

BUSINESS SUCCESS BY DESIGN



In today's volatile and hyper-competitive business world, getting to market first with the most innovative product is often the key to success. Increasingly, it's engineering excellence that differentiates the leaders from the followers. Are your engineering teams leveraging the latest thinking and most-forward-looking practices to power your corporate success?

By Todd McDevitt, Director, Corporate Marketing, ANSYS

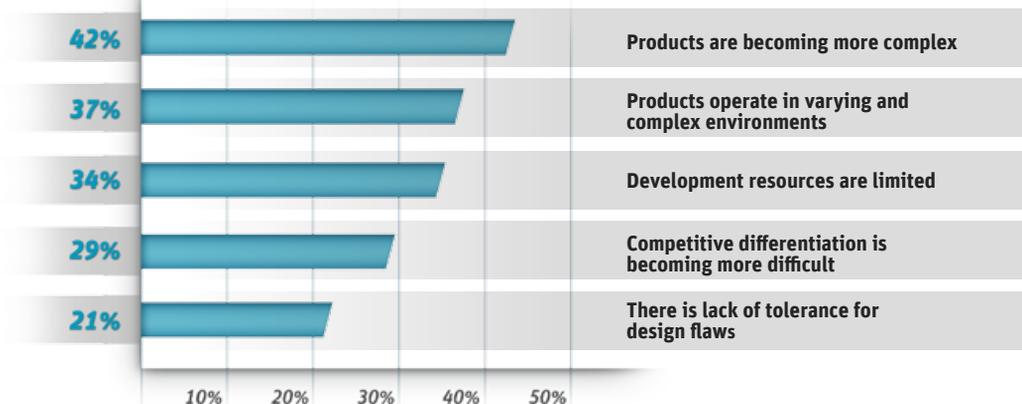
Today's industrial and consumer markets are characterized by increasingly complex products produced by a broadening distributed supply chain and consumed by an ever-evolving integrated global economy. Demand uncertainty, increasing competition and omni-channel selling have made the business climate even more challenging for manufacturers.

In this complex, challenging environment, companies that have seized leadership — like Apple and General Electric —

have done so by being the first to market with truly innovative, game-changing solutions. For product manufacturers, engineering excellence is an absolutely critical component for success.

However, while engineering is a key competency, companies often overlook the importance of engineering to long-term business success. At ANSYS, we've created *Dimensions* to illuminate how inventive engineering practices can lead to top-line growth and overall business success.

TOP CHALLENGES FOR PRODUCT DEVELOPMENT



Source: Aberdeen Group, June 2014

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THE CHANGING BUSINESS OF ENGINEERING

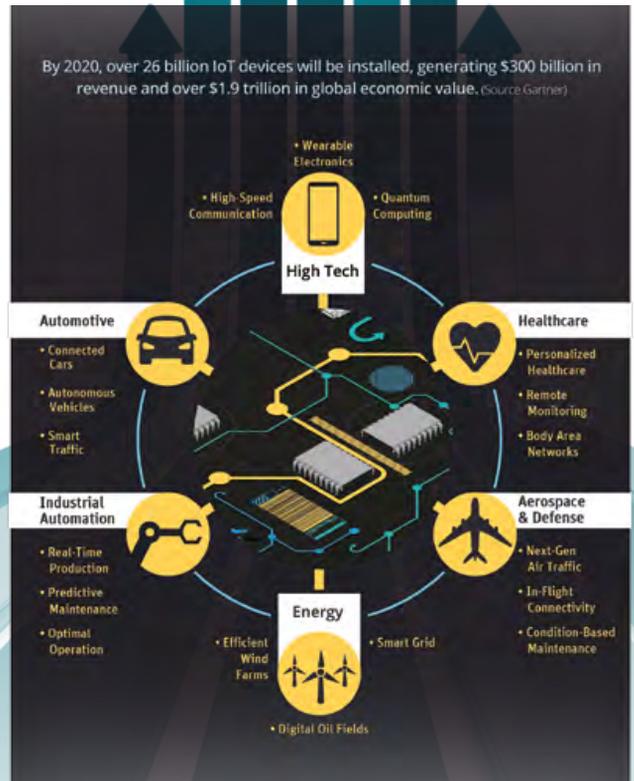
Engineering product development has never been trivial, but today it is even more challenging to sustain engineering leadership. Not only is change constant, but the pace of change is accelerating. Products are much more complex, in many instances because they feature smart components like sensors that collect real-time performance data. Products now include the embedded software and electronics that are required to process this data, automatically improve performance, or anticipate future user needs.

