Metrics: The Lean Assessment Tool

As a manufacturer, being green is no easy feat. The reason: the concept of green is not so black and white—in fact it's very gray.

We know that lean is all about operational efficiency and reducing waste. But wait! Some of the processes used in lean thinking are the same processes that companies are using to go green. Does that mean that going lean is equivalent to going green? The answer is an unequivocal "No." There's a lot more to it than that.

According to a paper by Deloitte Development entitled Green Lean Six Sigma: Using Lean to Help Drive Results in the Wholly Sustainable Enterprise, three factors that can help companies broaden lean Six Sigma to improve environmental performance are governance, metrics, and training. But can these same factors help with the green initiative?

It goes on to say that

> … environmental costs are often hidden and, therefore, not always addressed because they typically fall into the realm of allocated overhead costs. Lean tools, such as Value Stream Mapping can help identify these hidden costs by illuminating the waste in a process. Lean Six Sigma projects, in turn, can help reduce waste and deliver both environmental and financial benefits that might not have been captured or, if captured as part of another project, might not have been recognized.

One way to tap into this important information is through conducting a "gap analysis" of your businesses operational processes, by figuring out where are you now and then determining where you want to be down the road.

" What are Automotive Manufacturers Doing?

The economic situation, coupled with the push for development of new technologies, has created a challenging business environment for global automotive companies. Ironically, the automotive industry provides a good example of how manufacturers can work toward greener operations.

Automotive manufacturers seem to have been hit the hardest by economic difficulties. However, today companies like GM are transforming their operations through an initiative called Green Technology Transformation. This transformation will result in the production of 15 hybrid models by the year 2012. With the addition of highly fuel-efficient vehicles, zero-emission hydrogen fuel cell vehicles, and its goals regarding the electrification of vehicles (e.g., the Chevrolet Volt), GM will be paving the way for other automakers to follow suit.

Subaru of Indiana Automotive Inc. (SIA) is another example of a company that has greened its operations. Since 2004, Subaru has been "zero landfill" (meaning that 99.8 percent of what was once garbage is now either reused or recycled). And it's not only in terms of their manufacturing processes, but in many other areas within their operations (from materials to disposal). Their processes are so efficient that other companies are now looking to adopt SIA's model.

Companies like Volvo Car Corporation have taken another approach to sustainability improvement by asking their stakeholders to assist them in identifying what they feel the highest priorities should be. The top three issues that were considered the most important to Volvo's stakeholders were climate change, exhaust emissions, and fuel efficiency. The full results of this survey have been highlighted in Volvo's 2007 Sustainability Report. "

Lean and Green: Building a Greener Business

There's no doubt that the adoption of lean concepts, along with critical thinking, can enable your company's success on green initiatives in many ways, but it often goes beyond the scope of the supply chain.

When we think about lean, we automatically think about it in the context of manufacturing; after all that's where it got its start. But there's another way to look at lean, and that's through the concept of lean in the "greening of buildings." The end result of both of these lean concepts is the same green outcome: better efficiency, and reduced waste.

Buildings account for a large percentage of energy consumption and produce a fair amount of greenhouse gas emissions.

Companies like Tririga, with its workplace management system (WMS) Real Estate Environmental Sustainability (TREES) solution, have helped companies reduce their energy consumption and greenhouse gas emissions through the use of assessment tools. By collecting and compiling critical workplace asset information (e.g., energy consumption, emissions data), the assessment tools can then calculate and measure the environmental impacts of the organization's buildings. By integrating the LEED Green Building Rating System, the solution can automatically calculate and score the environmental sustainability of operations and assets for the organization's buildings.

The US Green Council's LEED program helps businesses in sustainable site development, water savings, energy efficiency, building materials selection (e.g., renewable materials), indoor air quality (through the addition of plants and the use of low volatile organic compound [VOC] paints), as well as through recycling and composting.

For more information about these initiatives, Energy Star's website provides some great guidelines on "energy management, measuring energy, policy creation, and more." You may also be interested in this very complete list of 42 Tips for Greening your Business by Direct Energy.
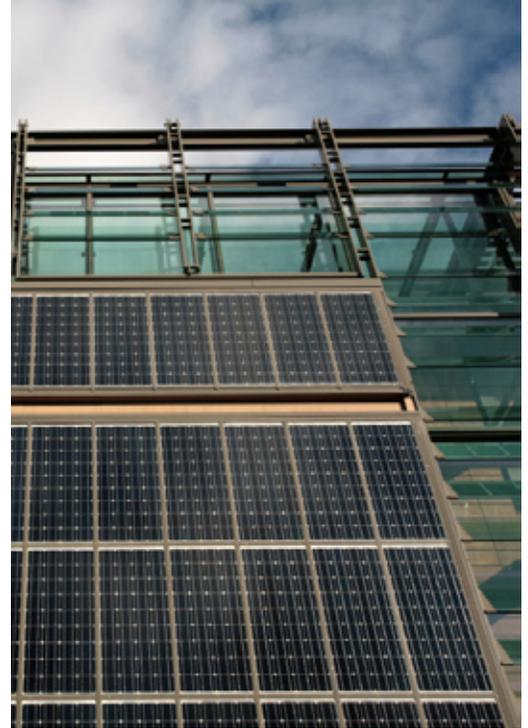
" When we think about lean, we automatically think about it in the context of manufacturing; after all that's where it got its start. But there's another way to look at lean. "

The bottom line on lean? There is no doubt that implementing lean principles can lead to a greener business; but it's important to recognize that lean alone cannot achieve this. Lean strategies—although not driven by a responsibility framework like green strategies are—can help businesses move toward operational efficiency—which aligns perfectly with green initiatives.

Technology: What to Look for in a System

What can technology offer companies looking to adopt lean and green strategies? Can one solution do it all? The truth of the matter is that for companies, investing in technology for the future is as much about green (money, that is)—as it is about the environment.

Methodology

What is the methodology behind developing and implementing a "green" solution? A Gartner press release, dated October 4th, 2007 stated that

> … businesses need to focus less on how IT contributes to their environmental impact and more on how IT can help lessen the environmental impact of business operations and the supply chain or that of enterprise products and services … [A]lthough making IT more green must remain a concern, there are areas where deploying more IT can significantly contribute to making an organization more environmentally sustainable.

