

NX

Dyson

Dyson innovation yields revolutionary products

Industry

Consumer products

Business challenges

Take vacuum cleaner performance to the next level with revolutionary new Ball technology

Maintain fast development cycles for first-to-market advantage

Keys to success

Evaluate concepts as 3D models

Simulate motion and interaction of parts and assemblies in software

Leverage design geometry for rapid prototyping

Results

Development cycle times maintained despite increasingly sophisticated technology

Backed by a culture that revolves around innovation, Dyson elevated the vacuum cleaner to a work of high-performance engineering and catapulted itself into market leadership

Dyson uses digital product development in its R&D projects, such as the D15 vacuum cleaner, while maintaining fast development cycles.

Driven to innovate

Led by its charismatic founder, James Dyson, Dyson is an innovation success story. In 1993 the company introduced the Dyson DCO1 Dual Cyclone, the first vacuum cleaner with constant suction. Over the following decade, Dyson has grown to become the top-selling vacuum cleaner manufacturer in Western Europe and the leading vendor of upright vacuums in the USA. It now employs 1,400 people in the UK and sells machines in 38 countries.

Dyson's most recent vacuum cleaner innovation is the Dyson DC15, launched in 2005. The DC15 incorporates the revolutionary Ball technology, which replaces the traditional, rigid wheels of a vacuum cleaner with a ball. This configuration allows the user to guide the cleaner around furniture and other obstacles. The Ball successfully eliminates the struggle of maneuvering a vacuum around a room, allowing the user to control the movement – not the other way around.



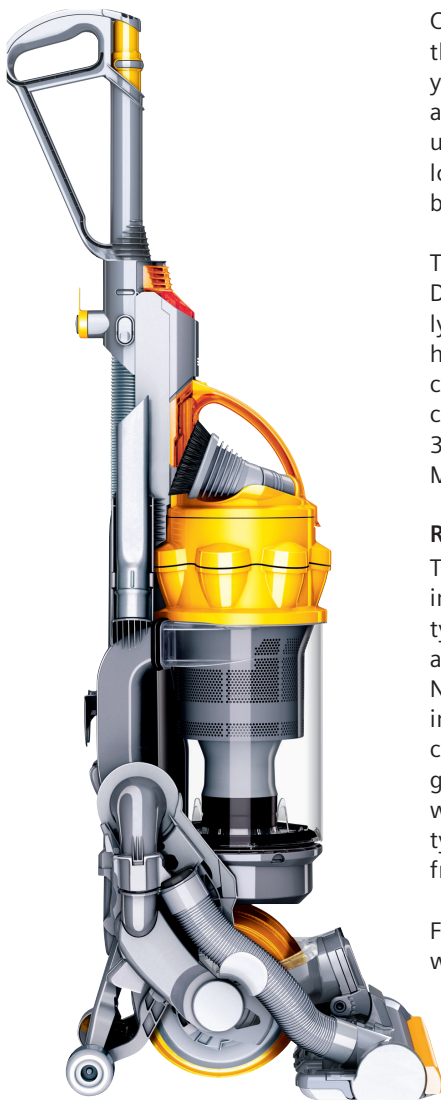
The innovator's challenge

One of the issues facing Dyson is how to create increasingly sophisticated machines such as the DC15, which has more components, while ensuring that design and development cycle times do not become overly extended.

Since 1998 Dyson has been a committed user of the NX™ next-generation digital product development software system. Dyson originally bought five seats of NX. Over the years this has increased to 88 licenses, with the software now being used by more than 100 in the Dyson R&D team: design engineers who are part of

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John Myers
CAD Systems Manager
Dyson



the New Product Development team, which generates ideas and concepts; scientists involved in testing and developing ideas and technologies; and the engineers responsible for the actual detail design of the machines.

Fast transition from concept to 3D

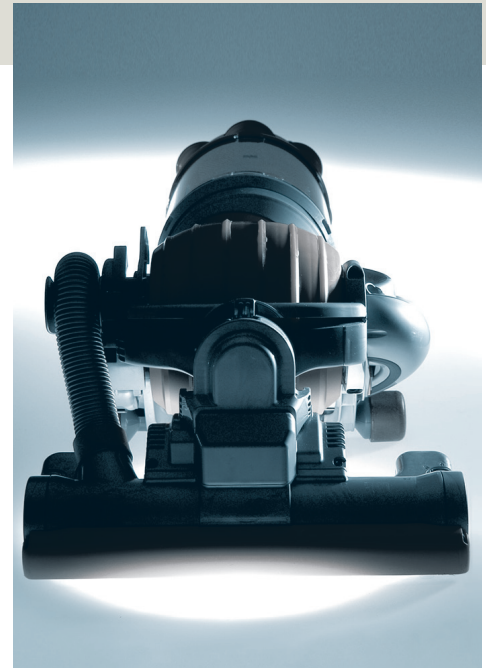
As the early ideas and concepts for the DC15 began to come together in cardboard and foam, design engineers used NX to produce detailed 3D models that helped them clarify their thinking and refine the ball mechanism. “Our conceptual designs are produced in 3D, which has fantastic benefits,” explains John Myers, CAD systems manager at Dyson. “Rather than just producing views of the product, you design the real thing. This reduces ambiguity and often makes it easier to understand complex assemblies. You get a lot of feedback, seeing it coming together before your very eyes.”

