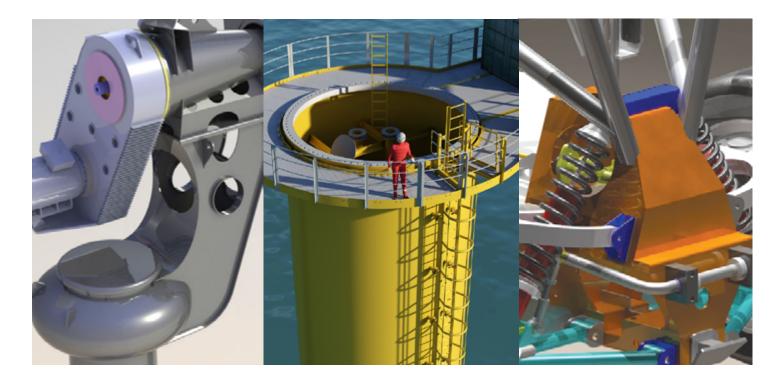# DRIVE GROWTH AND INNOVATION WITH SUSTAINABLE DESIGN

Overview

Manufacturers that effectively adopt sustainable design practices will position themselves to successfully respond to increasing consumer demand for "greener" products. They also will spark innovation in product development, control energy and material costs, and grow revenues. Yet, implementing a sustainable design strategy can be challenging because of misconceptions about costs versus benefits, as well as questions about how to effectively implement sustainable design. You can facilitate the implementation of sustainable design by using product life cycle information to leverage sustainability as a competitive advantage.

3S SOLIDWORKS

Sustainable design is good business

Sustainable design—a dedicated effort to create products in a manner that minimizes their negative impact on the environment, making them more economically viable, socially acceptable, and ecologically tenable—is often misunderstood. In the past, many manufacturing executives viewed efforts to become more environmentally friendly as expenses rather than opportunities.

However, in today's marketplace, this perspective is proving to be outdated, short-sighted, and fraught with misconceptions. Today, more environmentally friendly and sustainable design can substantially increase revenues, significantly lower costs, and dramatically become a catalyst for innovation and business growth. Rising energy costs, the depletion of natural resources, varying global market requirements, and greater environmental awareness—among customers and the general public—have combined to create a business climate in which green is good not just for your company's reputation or brand's image, but for the very success of your enterprise.

The growing environmental awareness of consumers, and its impact on purchasing decisions, creates valuable opportunities to produce greener products and generate new revenue streams. Sustainable design can spark innovative approaches and revolutionary new products. In addition to boosting the revenue side of the balance sheet, sustainable design is becoming an important business strategy for controlling operational costs and reducing energy expenditures. Sustainable design is no longer a burdensome regulatory requirement of the past, but rather a critical strategy for gaining competitive advantage and supporting business growth.

The future of product development is sustainable design

Too often, manufacturers operate according to a short-term view. While focusing on the present is important for achieving success in the near term, a total fixation on the marketplace as it is today—rather than on making decisions and investments that take into account anticipated changes—can prove to be extremely short-sighted and ultimately detrimental to your company's future success. Without including a long-term view as part of your business strategy, you may find your organization unmotivated and unable to respond to competitive pressures, or incapable of capitalizing on new green markets and business expansion opportunities.

The only thing certain in life, and business, is change. The visionaries who perceive and anticipate the winds of change—and who can apply outside-the-box thinking to the businesses they run—will stay ahead of the curve and be prepared to identify and capitalize on rapid innovations in the business landscape.

Consider the breakthrough changes that have occurred over the last few decades, including the:

- Introduction of green products

- Rising cost of traditional energy sources

- Increasing reliance on renewable energy sources

- Continuing depletion of natural resources

- Substantial growth in municipal recycling programs

- Rise in consumer-driven "eco-labeling" programs

- Adoption of carbon legislation by governments worldwide

- Launching of major sustainability initiatives by Fortune® 100 companies such as GE, IBM, and Wal-Mart

This reflects how critical sustainability will become to your company for achieving and maintaining a competitive edge.

Manufacturers that can successfully incorporate sustainable design practices will be positioned to respond to increasing consumer demand and a growing preference for eco-friendly products. They also will be able to stimulate innovation in the development of new products and strategic markets, control development costs through optimized energy and material usage, and boost revenues through product expansion and organic growth.