Facing the increasing market demands for software to support green initiatives, enterprise software vendors have reacted promptly. To study and experiment with what software technologies can do for existing and upcoming environmental issues, a number of research projects are under way. For example, an SAP research project launched in October 2007, titled "Green 2.0," is focusing on areas such as environmental accounting, green supply chain, and carbon dioxide (CO_2) footprint management to address pressing environmental issues. Based on their research work, other vendors have started to provide applications that address environmental issues directly in areas such as material compliance, environmental reporting, and carbon emission management.

Corporate users can expect that more innovative applications will be introduced to the market over the next few years. Meanwhile, to respond to customers' green initiatives more quickly, vendors are emphasizing existing features and including new features related to green in their current solutions. They then re-market their offerings with a green tag. This approach contributes to the existence of products such as "green ERP," "green SCM," "green PLM," etc.

In addition, there are some software vendors that make tremendous efforts in making themselves greener. In 2008, Dassault Systèmes launched its "green" global headquarters that incorporated a series of green features. Making its own operations more environmentally friendly is beneficial from various perspectives, including increasing the credibility of a company as a green technology provider.

Recognizing Companies and their Green Initiatives: Vendor Overview

In this report, we've discussed some of the factors that can help determine how green you are as a company. But what if you're a company that sells enterprise software?

We've taken a look at 10 enterprise software vendors to discuss what differentiates their products from other vendors when it comes to their green innovations in the areas of PLM, ERP, and EAM.

Environmental Software Solutions Guide

Vendor	Website
SAS	http://www.sas.com/solutions/sustainability/
Greenware	http://www.greenware.com/fsh.asp
ESS	http://www.ess-home.com/
Pavilion Technologies	http://www.pavtech.com/index.php?option=com_content&task=view&id=22&Itemid=48
Logical Data Solutions	http://www.logicalds.com/
Entech USB	http://www.entech.us/entechusb/Home.aspx
Energetics	http://www.energetics.com.au/
Zerofootprint	http://www.zerofootprint.net/products/enterprise-carbon-manager

You can also visit Environmental Expert.com for a comprehensive listing of environmental management solutions.

Vendor	Geographic coverage	Industry coverage	Solution coverage	Lean manufacturing*	Material compliance	Environmental health and safety	Carbon emission management	Energy management	Waste management	Green IT infrastructure
Dassault Systèmes Encompassing environmental compliance, eco-design, and other green enablers, product lifecycle management (PLM) 2.0 is a newly advocated notion by Dassault Systèmes that focuses on extending the generation and consumption of product definition information to a wider range of product stakeholders. 3DVIA, the company's effort to extend 3-D experience to new markets including consumers, is an important example of the PLM 2.0 concept. By using a 3-D product model that conveys rich product information, consumers can be involved earlier in the product development cycle in a more sustainable manner.	*Global (high)*	Automotive and transportation Shipbuilding High tech Consumer packaged goods Energy and process Business services Aerospace and defense Industrial equipment Consumer goods Life sciences Architecture, engineering, and construction	CAD/ CAM/ CAE PLM	✔	✔					
Siemens PLM Software Siemens PLM Software emphasizes the idea that sustainability is a strategic competence and competitive advantage for today's companies. It offers a total life cycle approach for greatest impact. Siemens PLM's solutions provide the continuity and traceability needed to globally manage sustainability requirements across life cycle phases, which minimizes resource impact and product cost. Siemens PLM technology delivers the end-to-end life cycle support needed to manage the "green" product and process development life cycle.	*Global (high)*	Aerospace and defense Automotive and transportation Consumer products Federal government High tech and electronics Life sciences Machinery and industrial products Softlines, footwear, and accessories	CAD/ CAM/ CAE PLM	✔	✔					
PTC PTC's InSight Environmental Compliance (formerly Synapsis Technology's EMARS) helps manufacturers meet the environmental product requirements of their customers and of regulatory authorities. Supported environmental standards include: Registration, Evaluation, and Authorization of Chemicals (REACH), Restriction of Hazardous Substances (RoHS), and industry standards like the Joint Industry Guide (JIG) and Global Automotive Declarable Substance List (GADSL). Supported information exchange standards include: IPC-1752, the Automotive Industry Action Group (AIAG) Compliance Connect spreadsheet, and International Material Data System (IMDS). Powered by a patented analytical engine, InSight provides a comprehensive view of a product's environmental status, backed by an exhaustive audit trail.	*Global (high)*	Aerospace and defense Airlines Automotive Consumer products Electronics and high tech Footwear and apparel Industrial equipment Medical devices Retail	CAD/CAM/ CAE PLM	✔	✔					

* Different vendors may interpret and support this and the following green features differently.

Vendor	Geographic coverage	Industry coverage	Solution coverage	Lean manufacturing*	Material compliance	Environmental health and safety	Carbon emission management	Energy management	Waste management	Green IT infrastructure
SAP — SAP is one of the most advanced vendors in supporting enterprises' green initiatives. It sees compliance and emission management as a priority for current businesses. The company promotes its xApp Emissions Management (xEM) as a solution to align business processes with regulatory requirements, to mitigate risks, and to identify opportunities. SAP's xEM is comprised of four major components including compliance management, permit management, emission management and green house gas management. SAP also has good presence in supporting greener business processes in areas such as Evironmental Health and Safety (EH&S), enterprise asset management (EAM), and energy management.	Global (high)	Quite comprehensive	ERP SCM SRM EAM CRM PLM BI	✔	✔	✔	✔	✔	✔	
Oracle — Oracle's approach toward green is on three levels. First, the company provides applications such as "Sustainability Reporting, Planning and Management" and "Green Compliance" to help enterprises address major environmental issues from a more strategic level. Second, Oracle declares its enterprise software (e.g., supply chain management [SCM], customer relationship management [CRM]) is the solution for environmental sustainability because of its ability to help increase productivity, improve resource-use efficiency, and reduce waste. Third, the company extends to the IT infrastructure level by providing on-demand services and green data center solutions.	Global (high)	Quite comprehensive	ERP SCM SRM EAM CRM PLM BI	✔	✔	✔		✔	✔	✔
Infor — Infor is pouring green elements into almost every solution that it provides to the market. The company also has a product named Environmental Materials Aggregation and Reporting System (EMARS) to directly address compliance issues. EMARS automates data collection and aggregation, performs complex compliance analysis, and reports to different stakeholders. This software is especially beneficial for high-tech and electronics companies facing newly enacted or up-coming environmental regulations, such as RoHS and Waste Electrical and Electronics Equipment (WEEE).	Global (high)	Quite comprehensive	CAD/CAM/ CAE PLM	✔	✔					

* Different vendors may interpret and support this and the following green features differently.

