



The Green Space: Is Lean Turning Green?

Lean manufacturing is old hat to many manufacturers. With its goal of continuous elimination of any activities, processes, and materials that do not add significant value to the manufacturing process, lean manufacturing initiatives have helped countless facilities become more efficient, and led to increased production and lower costs. While lean alone is great, many manufacturers are taking lean to the next level. Incorporating many of the same principles as lean manufacturing, *green* manufacturing also takes into consideration everything from the environmental impact of the chemicals and processes that are used, to the nature of the daily operations of employees.



Despite the notion that it is expensive to go green, many companies that have implemented lean manufacturing principles—and saved money in the process—are finding that there is a strong correlation between these efficiency improvements and environmental stewardship. It is difficult to argue any longer that environmental sustainability is just a passing fad. Actually, it has become a core principle of today's business world, as more companies begin to implement environmentally sound practices. If you have already made the



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journey to lean, you will likely find that reaching green is just a few steps further down the road.

A green manufacturing facility incorporates processes and equipment that maximize energy efficiency, minimize waste from pollution, and help ensure compliance with the requirements of environmental regulations. The cost of retrofitting equipment and changing processes to become more energy efficient and reduce emissions might lead to some initial foot-dragging, but the money spent on such changes is quickly regained in savings from increased energy efficiency of equipment and a significant decrease in time spent completing processes. Green manufacturers also find there is less money spent for waste management, due to recycling and other waste reduction efforts (the lean part of the picture). Depending on the manufacturing industry, funds can also be retrieved through government programs and initiatives, which were created to promote green manufacturing. (Not to mention the savings from avoiding potential environmental compliance penalties.)

The first step in green manufacturing is to determine what green means for a manufacturer's specific industry. Using the Commission for Environmental Cooperation's (CEC) North American Pollutant Release and Transfer Register, manufacturers can determine the emission rates and toxicity levels of chemicals used and find information on handling laws pertaining to these chemicals. After the chemicals and products used are carefully analyzed for environmental friendliness and levels of toxic emissions, it is fairly easy to determine which products can stay, which products should be avoided, and which products and chemicals can be reused.

According to a Fujitsu sustainability report, reusing waste is one of the simplest and most cost-effective ways to reduce manufacturing environmental impact. Some common manufacturing wastes, along with some potential reuses, are listed below:

- Sludge—Raw material for cement, copper recovery.
- Plastic—Raw material for plastic or solid fuel.
- Acid/Alkali—Neutralizer.
- Paper—Thermal recycling.

- Oily substances—Reused in combustion improvers.
- Metallic substances—Raw material for smelting.
- Animal/vegetable waste—Fertilizer.

Green manufacturing may mean recreating manufacturing systems for an entire site, but that is not the only way to green up a facility. Incorporating energy-efficient equipment can also be a less expensive way to help the environment and save time and money in the long run. For example, a Regenerative Thermal Oxidizer (RTO) destroys toxins and Volatile Organic Compounds (VOCs) in the air, allowing some VOC-emitting equipment to remain in use, due to the fact that the RTO would remove the equipment's emissions. Buying products made from recycled materials and manufacturing products with reused materials can substantially reduce the facility's carbon footprint (the level of environmental impact from human activity).

The responsibility of green manufacturing does not rest solely with management; employee participation is an essential part of the process as well. Employees can be involved in every aspect of the greening process, from designing the latest efficient production system to recycling. Simple recycling programs can be implemented to encourage employees to reduce consumption and recycle renewable material. Creating incentive programs and in-house training sessions can help increase employee participation in conservation and recycling efforts.

Upper-level management and supervisors need to be entirely on board with any green initiative, and should regularly stress the importance of reducing consumption and recycling to employees. Visibility is also an effective way to encourage employee participation in conservation efforts. Posting signs and emails promoting the initiative, increasing the number of recycling containers, and strategically placing containers at common points of disposal, such as a break room or by a printer, can go a long way toward increasing participation.

Incorporating the Japanese "Five S" system can also help simplify the transition to lean and green. Each S in the Five S system—Seiri, Seiton, Seiso, Seiketsu, and Shitsuke—can be loosely translated into the following:

- Sort—Separating the useful from the useless can help simplify manufacturing processes, saving time and money spent on the unnecessary items.
- Store—Finding a convenient location for recycling bins and other conservation efforts can mean the difference between significant employee participation and no participation at all.
- Shine—Keeping the workplace clean and organized.
- Standardize—Applying the most cost-effective, energy-efficient practices.
- Sustain—Benefiting from the chosen practice and continuously making improvements.

According to the Grocery Manufacturers Association, there are four key aspects that contribute to a successful green operation: strategic collaborative alignment, governance, continued process improvement, and operational effectiveness and efficiency. Collaborating with partners and suppliers on green initiatives can help save money, because companies can receive a higher return when the whole supply chain joins the effort, according to the Green Suppliers Network, an organization that promotes and teaches green, lean manufacturing. A comprehensive approach must be taken to optimize results.

During the early stages of the initiative, it may be wise to create an awareness campaign to alert partners and consumers of new changes. Part of the road to becoming more energy efficient might be using less packaging for concentrated products, or even a slight increase in price. Informing consumers of the reason why these changes are taking place will let them know that they are still receiving the same value as they support the green initiative. Even if consumers will not be directly affected, it is still a good idea to inform them of the changes, because environmental stewardship can have a powerful impact on the manufacturer's public perception. Green manufacturing can also increase a company's competitive edge, as the initiative may help form new partnerships with other companies wanting to collaborate with green manufacturers, or wishing to implement the same technology or techniques.

Once initiative goals have been met, be sure you are not just resting on those new lean and green laurels. Continuous assessments and improvements should be made to ensure that process equipment maintains maximum efficiency levels, waste levels remain low, and government and organization standards are met or surpassed.

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