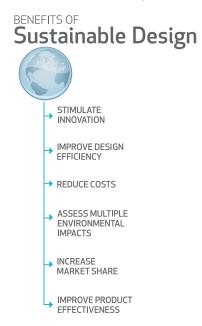## Sustainable product development yields benefits

Although many manufacturers view sustainability favorably, some executives remain skeptical about the purported benefits of sustainable design. How can making your processes more sustainable and your products greener give you an advantage over low-cost competitors that don't operate under the same requirements? By providing you with the ability to innovate technically and organizationally, sustainable design can produce bottom-line and top-line benefits that combine to give your organization a strategic advantage.

Take compliance, for example. Contrary to popular belief, it actually costs more to manage minimal regulatory compliance for each and every market in the world than it does to adhere to the most stringent standards throughout your organization. By uniformly meeting the toughest regulations across your enterprise, you can benefit through economies of scale and optimized supply chain operations. You also will find yourself at the forefront of new business opportunities related to your compliance efforts, and able to anticipate the changing environmental landscape, rather than rushing to adopt each new regulatory requirement.

Similarly, sustainable design can reduce or control product development costs through improved material usage, alternative manufacturing processes, reduced energy consumption, optimized shipping scenarios, and decreased risk and liability concerns.

On the revenue side, sustainability can help you increase revenue by stimulating the development of innovative products, supporting the creation of new business initiatives, improving the quality of existing products, and differentiating your products in the marketplace. Sustainable design also enables you to enhance your company's reputation, build brand equity with your customers, and achieve preferred supplier status with larger OEM customers.

Moreover, adopting a sustainable design strategy will foster a culture of corporate responsibility within your organization. By nurturing an eco-friendly, challenging work environment, you can attract and retain design and engineering talent, and task them with creating the innovations that will move your business forward.

BENEFITS OF
Sustainable Design

- STIMULATE INNOVATION
- IMPROVE DESIGN EFFICIENCY
- REDUCE COSTS
- ASSESS MULTIPLE ENVIRONMENTAL IMPACTS
- INCREASE MARKET SHARE
- IMPROVE PRODUCT EFFECTIVENESS

Sustainable design is more than just the right thing to do to safeguard the environment. It also makes good business sense and result in a range of benefits that can drive innovation throughout your organization.

Adopting sustainable design starts with product development

Understanding the critical nature and sizable benefits of sustainable design is only the beginning. The real challenge arises in effectively implementing a sustainability strategy. Where should you start? In manufacturing? Sales and marketing? Regulatory compliance? Clearly, the best approach for implementing a sustainable design strategy is to do so in a way that causes the least amount of disruption to your current business operations, while setting the stage to drive sustainability throughout your future business functions.

Product development is the natural place to implement sustainable design because it represents your business at its most embryonic point. The design and engineering of a product dictates everything that follows: what the product's made of, how it's made, how much energy it consumes (in use and while it's manufactured), how it's shipped, and what type of environmental impact the product has throughout its life cycle. Virtually every issue related to sustainability emanates from a product's initial design.

Assessing sustainability at the product development stage is the most logical place to start because decisions made when a product is designed can impact the eco-friendliness and sustainability of subsequent processes in an exponential fashion. Choosing to continue to use an increasingly expensive, scarce, or harmful material, for instance, can have substantial cost ramifications in manufacturing, purchasing, and sales.

When you evaluate a product's environmental impact while it's being developed, you can most effectively communicate sustainability benefits to downstream processes and across your organization. By implementing sustainability practices in product development, you can create the critical mass required to overcome organizational inertia to implementing sustainability practices throughout your enterprise.

THE
PRODUCT DEVELOPMENT
CYCLE

MARKETING

MANUFACTURING

REGULATORY
COMPLIANCE

OPERATIONS/
ENERGY CONSUMPTION

DISTRIBUTION/
TRANSPORTATION

PURCHASING

Product development resides at the center of the sustainability universe, because the design and engineering dictate the environmental aspects of the business functions that follow.

Sustainable design requires a focus on life cycles

What type of information should you generate in product development to facilitate sustainable design? Some companies have undertaken elaborate, detailed Life Cycle Assessments (LCAs) for each of their products to understand how they can apply sustainability to existing products and develop derivative offerings.