Vendor	Geographic coverage	Industry coverage	Solution coverage	Lean manufacturing*	Material compliance	Environmental health and safety	Carbon emission management	Energy management	Waste management	Green IT infrastructure
IFS IFS helps customers become greener in two main areas: lean manufacturing and material compliance. "IFS Applications supports lean principles, particularly in the many manufacturing environments that require both rate-based (takt-driven) and order-based shop-floor execution." On the material compliance side, the company's strategy is to integrate with leading product compliance solutions (e.g. Atrion) to enable "IFS customers to automate and streamline product compliance" across the entire product life cycle.	Global (medium)	Aerospace and defense Industrial manufacturing Automotive High tech Process industries Construction, engineering, and service management Energy and utilities (including oil and gas)	ERP EAM SCM CRM PLM	✔	✔			✔		
Lawson Lean manufacturing, a strong element of Lawson's offerings, can help customers become more environmentally concerned. Lean manufacturing methodologies such as kanban-based just-in-time (JIT) systems, theory of constraints-based production planning, and simple order-less production and material back-flushing are incorporated into Lawson's functionality and technology. In addition to this, products such as Compliance Control Manager and Corporate Social Responsibility can also help customers' green initiatives.	Global (medium)	Asset intensive Distribution Fashion Financial services Food and beverage Health care Manufacturing Public Sector Service (rental, retail, etc.)	ERP SCM SRM EAM CRM PLM BI	✔	✔	✔		✔	✔	✔
Apriso Apriso's focus is on operation execution solutions. Its flagship product, FlexNet, offers an integrated approach to achieving manufacturing execution excellence. According to Apriso's methodology, the easy-to-deploy, flexible, real-time, cross-operational features of its solution are fundamental aspects of lean manufacturing. The operation execution system is also an indispensible information source for many other enterprise systems, such as enterprise resource planning (ERP), supply chain management (SCM), and PLM.	Global (medium)	Manufacturing	*MES WMS Quality management Manufacturing operations management*	✔						
Tririga TRIRIGA provides environmental sustainability software for real estate assets and operations. The company provides TRIRIGA Real Estate Environmental Sustainability (TREES), a solution to measure, manage, and reduce buildings' energy consumption and greenhouse gas emissions. TREES uses over 24 performance metrics (including carbon intensity, energy efficiency and waste/water efficiency) to improve environmental performance and reduce expenses and operating costs.	North America	Asset intensive	Workplace management Real estate environmental sustainability				✔	✔	✔	

* Different vendors may interpret and support this and the following green features differently.

The Last Word

It's a foregone conclusion that in order to stay competitive, companies must once and for all become active in creating a greener business environment. Greening your business involves basic management theories, coupled with some common sense.

Sustainable initiatives should be seen not as burdens, but as sources of innovation and competitive advantage. By being a leader in sustainable practice, your business will grow, your stakeholders will be happy, and you will see the benefits in your bottom line.

With operational efficiency as your goal, you can be certain to make the greening of your business a win-win situation. By adhering to mandatory compliance regulations, adopting voluntary standards, incorporating lean processes, and implementing green technologies, you can be assured that your business will benefit from a relatively quick ROI.

About The Authors

Sherry Fox is a TEC research analyst with over 20 years of experience in the private sector. Before joining TEC, Fox spent 5 years as vendor compliance administrator for a large Canadian clothing retail chain. She helped create and manage the department and provide support regarding policies and procedures to vendors all over the world. Fox also helped develop various programs relating to environmental and human rights issues within the apparel industry, and participated in conferences on the subjects of sustainability and climate change.

Fox has been involved with several software implementation projects during her years in the retail industry. From deploying payroll software to integrating a benefits module, she was actively involved in all phases of these implementations.

A proficient writer of articles, online content, guides, and manuals, Fox has comprehensive knowledge in the areas of retail, manufacturing, compliance, and technology. She also has in-depth management experience with various enterprise segments, including payroll, human resources, logistics, and compliance.

Vendor Overview by Kurt Chen:

Yu (Kurt) Chen is a TEC research analyst with over 10 years of experience in IT strategy consulting and project management. With extensive experience in planning and realizing enterprise information systems, Kurt conducts software research oriented toward both business needs and market trends.

Before joining TEC, Kurt was a cofounder of a leading PLM developer in China. As one of the early PLM advocates in China, Kurt contributed toward Chinese industry standards for enterprise information system implementations. More recently, as a consultant for a global manufacturer, Kurt was responsible for identifying issues and recommendations related to the management of environmental issues, which he sees as a key element to both manufacturing and IT governance best practices.

Kurt earned his MBA from HEC Montreal (Quebec, Canada), with a concentration in IT management. He is also an SAP-certified consultant.

Research by Paloma Somohano:

Paloma Somohano works on special projects for various departments at TEC. She has a BBA in management and is currently studying for an MBA in corporate social and environmental responsibility. Her areas of interest include corporate strategy, the environment, and international trade.

Further Reading

Green Lean Six Sigma: Using Lean to Help Drive Results in the Wholly Sustainable Enterprise, Deloitte Development LLC

State of Green Business 2008 (registration required), Joel Makower, Greener World Media

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new thinking
Going Green

Businesses are looking to use technology they already have to help become good corporate citizens and be proactive in combating carbon emissions. As with financial compliance standards that guided the earlier part of the decade, technology can be a means for action—rather than a reaction.

Corporate Social Responsibility: Using Technology to Become More Lean and Green

By Tim Teeter, product marketing manager, Epicor Software

Businesses are looking to use technology they already have to help become good corporate citizens and be proactive in combating carbon emissions. As with financial compliance standards that guided the earlier part of the decade, technology can be a means for action—rather than a reaction once legislation has mandated adherence to local, state, national, or international requirements.