Products are also more connected, sharing data and communicating with other products and systems to support the Internet of Things (IoT). For example, active automotive safety systems have evolved from systems contained within the car — such as automatic braking assemblies — to complex systems that enable vehicle-to-vehicle and vehicle-to-infrastructure communications to warn drivers of possible hazards.

Refrigerators, thermostats, gaming systems and digital video recorders have wireless capabilities so that you can control them via personal smartphones and tablets. Oil rigs, locomotives, jet engines and other industrial products are more connected, with the ability to optimize performance, minimize downtime, and improve utilization of natural resources.

The globalization of companies — and thus, their engineering organizations — means that design is a 24-hour endeavor, characterized by international collaboration and distribution of work across several continents. The trend toward connected products further complicates business practices, as companies must forge supply chains and relationships outside of traditional industry channels.

Market globalization means that most companies now have international customers who demand a steady stream of new products, often customized to their regional preferences. In response, engineering teams must develop a versatile platform



The Internet of Things is expanding across all industries, affecting product complexity and the need for new engineering practices.

for their product and then deliver rapid, frequent product variations, all without relying on additional resources — because low product-development costs lead to competitive pricing.

The relentless and changing demand for innovative products, the need to further decrease time to market, and the requisite for highly distributed engineering teams and supply chains are changing how companies perform and manage engineering.

REDEFINING ENGINEERING EXCELLENCE

ANSYS works with leading businesses worldwide to support not just product development success, but the success of their overall organizations. For more than 40 years, ANSYS has provided simulation software that empowers companies to test and verify their products in a low-cost, risk-free virtual world.

Based on our collaborations with thousands of companies (including 96 of the top 100 *Fortune* 500 industrial companies), ANSYS has learned that successful engineering teams are quick to adopt innovative practices and re-invent their traditional ways of working. This requires the foresight, support and guidance of high-level executives who understand the big picture — industry trends, competitive threats, customer concerns — to ensure that changes within the engineering

function reflect the highest priorities of the company. These leaders are champions of change, ensuring that their entire organization employs new, higher-impact processes and tools.

Dimensions showcases innovative companies that employ ground-breaking new practices, specifically in engineering, to address core business challenges and directly support long-term strategic success. In general, we've found that leading engineering teams focus on four key areas: improving collaboration and communication, increasing productivity and throughput, performing engineering at the systems level, and increasing the scale and pace of product innovation.

COLLABORATION AND COMMUNICATION

As John Mannisto, formerly of Whirlpool, points out on page 19, collaboration, teamwork and brainstorming were much easier when engineering teams worked at a single location — and engineers could gather around a drafting table to collectively solve problems.

But in today's globalized business world, engineers may be trying to solve similar problems while working on different continents. Product development teams need new ways of working together to address shared problems.

Leading international companies have arrived at some innovative ways to leverage their geographically distributed knowledge. At Whirlpool, an internal social media platform called the Commons provides a unique environment in which collaboration can occur 24 hours a day, seven days a week — and accumulated knowledge can be accessed on demand.

Scattered around the globe and focused on different phases of the product development process, engineers at Qualcomm Halo (see page 12) get together virtually during weekly “coffee breaks” to exchange ideas and present progress reports to maximize the speed and productivity of Qualcomm Halo development efforts worldwide.

ANSYS supports collaboration and communication by offering a simulation platform to unify industry-leading simulation technology and to enable enterprises

to manage design processes and access shared data securely, no matter where engineers are located. Cloud computing will play a critical role in fostering even greater collaboration among international engineering teams by providing easy, round-the-clock access to simulation tools, data and work in progress.



INCREASED THROUGHPUT

A hyper-competitive, innovation-driven business environment means that engineering teams need to launch the “next big thing” faster, and more frequently, than ever. But cost pressures mean that additional speed and increased throughput cannot be achieved by adding new resources.