An LCA is an in-depth, cradle-to-grave analysis of your product's environmental impact throughout every facet of its life cycle. Although LCAs can be sophisticated and expensive, manufacturers can perform automated life cycle-based evaluations in software that produce good estimates, which you can use as guidance for sustainable design. The most important step is to start thinking about environmental impacts over your product's full life cycle.

For example, what are the characteristics of the different stages of a product's life cycle that hold the greatest potential for damaging environmental impacts? What is the product's carbon footprint—how much CO_2 is released into the atmosphere as a result of the manufacture and use of the product? How much energy does the product consume—both during use and while it's manufactured? Does your product or production process emit gases and compounds into the atmosphere? Are effluents that can impact vital ecosystems released into waterways during manufacturing or as a result of the use of your product?

In-depth assessments of the impact of a product's life cycle can be quite elaborate and detailed. For the purposes of product development, LCA thinking, automated solutions, and reliable metrics of environmental impacts, which provide guidance on a design's potential sustainability, represent simpler, more pragmatic approaches to incorporating sustainable design in product development than a full, comprehensive Life Cycle Assessment.

Obtaining these types of quick answers provides designers and engineers with the information and confidence that they need to make smart, environmentally friendly design decisions before manufacturing begins.
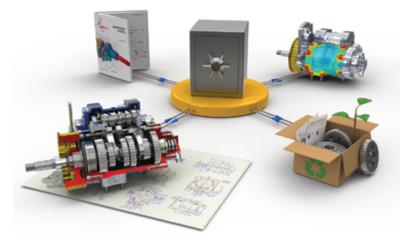

With an automated Life Cycle Assessment application, you can evaluate the projected environmental impacts of a product design at each stage of a product's life cycle, giving you the information you need to make sustainable design decisions.

Adopt greener design practices with SolidWorks Sustainability

As a leader in your company, you have a responsibility and duty—to yourself, your company's owners and shareholders, and your employees—to implement the strategies that will enable your organization to grow and prosper. The critical role that sustainability will play in establishing strategic advantage has already begun, and is no longer a topic of debate. Many large, multinational corporations have already formalized their sustainability initiatives. In fact, most business experts anticipate that sustainability will force companies to rethink their business models to make their products, technologies, and processes more sustainable—not just to achieve regulatory compliance or engender goodwill, but to remain viable and successful.

The challenge you now face is how to go about translating your company's strategic sustainability goals into effective action. How can you sell a sustainability strategy internally? How can you demonstrate that implementing sustainable design makes sense from a business standpoint? How can you inculcate sustainability into your corporate culture without handicapping your existing business model?

To answer these questions, you need more than just assumptions regarding environmental impacts. You need to be able to compare the consequences of staying your current course with the advantages of doing things differently. You need to be able to use LCA thinking to generate reliable estimates of environmental impacts in order to manage the development of greener products and demonstrate the benefits of sustainable design to important stakeholders in your organization. To implement sustainable design in a manner that effectively establishes a competitive advantage, you need SolidWorks® Sustainability software.

Designing greener products has many facets—including energy usage, performance, assembly, and packaging. To effectively implement sustainable design, you need a solution like SolidWorks Sustainability software.

Effective strategies for driving sustainable design practices
For a technology-based solution to be effective in facilitating a game change as significant as sustainable design, it must take into account the strategies required to effect this transition. SolidWorks Sustainability software was designed to provide manufacturing organizations with the product life cycle information they need to make savvy product development decisions regarding sustainability. The information generated as a result of LCA-based sustainable design establishes the foundation for the successful execution of the planning, development, manufacturing, communication, and marketing strategies that will drive your company's sustainability efforts forward.

The software allows you to assess and evaluate environmental impacts before making any hard investments in materials or machinery. You can use this information to create breakthrough innovations, introduce new processes, communicate sustainable initiatives, and market greener products.

SolidWorks Sustainability allows designers and engineers to measure the environmental impact of the products they design in SolidWorks CAD software. Because SolidWorks Sustainability is fully integrated inside the SolidWorks software design environment, it provides real-time feedback on environmental impacts in four key areas:

- Carbon Footprint

- Total Energy Consumed

- Effect on Water

- Effect on Air

This LCA information is generated through the GaBi database and material/process model, provided by PE International, a leading provider of sustainable design and software services. SolidWorks Sustainability results provide valuable estimates that can help guide your sustainability efforts. The accuracy of results improves when you use the software to track the relative changes from one version of a design to the next. This is why having the solution fully integrated inside your design process is so important. It's the relative change between design versions that provides an accurate indicator of environmental improvement.