AMR Research estimates that within the next two years 89 percent of companies in the US and 62 percent in Europe plan to use technology to manage their corporate social responsibility (CSR) initiatives, and even more encouragingly, 70 percent of companies have a dedicated budget for CSR initiatives[1] . Some of the most notable areas that corporations are placing emphasis on when deciding on a path to CSR surround strategic sourcing and procurement, continuous process improvement, and product lifecycle management (PLM).

1. Strategic Sourcing and Procurement

As a result of increased scrutiny, companies are now setting up supplier guidelines that include social and environmental requirements as well as supplier codes of conduct. Traditionally, preferred suppliers have been viewed as those with the best performance, total cost, and quality. In leading-edge companies, CSR and sustainability are now part of the preferred supplier equation, ensuring social and environmental compliance as well as the normal performance metrics of product quality, on-time performance, and price.

Historically, procurement has been based on two criteria: price and quality. As long as the right product arrived on the doorstep at the right price, everyone was happy. Today, talking about procurement in a more socially conscious world, companies have to worry more about sustainable procurement. Sustainable procurement broadens this framework to take account of third-party consequences of procurement decisions, forming a "triple baseline" of environmental, economic, and social considerations. Due to the extended supply chains of many companies, it is more critical than ever for enterprises to have the proper information about their supplier base (environmental performance, environmental certifications, and codes of conduct of their supply partners). The 2007 toy recalls for excessive lead paint levels should serve as a wake-up call for all manufacturers. Supply chain disruptions such as these can potentially cost millions of dollars to enterprises.

Supply chain inefficiencies that promote poor environmental performance create a serious disadvantage. Managers are teaming with procurement departments to better leverage efforts to "green" their suppliers. This requires carrying out an assessment of the environmental consequences of a product at all the each stage of its life cycle. This translates to measuring the environmental costs of securing raw materials; and manufacturing, transporting, storing, handling, using, and disposing of the product. Implementing an automated supplier enablement process brings higher visibility into the overall process. It provides essential and comprehensive information about suppliers that improves the strategic value of those relationships and mitigates risk.

In leading-edge companies, CSR and sustainability is now part of the preferred supplier equation, ensuring social and environmental compliance as well as the normal performance metrics of product quality, on-time performance, and price.

2. Continuous Process Improvement

Midmarket companies are challenged to find ways to better facilitate communication and create streamlined manufacturing processes that don't decrease current production or add additional cost to the final product. One way for manufacturers to enable sustainability across every process in the organization is to implement continuous process improvement programs. The underlying principles of the programs are to foster effectiveness and efficiency across the entire supply chain while improving workflow by utilizing such tools such as lean manufacturing, six sigma, and total quality management (TQM) principles.

Companies may not consciously target "environmental" issues such as energy or water use, solid or hazardous waste, or chemical hazards in their process improvement initiatives. Yet, given the recent public focus on green and corporate social responsibility coupled with the rise in energy (and transportation) costs, an increasing number of companies have begun specifically targeting energy consumption with process improvement initiatives. Energy consumption and waste output have a very definite and measurable impact on a company's bottom line as well as a facility's environmental footprint.

Most companies believe that continuous process improvement's main benefits come from cutting costs, while improving manufacturing and distribution process and efficiency, but that is really a mistaken perception. Process improvement is not a quick solution for cost reduction; it is a fundamentally different system than traditional management for organizing and deploying corporate assets.

Process improvement initiatives can have far-reaching implications, ranging from management of supplier and customer relationships to executing product development initiatives and managing manufacturing production resources across the extended enterprise. While continuous process improvement's fundamental focus is on the elimination of non-value-added activity and waste from the production and distribution processes, the implementation of continuous process improvement principles leveraging lean manufacturing, six sigma, and TQM methods results in significantly improved environmental performance. This translates to a focus on continually improving resource productivity, production, and distribution efficiency, which results in less material, less capital, less energy, and less waste per unit of production.

Continuous process improvement also ultimately identifies overall manufacturing and distribution requirements and aligns production "need" to production capacity. Doing this will always ensure that production lines are optimized, improving the utilization of energy and raw product in the manufacturing process. Implementation of continuous process improvement principles also provides companies the necessary resources to tightly align packaging material to production events. Effective alignment of the two processes again results in more efficient use of materials, reduced waste, and improved line and machine utilization.

3. Product Lifecycle Management

Another hurdle to overcome with a global supply chain is a lack of communication between design and manufacturing. Product lifecycle management (PLM) is an enterprise, business, and information strategy that enables companies to establish global information networks to meet these challenges. By providing a digital manufacturing environment with a centralized data repository, PLM makes it possible to capture information from all stages of manufacturing and production. This includes product engineering, product release management, assembly process planning, process simulation and validation, and process detailing and documentation, as well as product launch support.

The entire process combines all relevant data into a repository, which reduces the number of redundant parts used in product development, efficiently manages component identification and sourcing, performs substance survey collection and storage and testing reports, and analyzes components for Restriction of Hazardous Substances (RoHS)-restricted substances by searching bill-of-materials (BOM) information and related material data to determine compliance. On a more tactical level, when linked with sourcing initiatives and vendor management applications, PLM provides companies the means of identifying and sourcing from suppliers that follow sustainable practices, fair-trade relationships, and progressive labor practices.

PLM systems can also provide a new perspective on a company's own use of resources. For example, PLM capabilities can be used to calculate the amount of packaging used for products and help identify opportunities to reduce packaging. This not only improves margins by lowering packaging costs, but also reduces the amount of waste produced when the product is opened and the packaging discarded.

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In the early stages of any lean manufacturing project, it's easy to see the benefits immediately; however, as you progress, it becomes harder and harder to increase that efficiency if it is not possible to clearly see where the hidden waste remains.

