

NX

Twyford Bathrooms

Innovation done right, the first time

Industry

Consumer products

Business initiatives

New product development
Commonization and re-use

Business challenges

Create innovative products
Incorporate water conservation into new designs
Quickly reach volume production to avoid late delivery charges

Keys to success

Integrated design-to-manufacture solution
Re-use of optimized design components
FEA to simulate ceramic firing process

Results

New concepts reach volume production in record time
35 new products per year (versus 15 previously)
Higher manufacturing yields
Two-year payback on design-to-manufacture solution

NX-based development process supports the combination of creativity and practicality that produces 35 new products a year

The rimless revolution

Twyford Bathrooms, a leading manufacturer of sanitaryware products, has once again broken the mold. The company recently launched a truly rimless toilet bowl that flushes effectively with only four litres of water, two litres less than current United Kingdom (UK) water regulations allow. Unique to Twyford Bathrooms, this patent-pending toilet has no covered rims, no hidden channels, no box section, no tubes and no hidden pipes. The uniquely engineered water distribution system efficiently removes all waste as effectively as a traditional toilet. In addition, the company has been awarded the prestigious Waterwise Marque for the Galerie Flushwise toilet, a new dual flush that operates on an amazingly low four or 2.6 litres of water, as opposed to current legislation that allows a maximum of six or four litres for flushing. (The Waterwise Marque is awarded annually to products that reduce water waste or raise the awareness of water efficiency.)

Both of these innovative products have been developed and brought into volume production in record time and are tangible evidence of the return that Twyford Bathrooms is getting from its investment in the NX™ design-to-manufacture solution from Siemens PLM Software.

Design without constraints

Kombiz Layeghi, Ceramic Development Manager at Twyford Bathrooms, explains the decision to purchase the NX software. "Seven years ago, we made a decision to move to a complete design-to-manufacture software environment," he says. "However, our existing CAD software couldn't provide a good enough platform for this. We invited a number of vendors to carry out benchmarks and we could see that parametric modelers were so constrained by the technology that it just was not possible to create the complex surface models we needed."



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Kombiz Layeghi
Ceramic Development
Manager
Twyford Bathrooms



"We could see, however, that NX featured both surface modeling and solid modeling which we could use interchangeably," he continues. "We chose NX and use it not only to design and manufacture our products. We also use it to generate catalogue drawings, brochure drawings and production quality drawings." In addition, the company has invested in a five-axis Job 32 CNC with FIDIA M30 controller that it is using with the NX machining functionality to produce full-size prototypes and forms.

Five times quicker than manual techniques

Outlining the product development process, Layeghi says, "Ian Randle, Senior Designer and Scott Derbyshire, Designer, are responsible for the aesthetic design. They develop a range of concepts within NX, get feedback from stakeholders and then create full-size mockups or rendered NX images to show to customers. Once a design is approved by the customer, our product managers and by Anna Burns, our brand marketing manager, we develop it into a manufacturable product using NX."

While modeling the new product in NX, designers have access to a library of about 40 standard features that they know work and can be made consistently at a known cost. "In any new design we use these proven elements to reduce time and cost," Layeghi explains. "Water efficiency is a crit-

ical design consideration, and one that has been addressed in this manner as well. A sump that flushes effectively with only four litres of water has been added to the library and is re-used in new designs."

"To create the sump, we had to evaluate a lot of ideas: the shape and location of the sump, the height from sump to outlet and from inlet to outlet, how the water hits the sump and at what angles," Layeghi continues. "We had to be able to manipulate and evaluate all the variables to see if the design was viable. Getting it right was at least five times quicker with NX compared to using traditional techniques where we would iteratively remodel the item, adjusting the mold and associated parts until it was right." The library also includes other components such as the rimless bowl and outlets, which new products are now built around. Design constraints (such as British Standard and European Norms for outlet dimensions and positions) are entered into the NX model to quickly configure a new model.

FEA enhances manufacturing yield

During the mold design stage, designers must counter the distortion that occurs during the firing of the ceramic material. NX finite element analysis (FEA) functionality is used to help decide counter distortion, by how much and where, allowing for the placing direction of the item during firing where thermal, gravity and frictional forces are in play. "We now know in advance what is going to happen in the firing process," says Layeghi.

Twyford Bathrooms is part of Sanitec, the European sanitary ware group, and is leading the counter distortion project for the whole group. "With NX, we are taking analysis to the next level, looking for an overall product yield of more than 90 percent," Layeghi says. "We have already established that we can resolve any cracking that may occur during firing. Now we want to use NX CAE to simulate load tests. We are proposing the use of Femap in six of our European sites that don't currently

Solutions/Services

NX
www.siemens.com/nx

Customer's primary business

Twyford Bathrooms produces high-quality sanitary ware for domestic and commercial use.
www.twyfordbathrooms.com

Customer location

Stoke-on-Trent
United Kingdom

"The ROI has been immense. We foresaw a two-year payback. Not only have we done that but over five years we will have paid back an extra £1.6 million."

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Ceramic Development
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use NX, since Femap uses the same meshing and solving engines as NX CAE and reads 3D models directly from other CAD systems."

Immense return on investment

Twyford's investment in software, hardware, machine tools and training is significant. "Overall, we have invested close to £1 million including the machine tool and training," Layeghi says. "The ROI has been immense. We have a very formal capital request process that includes detailed return-on-investment calculations. The business case was based not on staff savings but improved efficiency – more new products in less time and higher manufacturing yields. We foresaw a two-year payback. We've carried out an audit that showed that not only have we done that but over five years we will have paid back an extra £1.6 million."

Summing up, Layeghi comments, "This is a highly competitive business and our major customers can be very demanding. Once they have made a decision, they want fast delivery in volume, with late delivery penalties. With NX we can work end-to-end internally with the whole process under our control and we can develop and manufacture new products quickly and efficiently." He continues, "Before we moved to NX, we used to be able to create 15 new design pieces a year. With NX, we are capable of producing 35." Layeghi does point out, though, "It's that quality issue, too. It is our goal to get our product right the first time at the right quality and cost with substantial lead time reductions, and I believe we are not far from achieving this goal. We genuinely could have not considered achieving this without NX."



Siemens Industry Software

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

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