The integrated solution also helps facilitate the completion of a full verification LCA, a service provided by PE International. The results from this verification of SolidWorks Sustainability values can be used to drive marketing campaigns and external reporting of sustainability attributes, such as the product's carbon footprint.

PE International
PE International is a recognized expert in sustainability, providing cutting-edge tools, in-depth knowledge, and an unparalleled spectrum of experience in making both corporate operations and products more sustainable. Applied methods include implementing management systems, developing sustainability indicators, life cycle assessment (LCA), carbon footprint, design for environment (DfE) and environmental product declarations (EPD), technology benchmarking or eco-efficiency analysis, emissions management, clean development mechanism projects, and strategic CSR consulting.

More than 1,000 companies and institutes worldwide utilize PE International's consultancy and software, including market and branch leaders such as Alcan, Allianz, Bayer, Daimler, Deutsche Post DHL, Rockwool, Siemens, ThyssenKrup, Toyota, and Volkswagen.

Incorporate a new dimension in product design
The ability to estimate environmental impacts during product design—at the single component, individual assembly, and complete product level—adds a whole new dimension to your product development process. Heretofore, product design primarily focused on performance and manufacturing issues, including fit and function, safety and failure concerns, and design manufacturability and production costs.
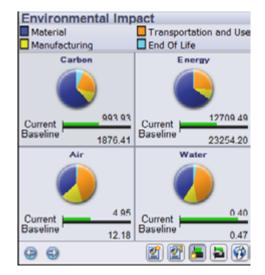
With SolidWorks Sustainability software, your designers and engineers will have an Environmental Impact Dashboard as part of their design system, so they can estimate environmental impacts for each stage of a product's life cycle, including:

- Raw Materials Extraction

- Material Processing

- Part Manufacturing

- Assembly

- Product Use

- End of Life

Specifically, SolidWorks Sustainability can generate the following estimates:

- **Carbon Footprint.** Measures the units of carbon dioxide equivalent (CO2e) emitted.

- **Total Energy Consumed.** Measures the consumption of non-renewable energy associated with the design's lifecycle, in units of megajoules (MJ).

- **Air Acidification.** Measures the units of kilogram sulfur dioxide equivalent (SO2) emitted into the atmosphere; used as a measure of overall environmental impact to the air.

- **Water Eutrophication.** Measures the units of kilogram phosphate equivalent (PO4) released; used as a measure of overall environmental impact to the water.

Engineers previously have not had this type of information readily available. Rather than force designers to make only eco-friendly choices, the software provides insights and guidance on environmental impact. This approach gives your organization the sustainability data that you need to make informed choices.

By providing environmental impact estimates in each of four key areas, SolidWorks Sustainability software provides the insights that your product developers need to make better informed sustainability decisions.

Insights for developing greener products

Adding an environmental impact assessment tool to your product design system gives your designers and engineers access to information that can spark creativity and innovation, helping them to design greener products. SolidWorks Sustainability produces insightful data that fosters sustainable design without constraining development through the use of broad environmental mandates.

Sustainable design is not always an all-or-nothing proposition. Many manufacturers will undertake a phased, gradual approach to sustainability. By providing guidance on how to rethink existing products to make them more eco-friendly and how to develop next-generation, green products, SolidWorks Sustainability enables you to implement sustainable design in a way that fits your business.

Increasingly, consumers consider the environmental impact of the products that they buy. They want to know about how and from what a product is made. SolidWorks Sustainability provides the tools that product developers need to create products that can influence these purchasing decisions, so your company can capitalize on the growing demand for sustainable products.

For example, by using tools like Find Similar Materials, your engineers can explore a variety of alternative materials that not only are more eco-friendly, but also are potentially cheaper, less costly to manufacture, and more desirable in the marketplace. In a similar fashion, SolidWorks Sustainability can help your engineers investigate energy efficiency strategies to make your green products even greener.

Consumer demand for eco-friendly products can lead to innovative new designs, such as the Tango electric car from Commuter Cars Corporation shown here. SolidWorks Sustainability can help you make green products like this even greener.