Mitsubishi Heavy Industries Increases Scheduling Efficiency with Asprova

Nagoya Guidance and Propulsion Systems (NGPS) of Mitsubishi Heavy Industries (MHI) Ltd. was founded in 1920 as the Nagoya Plant of Mitsubishi Internal Combustion Engine Manufacturing Co., Ltd. (Mitsubishi Nainenki Seizo KK). It started as an aircraft division, manufacturing and repairing aircraft and aircraft engines. Since then, MHI has participated in a wide variety of aircraft and aerospace development and in the launching of rockets. At the present time, more than half of its production goes into related products such as aircraft guidance systems.

> " When the revisions were complete, NGPS found that the very situation for which the revisions had been made was completely different, preventing them from making accurate forecasts of completion. That was the situation that led to NGPS's decision to install Asprova. "

In 2003, NGPS installed Asprova to get greater efficiency out of the planning that had been done manually up to that time. In 2007, the Asprova Sales option was added for more uniform production planning. Kazuhiro Yoshino, manager of the Production Engineering Department at NGPS Works spoke about the background for Asprova's installation. "We installed Asprova to achieve greater precision in automating our scheduling work. Asprova was installed on the production line that builds a device known as a disk, a component that is part of the structure of aircraft engines used in private aircraft and used to convert the force of combusting gases within the engine into dynamic power. The flow of production is one in which NGPS produces a wide variety of parts that includes these disks and supplies them to the engine manufacturers. The engine maker assembles those parts into the final form and ships the engine to the airline company."

Since 2003, NGPS has been working on increasing the efficiency of scheduling, which until then was done by hand. At that time, manual scheduling often required a complete reworking of the schedule, which led to a constant problem of delayed operations. Then, when the revisions were complete, they would find that the very situation for which the revisions had been made was completely different, preventing them from making accurate forecasts of completion. That was the situation that led to NGPS's decision to install Asprova.

Hirokazu Yoshino, manager of the Manufacturing Department's Production Engineering Section gave the reasons that Asprova was selected. "The first reason for our selection was the large number of parameters that we could assign for ourselves. I'm sure that this is the case at any plant, but there are particular conditions and requirements here that are unique to us. Asprova's flexibility really fits the bill in that regard. We tried a lot of other schedulers, and

almost all of them supported the production lines that are part of the assembly system, but we judged that Asprova was the only product that best took care of the main lines in our process systems themselves.

"We placed the focus for the installation of Asprova on our disk production line. The reason for placing it there was that the equipment was fixed, and by limiting the line to reduce the number of items, we believed that we could also hold down the number of changing factors as well. In short, the flow of disk manufacturing is: cutting material —> grooving —> drilling holes —> rounding —> aperture polishing —> inspection—for a total of about 15 processes, including detailed items."

Lean manufacturing is not just about removing the waste from your factory; it's about improving the overall efficiency of your production.

In the early stages of any lean manufacturing project, it's easy to see the benefits immediately; however, as you progress, it becomes harder and harder to increase that efficiency if it is not possible to clearly see where the hidden waste remains. Asprova's Production Scheduling System keeps your lean manufacturing on track, ensuring that your continuous improvement lasts for many years, instead of just a few months.

The main general benefits of installing Asprova were:
•   Visualization
•   Reducing the amount of inventory (for both the raw materials and finished products) by planning the delivery of raw materials to arrive just as they are going to be used, and scheduling operations so that the finished products are ready just when they need to be shipped
•   Reducing the work in process (WIP) by intelligently scheduling the operations to cut down the waiting time between processes, resulting in a shortened lead time
•   Strict adherence to delivery time
•   Optimizing the utilization of all the resources in the factory (machines, tools and workers) so there is the least amount of idle time. Users can run a schedule simulation to see if the same amount of orders can all be done by their due dates with fewer machines and workers
•   Greater operational planning efficiency
•   Greater planning precision
•   Shorter planning cycle
•   Frequent planning changes dealt with easily
•   Shared process data

More specifically, installing the Asprova Sales option enabled faster speeds and greater precision in production planning. NGPS started installing the Asprova Sales option at the end of November 2007, completed installation in about one month, and then took two or three months to tune it before putting it into online operation. That made it possible to draft a production plan from order data, all the while taking safe inventory into consideration.

"Now, for example, we assign quantities in inventory and everyone knows exactly what that data is. Before, we had to go directly to the people in charge and ask them.Now, management can look at the data and debate the adjustments needed in production planning. Another thing is that we can accurately measure the number of lots for each part, which greatly enhances the precision of production planning."

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Following a failed implementation, Decorated Products needed a fresh start with a new ERP solution robust enough to support the company's growth and its drive toward lean efficiencies.

Lean in Action: Manufacturer Cuts Lead Time from Four Weeks to Four Days

Business Challenge

Following a failed implementation, Decorated Products needed a fresh start with a new enterprise resource planning (ERP) solution robust enough to support the company's growth and its drive toward lean efficiencies.

Solution

At a Glance

Decorated Products

Decorated Products found the solution in Epicor Manufacturing, and has expanded and upgraded to the most recent version built on a true service-oriented architecture, True SOA™.

Industry

Metal Nameplates & Labels

Business Benefits

- increased inventory turns from less than two to over 50

- reduced customer lead time from four weeks to four days

Headquarters

Westfield, MA

- reduced finished goods inventory, freed up warehouse space

Employees

42 Employees

Decorated Products, a Westfield, Massachusetts-based maker of metal identification labels, decals, and roll labels, was started in 1950 by the father of the current president/owner, Jeff Glaze. As a family owned and operated business, Decorated embodies the traditional focus on customer service and the personal touch that has made the company an undisputed leader in its industry. But these traditional values have not stood in the way of innovation and efficiency.

Solution

Epicor Manufacturing

"Decorated is a much leaner company than we were several years ago," Glaze says. "We are continually striving to reduce waste, improve operations, and be more flexible to better serve our customers." That journey has taken the company through kaizen (starting in 1988), Six Sigma, Deming's 14 points, and various lean initiatives to International Organization for Standardization (ISO) 14000 compliance, ISO 9001:2000, and ISO/TS 16949:2002 registrations, and qualification as a Tier 1 vendor to the automotive industry. Epicor's manufacturing software solution has been a key part of these lean efforts.