How can engineers expect to accomplish more development work, with the same resources, in a much shorter time frame? The answer is process compression. Leading companies use a variety of approaches to eliminate time from the engineering and design phases, while still ensuring uncompromising product quality.

Recognizing the growing need to streamline processes and amplify engineering resources, ANSYS enables companies to customize simulation work processes and codify best practices. When method groups deploy a set of customized best



practices for engineering simulation, even casual users can quickly complete analysis tasks accurately and support design decisions earlier. Amplifying the value of engineering simulation throughout the design teams can dramatically accelerate the development cycle without the need to hire new staff.

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ENGINEERING AT THE SYSTEMS LEVEL

Today's products are more intelligent and interconnected than ever, with software-controlled mechatronic systems that deliver advanced features to ensure safety, improve efficiency or reduce energy consumption. Systems-level engineering helps to ensure that all components will work together when the overall system is subjected to many different operating conditions and physical forces. A systems-level approach also helps engineering teams to overcome functional silos and achieve a shared vision of product performance.

Because modern jets comprise a number of increasingly complex, distributed smart systems, it's absolutely imperative for Airbus to take a systems-level approach (see page 6). By

simulating the performance of entire systems in a risk-free, virtual environment, Airbus ensures safe operation under real-world conditions while protecting passengers' well-being.

ANSYS helps customers across a multitude of industries to manage product complexity, reduce software development costs, and optimize overall system performance at all design phases with model-based engineering solutions. ANSYS supports model-based systems engineering, model-based software development, and virtual system prototyping to deliver safer, higher-quality smart products to the market rapidly, while still ensuring product quality, robustness and durability once the entire system is placed into operation.

PLATFORM FOR INNOVATION

Although the bottom-line benefits of driving time and costs out of product development are important, they represent only half the picture. To truly succeed in the current business climate, companies need to drive top-line revenue growth via ongoing product innovations.

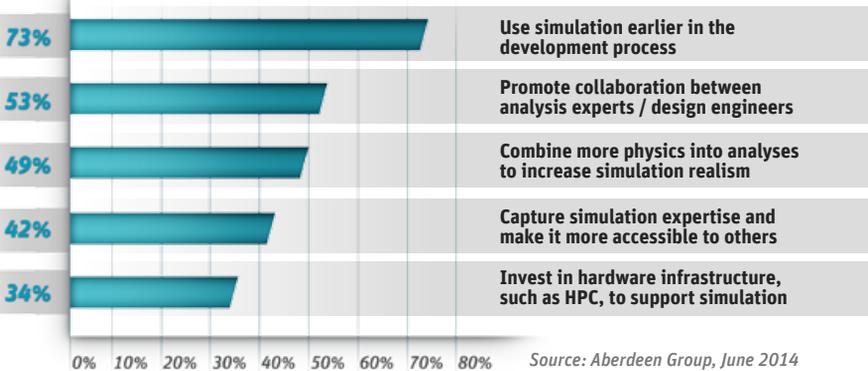
It's imperative that companies get to market rapidly, with a superior product that exceeds customers' expectations. In today's globalized market, it is also important to create

customized product variations that reflect localized customer preferences. In short, companies win today by out-engineering their competitors.

When we talk about innovation, often we think of companies like Firefly Space Systems, which seeks to democratize access to space and dramatically cut the cost of space travel (see page 36).

Every business can drive innovation within its own business model and its own product suite. For example, in 2013, Gilkes — a long-term leader in power generation and engine systems — realized that emerging competitors were copying its designs and winning customer contracts. Today, Gilkes relies on advanced technologies to completely reinvent its traditional product lines and redefine customer value (see story on page 31).

TOP ACTIONS TO IMPROVE PRODUCT ASSESSMENTS



LESSONS FROM THE LEADERS

In today's global marketplace, businesses must constantly rethink not only their products and services, but the internal processes and tools that support their success. Our world is characterized by continual change.

It is especially important to ensure that designers and engineers work with the most up-to-date, innovative practices and technologies. It's always a good idea to study what the leaders

do, as a means of benchmarking your own performance and applying some valuable lessons learned.

In publishing *Dimensions*, our goal is to showcase some of the innovative processes and tools that leading engineering teams in a variety of industries use. Whatever your industry or product focus, we anticipate that the articles in this magazine will inspire you to pursue excellence and innovation in your own engineering organization. 