Unleash the power of sustainable design in product development
Sustainable design practices are crucial aspects of any sustainability initiative. By implementing SolidWorks Sustainability, you can unleash the power of sustainable design in product development. Having environmental impact assessment capabilities integrated inside your company's design system will jumpstart your sustainability efforts by generating the kinds of information that you could only have guessed at in the past, but really need to know to plan and execute a successful sustainability strategy.

How you go about developing products marks the next evolution of your journey toward sustainability. By implementing SolidWorks Sustainability, you will empower your designers, engineers, and product developers to use environmental impact information to develop the breakthrough products, processes, and technologies of tomorrow. Without this type of information, decisions that influence your objectives will be based on someone's assumption, mere intuition, or your best guess.

In many ways, product development represents the keystone of your enterprise. What happens there generally matriculates throughout the rest of your organization, from manufacturing, assembly, and distribution through marketing, sales, and field service/maintenance. The benefits of the SolidWorks Sustainability solution will first appear in how your company uses environmental impact information to incorporate sustainable design practices. As the benefits of sustainable design practices take hold, the positive effects of the SolidWorks Sustainability solution will become apparent to the rest of your organization.

The quest for more sustainable products can stimulate innovation, such as this gas turbine engine for hybrid buses and trucks developed by Brayton Energy Canada. SolidWorks Sustainability can provide the environmental impact answers that your product developers need to create these kinds of innovations.
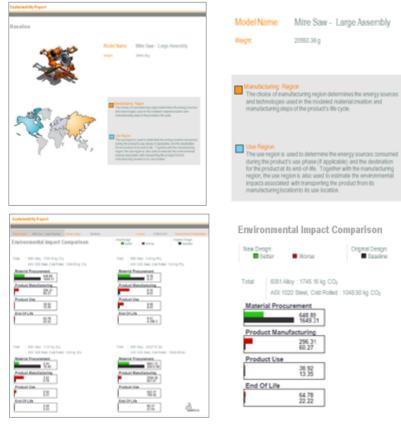
Communicate sustainability benefits in a way that makes business sense

Perhaps the greatest challenge that manufacturers face in implementing a sustainability strategy is communicating the benefits of sustainable design in a way that makes business sense. Every enterprise is composed of various internal and external audiences, many of whom have a stake in decisions related to environmentally responsible product design.

Internal stakeholders include product development, supply chain management, manufacturing, sales, and marketing. Some parties that may appear to be external—such as vendors, partners, and suppliers—become an integral part of the sustainability discussion because many of the environmental impacts linked to your products depend upon supplied components and materials. Even customers factor into the mix. For example, many OEMs now require sustainability scorecards from their suppliers in order to obtain preferred status.

Using SolidWorks Sustainability, you can automatically generate sustainable design reports, including life cycle impact estimates, which are easy to follow and enable you to communicate details on environmental impacts to your organization and external partners. The software also provides a common language and set of metrics, which you can use to measure internal progress toward achieving sustainable design goals. Most important, the solution enables you to communicate sustainability information in business terms that everyone can understand.

You can encourage your suppliers to use SolidWorks SustainabilityXpress the free, limited version of the software—to save their specific sustainability information within their SolidWorks software part files, which improves the transparency of the environmental impact information for purchased parts. You can even use this feature to embed sustainability information in subsequent products that you deliver to your own customers.

SolidWorks Sustainability enables your product developers to automatically produce environmental impact reports that are easy to follow and understand, enhancing communication within your organization and with external partners.

The future is now

Although you may believe that the time for urgency resides somewhere in the future, that time is here. It's not just consumer demand for eco-friendly products that's on the rise, but also a ramping up of sustainability programs and departments at manufacturing companies large and small. To reach the point where sustainability provides a competitive advantage for your organization, you need to start thinking about it now.

Regardless of how you plan to develop, implement, and manage your sustainability program, adding SolidWorks Sustainability software to your product design process will facilitate that process. The key to establishing a sustainability strategy that's right for your organization—and executing that strategy successfully—is to base your decisions on facts instead of assumptions.

With SolidWorks Sustainability, you will have an accurate idea of the environmental impacts attributable to your products before they are made. With this guidance, you can make informed decisions on sustainable design. How you apply these insights will determine the ability of your sustainable design to drive innovation and growth for your company.

To learn more about how SolidWorks Sustainability solutions can help you effectively implement sustainable design practices, visit **www.solidworks.com**, or call 1 800 693 9000 or +1 978 371 5011.

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