"Epicor is flexible enough to support what we have done in our lean transformation," Glaze says. As an example, he points to some of the changes in inventory management: "We standardized part numbering and reduced raw material inventory from 200 parts to about 60. We changed the way we purchase, so that now 80 percent of our materials is on consignment—time phased to coordinate with our raw material needs. Epicor's flexibility has fully supported this effort to the point where we trigger vendor billing for these materials when we open the box."

Decorated has cut manufacturing lead time from four weeks to four days. "We eliminated operations, and got better at the ones that remain," he says. "Real-time reporting and analysis in Epicor are key, enabling us to react much faster to customer requests and keep closer track of inventory and production activities." On some custom products, Decorated offers 24-hour turnaround by having the necessary materials on hand. Nevertheless, the company now maintains an average of only five days of materials on hand at any time. This is a dramatic decrease from before, when the company materials inventory averaged less than two turns (a six to twelve months' supply).

Increased Visibility, Visible Results

Before Epicor, Decorated was unable to track finished goods with any level of accuracy. "With Epicor, we can track value by warehouse using different valuation techniques for different kinds of inventory. That has helped us to reduce inventory and waste," Glaze says. "We used to have to walk out to the warehouse to check on what we had. That took a lot of time and effort. We don't need to do that any more." The warehousing efficiencies have also reduced the amount of space needed for storage. Decorated also instituted a numbered bin system so it knows exactly where everything is and can get to it faster.

While the company has chosen not to adopt the order-less flow style of production seen in many lean plants, it benefits from the ability to link subassemblies in the system to final products and customer orders using a type of electronic kanban. Since some of the subassemblies can be used in many end products, this visibility helps keep things in sync, avoiding shortages and unpleasant surprises.

Customer service improvements include the use of the Epicor product configurator to quickly and reliably capture customer requirements and prevent problems on the plant floor that can delay shipment and impact quality. "The configurator guides the customer rep through the specification process and helps avoid mistakes," Glaze says.
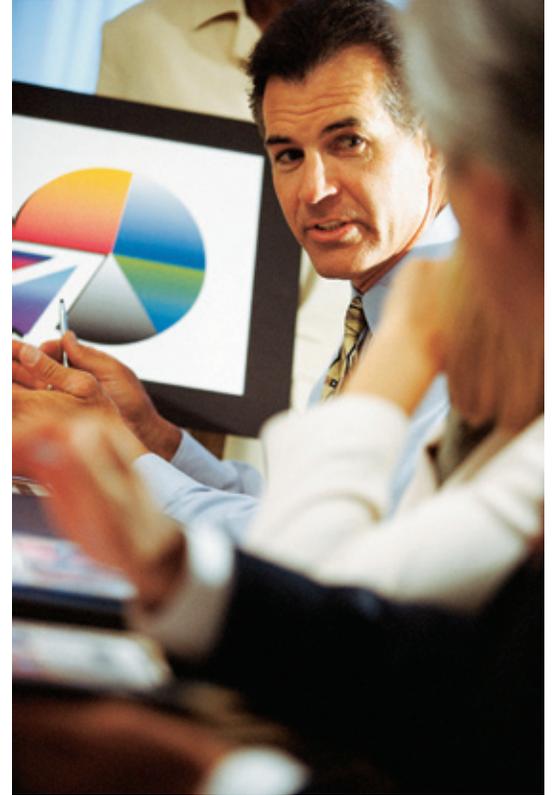
" Decorated is a much leaner company than we were several years ago. We are continually striving to reduce waste, improve operations, and be more flexible to better serve our customers. "

Jeff Glaze, owner/president of Decorated Products

Part of any lean effort must be focused on keeping the equipment in good working order to reduce breakdowns and disruptions to schedules. Decorated has an aggressive predictive and preventive maintenance program in place, using Epicor labor tracking to measure equipment usage and minutes of downtime.

Customer Appreciation

The company's accomplishments are evident through the inventory reductions, lead-time improvements, and high level of customer satisfaction. Major customer have recognized Decorated by bestowing single-vendor status (Parker Hannifin, Cummins Engine), and through collaboration efforts such as the partnership with Black & Decker, in which Decorated worked with the design team during the design phase for a complete reworking of the high-end DeWalt tool product line.

About Epicor

Epicor is a leading provider of enterprise business software solutions to the midmarket and to divisions of Global 1000 companies. Founded in 1984, Epicor serves over 20,000 customers in more than 140 countries, providing solutions in over 30 languages.

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While InkCycle is already helping to keep millions of spent ink-jet cartridges out of landfills, it is now reengineering its own processes to become even more environmentally responsible.

InkCycle Makes Green Ink, While Staying in the Black

InkCycle is an industry leader in toner and ink-jet print cartridge technology.

Facts about InkCycle

InkCycle is an award-winning company that specializes in remanufacturing ink-jet and toner cartridges. InkCycle is the largest remanufacturing facility by volume of ink-jet cartridges in North America, and operates out of two locations in the Kansas City area, employing more than 300 people. InkCycle specializes in providing premium quality aftermarket cartridges through both national retailers and office products dealer distribution channels.

Benefits

- Successful complex materials sourcing necessary to avoid intellectual property issues
- Dynamic connection between Web portal and IFS Applications, reflecting rapidly changing, customer-specific pricing
- Rapid new product launch capabilities
- Reduced paper costs due to electronic document management

InkCycle provides products to office and computer products resellers, office products superstores, other national chain stores, and printer service companies.

The challenge

InkCycle, the Lenexa, Kansas (US)-based industry leader in toner and ink-jet print-cartridge recycling, has been in "green business" since its creation in 1992. But the company is currently reengineering itself to become even greener, and to serve its retailer customers even better.

To date, the company has concentrated on remanufacturing ink-jet cartridges sold to office supply resellers and retailers—including major office supply chains and mass merchants—under generic and store-brand private labels. Each customer places unique requirements on InkCycle, forcing the manufacturer to, in essence, run separate back-end systems for numerous customers. Last year, InkCycle launched its first branded product: a "super-green" line of recycled ink and toner cartridges that has broken new ground in the area of environmental responsibility and recycling.

According to InkCycle Executive Vice President Brad Roderick, the company's technology infrastructure gives it the ability to meet the needs of multiple private-label customers and the flexibility to simultaneously launch a branded product. Technology has helped the company deal with the complexities of its business model while serving hundreds of large and small resellers.