The modeling features within NX enabled Dyson’s design engineers to work extremely quickly. “With the 2D CAD software that had been used before, a design engineer could spend weeks on the design of a complex part. With NX we can produce a 3D model in a fraction of the time,” Myers says.

Rapid prototypes from design data

The next phase in the DC15’s development involved the creation of physical prototypes to help the design team better evaluate the new concept. Designs created in NX were used directly for rapid prototyping, supporting the swift creation of physical models for testing and evaluation. NX geometry was converted into STL files that were then used by Dyson’s in-house prototyping modeler, which creates prototypes from successive layers of powdered nylon.

Fast prototyping of metal components was made possible by NX integrated NC machining functionality, part of NX computer-aided manufacturing (CAM)



portfolio. NX Machining leveraged the 3D design geometry to drive milling and cutting tools. One of the advantages of using NX Machining was that refinements made to the design were automatically incorporated into the CNC programs, without the need for reprogramming. This avoided potentially costly delays to the creation of successive prototypes.

Dyson generated a variety of prototypes as the design engineers and scientists considered alternative designs. The speed at which NX could help deliver prototypes was a major benefit. “With a complex project such as the DC15 that required us to evaluate a number of alternative models, NX ability to support rapid prototyping was an important factor in helping us to keep the development time in check,” Myers adds.

Computer simulation boosts design accuracy

To improve accuracy and eliminate errors in the design – and ultimately speed the overall development cycle – Dyson used a number of NX digital simulation and testing capabilities. For example, NX assembly modeling functionality allowed Dyson to ensure that the many parts within the

Solutions/Services

NX
www.siemens.com/nx

Customer's primary business

Dyson engineers and manufactures revolutionary, no loss of suction vacuum cleaners, two-drum washing machines and digital motors.
www.dyson.com

Customer location

Wiltshire
United Kingdom

DC15 is Dyson's most advanced vacuum cleaner and strengthens Dyson's reputation for innovation.

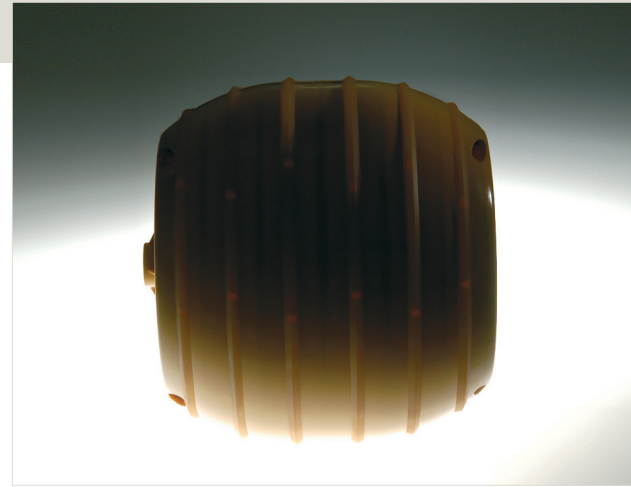
product, which were created by different design engineers, would fit together correctly.

NX mechanism analysis allowed the design engineers to view animated sequences simulating the precise motion of the moving parts. This ensured that parts did not interfere with each other as they moved. And to help engineers understand the stresses on the different parts within the DC15, 3D design data was also used for finite element analysis (FEA) within NX.

Moving quickly to tooling

When the major design and testing phase was completed, it was time for the tooling manufacturers to get involved. Dyson partners with several specialist toolmakers. The toolmakers fashion the machine tools used in the manufacturing, which takes place on Dyson's purpose built assembly lines in Malaysia.

It was important to provide the toolmakers with the information they need quickly and accurately to avoid delays. The high quality of NX data, due to the rigorous simulation and prototyping it had undergone, was able to support this fast turn-around. Toolmakers were able to access modeling data for the DC15 and, confident in its accuracy, employ it directly into their complex cutting tools.



Challenge the old to come up with the new

"As the development of the DC15 shows, Dyson's philosophy is closely tied to our ability to challenge existing technologies and to come up with new innovations and designs," explains Myers. "NX helps support our culture of innovation with its powerful design technology that takes much of the effort out of producing detailed 3D models, performing digital simulations and creating rapid prototypes."

One of Dyson's major concerns was that in its zeal to produce increasingly sophisticated technology, it may find development cycles getting longer and longer. This did not happen with the DC15 and over the years the company has managed to keep cycles to less than three years.

Siemens Industry Software

Americas +1 800 498 5351
Europe +44 (0) 1276 702000
Asia-Pacific +852 2230 3333

www.siemens.com/plm

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