The solution

The backbone of InkCycle's IT system is an instance of IFS Applications, which handles financials, customer relationship management (CRM), human resources (HR), timekeeping, document management, engineering, manufacturing, and maintenance. InkCycle has augmented this system with ScanWorks bar-code technology from the company that implemented IFS Applications for them, eNSYNC Solutions of Shawnee Mission, Kansas.

"During our peak recycling months, we recycle in excess of 1.7 million empty cartridges," Roderick said. "IFS is receiving every one into inventory. It is critically important for us to be able not only to bring in that many items, but to be able to track the cartridge type as well as its source. As with any critical raw material, it is imperative that we are able to fully track each and every cartridge from time of receipt all the way through the production process. We use ScanWorks to identify each cartridge, and then record its condition and who sent it to us. Attempting to do this type of tracking manually is not an option. If I needed to create the records manually, InkCycle would be out of business."

Not only does the data and material flowing through InkCycle's operations need to account for the origin, manufacturer, and model of every single cartridge, but it must be sliced and diced on behalf of each individual customer and by types of customer. InkCycle interacts with its larger customers through electronic data interchange (EDI), which allows larger customers to order electronically through a direct link to the recycler's instance of IFS Applications. Others can order through InkCycle's web site.

"We do operate EDI in and out of IFS Applications for some of our larger customers," Roderick said. "Whether our customers order through EDI or through our ePages web store, which is also integrated with IFS Applications, our systems need to be able to handle our customer-centric pricing model."

Maintaining customer-specific information at this level of granularity is not something normally associated with CRM, a type of software usually used for sales and contact management, according to Roderick.

"Our previous CRM was Goldmine," Roderick said. "That's a fine Rolodex, but IFS Sales and Marketing allows a much more efficient transfer of information by customer and by contact. The fact that customer records are integrated with back-end manufacturing, e-commerce, and other tools allows us to manage our growing customer care organization."

Green and getting greener

While InkCycle is already helping to keep millions of spent ink-jet cartridges out of landfills, it is now reengineering its own processes to become even more environmentally responsible.

> " The fact that customer records are integrated with back-end manufacturing, e-commerce, and other tools allows us to manage our growing customer care organization. "
>
> Brad Roderick,
> Executive Vice President, InkCycle

One process that Roderick and his team have paid special attention to is document management. Reducing the use of paper documents and relying more on IFS Document Management has been a relatively simple way for InkCycle to consume fewer natural resources.

But InkCycle's most significant environmental initiative was the July 2008 launch of its first branded product line. Unlike current products, which are marketed under customer brand names, this new offering will carry the grenk™ brand, and is designed to strip the environmental footprint of an ink-jet and toner cartridge to the bare minimum.

"The products themselves are manufactured differently, achieving a higher reuse rate of the cartridge components," Roderick said. "The internal packaging moves away from foam to air pillows and oxy-degradable materials. The cartridge box is sourced through a certified chain of custody so we can document that things are handled in an environmentally sustainable manner."

InkCycle is also looking at product end-of-life issues, and coming up with unique ways to dispose of cartridge material once it has been used to print its last page.

"Our goal was to provide total life cycle management and ensure that none of the empty cartridges we receive for recycling could end up in the hands of someone who might dispose of them in a landfill," Roderick said. "We recently finalized an agreement with a local company that requires a tremendous amount of heat in its production process.

"A large part of our scrap material is damaged cartridge housing, which has a very high BTU value," Roderick said, adding the cartridges would be burned for their high petroleum content.

From a business process standpoint, everything about this new product will diverge from how InkCycle normally does things. Marketing will be handled from an advertising pull-through basis. The product will be made to stock rather than made to order. Such violent change could be disruptive in a mid-market company.

"Fortunately, all of our structures and routings are in IFS Applications, and we can easily reconfigure things," Systems Analyst Tracy Reed said. "We are actually accustomed to managing change of this order. We regularly get new customers that have unique requirements under their private-label agreement. Each new customer increases the complexity of our business. The flexibility of IFS Applications in the areas of manufacturing resources planning, engineering, and costing helps us launch products more rapidly."

www.ifsworld.com/us/

Companies can take advantage of an economic slowdown as an opportunity to advance their lean practices. Businesses today are presented with a chance to modify their processes and tune their operations towards a more efficient, more sustainable, more profitable enterprise.

Power Tailoring Bundle: A Pragmatic Approach to Gaining Business Efficiencies

Mid-market manufacturers and distributors are constantly searching for ways to effectively compete in the global economy. In order to do so, manufacturers of all sizes must embrace lean manufacturing principles as the driver of their short-, medium- and long-term goals, regardless of the status of the economy. In fact, companies can take advantage of an economic slowdown as an opportunity to advance their lean practices. Businesses today are presented with a chance to modify their processes and tune their operations towards a more efficient, more sustainable, more profitable enterprise. A pragmatic approach to accomplishing this entails coupling lean processes with technology to simplify operations and, in doing so, open the road for more profits in the future.

SYSPRO has captured these elements and built beyond them to enable a totally user-centric enterprise resource planning (ERP) solution that has the capability to flex and grow with the specific business needs of each customer. For over 30 years, SYSPRO has consistently built on the most current technologies and developed diverse, quality business solutions for small to misized businesses (SMBs). SYSPRO was one of the first ERP providers to address service-oriented architecture (SOA) and has been recognized in the industry as a pioneer in that respect. From this position, SYSPRO has developed an effective toolkit it calls the Power Tailoring Bundle that ensures end users are working with a total system aligned to their unique business needs.

SYSPRO identifies with pragmatic yet visionary companies that have gone the extra mile in crafting a differentiable competitive advantage and developed business processes that compliment that uniqueness. SYSPRO allows companies to tailor the software to support their business strategies—its proven comprehensive feature set comprises over 40 modules and covers everything from accounts payable (AP), accounts receivable (AR), general ledger (GL), inventory, and bar coding all the way through to the more complex material requirements planning (MRP) and inventory optimizing. This, together with the Power Tailoring Bundle features listed below, allows a business not only to benefit from the SYSPRO ERP system's rich core functionality, but also to mold or develop the system to support business-specific processes.

SYSPRO's Power Tailoring Bundle, built upon the tried-and-true Microsoft .NET framework, is made up of these seven features.

- **SYSPRO e.net solutions** – A component-based architecture that enables integration of best-of-breed applications to facilitate business-to-business trading, Web-based transactions, multisite coordination and wireless connectivity. With e.net solutions, a company can effectively develop around the core SYSPRO system without affecting business logic, security, or the underlying database. In a platform-independent environment, disparate systems can be integrated seamlessly into SYSPRO. The environment ensures that this tailoring investment is not compromised by future SYSPRO updates and delivers a highly effective return on investment (ROI).

- **SYSPRO Document Flow Manager** – A collaborative commerce engine that automatically sends and receives transactions, enabling automated business-to-business trading and cross-system interoperability.

- **Fluid Interface Design** – Visual Basic Scripting (VBScript)-enabled screen customization capabilities that allow users to drag and drop or delete and restore custom data fields, and create their own forms and views. Users can leverage the power of user-defined fields with drop-down validation, further expounding and augmenting the core SYSPRO environment. This technology is pervasive throughout SYSPRO and ensures that users are served the most effective and efficient user interface (UI) for their specific job requirements.

- **Role-based User Interface** – An interface tool that allows system administrators to control the UI customization by applying roles to certain operators, delivering only what is pertinent to that user's function. Both UI and SYSPRO security are leveraged for both the effective administration of users and the efficient utilization of the SYSPRO enterprise software.

- **Web Services** – Web-facing applications that support a more convenient and efficient transaction environment. SYSPRO customers can effectively develop business-specific applications that are an extension of the SYSPRO system. Users can gain access to SYSPRO through Microsoft Office Business Applications (OBA) or by using Web services and Microsoft .NET.

- **Executive Views** – A dynamic pane customization tool that is defined per user or role, and created using standard templates of critical business metrics, financial ratios, custom panes, reports, web sites, etc.

- **SYSPRO Reporting Services** – a reporting and analytics tool embedded with Crystal Reports that enables maximum control over time and business management. Certain business functions require specialized reporting, and to this end SYSPRO incorporates a financial report writer for effective financial reporting, real-time analytics, and the out-of-the-box SYSPRO Financial Ratios that allow management to gain visibility and freely assess the company's financial health.

Using SOA, e.net, and practices like these promote effective and efficient operations—especially in a tightening economy. Automating critical processes allows an enterprise to cut costs and maximize resources by trimming the fat off day-to-day operations. SYSPRO extends its ability to address "lean and green" principles within the SMB environment by delivering deep functionality across all aspects of a single or multisite manufacturing and distribution business.

SYSPRO recently won a key "green" software contract with Chicago-based Greenmaker Building Supply, a construction and remodeling industry leader that provides environmentally friendly building materials. "We are a one-stop-shop for environmental materials and needed a comprehensive solution that was strong enough and customizable enough to manage a business like ours that is breaking exciting new ground in the world of 'green,'" said Greenmaker co-owner Ori Sivan. "SYSPRO understands visionary businesses of our size that are trying new things and breaking new ground—yet it is robust and pragmatic enough to grow as rapidly as we need."

Taken together, the tools that make up the Power Tailoring Bundle allow for total customization, while giving access to all information in real time so that management can make decisions based on complete knowledge rather than on "gut feel." At the same time, the system is agile—so that should management need to make decisions on the fly, it has the flexibility to apply changes across the board with minimal effort.

Businesses have a golden opportunity today to introduce new efficiencies into day-to-day operations. A robust, integrated ERP system commences the pragmatic approach that will get these businesses through any and all economic shifts and into profitability for years to come.

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From responsibly producing products, to minimizing waste, to properly recycling and disposing of products, the four vendors on the next page highlight some of their successes infusing green capabilities into their products and green thinking into their business strategies.

Case Studies at a Glance: Analyst Perspective

It's undeniable that "green" is the way to go for today's businesses. Even in light of the current economic climate, companies are realizing more and more that "green is good for business" (both environmentally speaking and from a business—and bottom line—perspective). From responsibly producing products, to minimizing waste, to properly recycling and disposing of products, the four software vendors below highlight some of their successes infusing green capabilities into their products and green thinking into their business strategies by sharing a few cases studies.

IFS's green success comes from providing its clients with the ability to track a product's raw materials from product conception through to the production process and beyond. With its document management capabilities, IFS Applications has also helped companies (like InkCycle—producers of recyclable ink cartridges) reduce paper costs (and by extension, consume fewer natural resources).

Asprova Corporation is another software vendor on the way to "greener pastures." It has helped companies improve lead times and reduce inventory through lean manufacturing capabilities, such as production scheduling and resource optimization. An example of one such company is Nagoya Guidance and Propulsion Systems (NGPS). Since implementing Asprova's Production Scheduling System, NGPS has greatly minimized manual scheduling processes and further optimized the use of its resources (such as machines, tools, and workers).

SYSPRO encourages its clients' green initiatives by helping them modify their business processes to incorporate lean manufacturing principles. SYSPRO has captured these elements through the development of an effective toolkit it calls the Power Tailoring Bundle, which ensures that users are working with a total system aligned to their unique business needs. Automating some of its critical processes allows an enterprise to cut costs and maximize resources by trimming the fat off day-to-day operations.

Epicor has helped companies like Decorated Products improve their environmental footprints by injecting lean capabilities into its manufacturing software solution. In doing so, Decorated Products has significantly reduced its raw material consumption and storage space requirements, as well as cut manufacturing lead times from weeks to mere days. With Epicor's labor tracking capabilities, Decorated Products has been able to create an aggressive predictive and preventative maintenance program which helps measure equipment usage and downtime minutes.

Technology Evaluation Centers (TEC) provides insight and expertise in offering impartial resources and services to minimize the costs, risks, and time associated with software selection. Over 3.5 million technology decision-makers visit TEC's Web sites each month, to find information on hundreds of solutions, and to access articles, white papers, and podcasts. TEC's decision support system (DSS) and analyst data assist with the evaluation, comparison, and selection of enterprise solutions and services. TEC's offerings include in-depth research, detailed product information, and software selection services for any industry or company size.