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## Innovation accelerated

Collaboration platform drives  
product development at  
Callaway Golf **p 18**

Alan Hocknell, VP,  
innovation and  
advanced design

Steve Ehlers, VP,  
product design  
and development  
Callaway Golf



(left to right)  
Alan Hocknell, VP,  
innovation and  
advanced design,  
and Steve Ehlers,  
VP, product design  
and development,  
Callaway Golf

Photos by Marc Berlow

# Innovation accelerated

PLM tools prove out concepts, speed  
collaboration for Callaway Golf and others

**By Roberto Michel**, senior contributing editor

Inside the gleaming glass headquarters of **Callaway Golf** in Carlsbad, Calif., product developers are hard at work coming up with the next great golf club. However, much of what Callaway does to launch clubs such as its Big Bertha Fusion FT-3 driver spans multiple locations, some of them external to the company, says Steve Ehlers, Callaway's VP of product design and development.

To accelerate the distributed communication challenges inherent in new product introduction, Callaway used a design collaboration software package from **UGS** called Teamcenter. The software, says Ehlers, is a more effective means of collaboration than e-mail and downloads from Internet file-transfer sites.

"I logged it out, and the supply chain for the FT-3 is about 51,000 miles long, or two times around the earth," says Ehlers. "We've got suppliers all the way from here to China. Being able to communicate with them by posting information on the Teamcenter site—which is secure and tracks what is being done—saves time and travel, and reduces errors. People don't end up with the wrong version of a file."

Callaway—as any golfer knows—makes high-end golf equipment and is credited with product breakthroughs such as the original Big Bertha, which was introduced in 1991 and set the trend toward wide body, stainless-steel woods. The FT-3 is the latest driver evolution, bringing together materials such as a titanium club face and a carbon composite body in what Callaway calls Fusion technology. The club even has a weighting system called Optifit to configure the club at the factory to meet a golfer's swing characteristics.

Such innovation takes talented designers and organizational commitment, not just technology. For example, a couple of years ago, Callaway

formed a design group focused on advanced concepts. Alan Hocknell, the Callaway VP that heads up this innovation and advanced design group, says this structure frees up

However, say experts, even the best PLM tools are only part of the secret to successful launches. Boston-based **AMR Research** posits that a “perfect product launch” is a cross-functional business process that requires coordinated demand and supply management, not just PLM tools.

Innovative companies also tend to have CEOs or other top leaders who place a high value on design, and on understanding the “customer experience,” says

Jonathan Cagan, a professor of mechanical engineering at Carnegie Mellon University, and co-author of *The Design of Things to Come*, a book about product innovation. “Unless upper management believes in innovation and strives for it, you can try all you want at your level, but it’s hard to make it a priority within the company,” he says.

Simply pouring more money into research & development budgets does not guarantee success either, claims Cagan.

“Look at Apple Computer and the iPod,” says Cagan. “Apple didn’t invent digital music player technology, but it crossed the chasm by understanding design and the customer experience.”

Cagan, whose area of expertise includes CAD, agrees today’s design-creation tools can speed certain aspects of innovation. “Because engineers can do an analysis and immediately know if something is going to fail or not, or see where the problems lie, they more readily have the information needed to change a design and make it better,” he says.

### Conquering complexity

At Callaway, better software tools have made development of increasingly complex designs more efficient. To a golfer, the FT-3 club is a solid and beautiful piece of equipment, but attaining its performance characteris-

tics required melding multiple materials and precise modeling and testing of weighting characteristics.

“The [FT-3] club is more complex because of the multiple materials,” says Hocknell. “There are pieces that have to come together that are made by completely different processes, but still have to be fitted together within correct tolerances for the bond between them to be structurally sound and cosmetically pleasing at the same time.”

Callaway’s design engineers use NX to build a parametric 3D model of the club to test the fit of the materials and establish the weighting characteristics. This data is fed into a proprietary analysis tool Callaway has developed called the Virtual Test Center, which analyzes factors such as the “loft” of the club—i.e., the angle of the club face relative to the ground plane. The software also tests the trajectory a ball hit with the club would take.

“The CAD system is indispensable,” says Ehlers. “Once you get the right densities and all the material properties into the model, it will churn out necessary data such as center of gravity location, and moment of inertia. We can plug that into our simulation software, and test the performance of a club design—without ever having to build a prototype.”

According to Ehlers, design work specific to the FT-3 began in early summer of 2004, and the club was ready in volume for product launch on July 4, 2005. However, prototypes were being tested by fall of 2004, with the bulk of the remaining time span devoted to supply and production planning activities. The project also benefited from earlier work on the use of multiple materials.

The exact time reduction due to the product development tools is difficult to gauge compared to previous driver projects, because the FT-3 is a more complex design. “The club designs are much more intricate, but we are still

“Technology allows us to experiment with a far greater number of concepts than we would otherwise be able to.”

—Alan Hocknell, VP, innovation and advanced design, Callaway Golf



resources to concentrate on new concepts and materials. But at the same time, Hocknell says designers in his group and on Ehlers’ team benefit from the use of software such as NX, UGS’s 3D CAD tool, as well as Teamcenter.

As Hocknell sees it, the spark behind innovation still comes from the designers, but tools such as NX can rapidly refine concepts by testing ideas in a virtual world. “The technology allows us to experiment with a far greater number of concepts than we would otherwise be able to, and it also allows us to produce more extreme concepts than we would have been comfortable committing prototyping resources to in the past,” says Hocknell.

### Innovation enablers

While 3D CAD has been around for years, users say the tools have progressed in their capabilities in recent years. There also are complementary analysis and simulation tools that allow design engineers to model everything from the strength of a material to surface aerodynamics. When you combine these design-creation tools with modern, Web-based collaboration portals, manufacturers have at their disposal a set of product life-cycle management (PLM) applications to speed new product innovation. Callaway’s FT-3, as well as other examples are products born of this leveraged PLM strategy.

## Innovation accelerated

able to get them to market in the same amount of time, or less than in the past," says Ehlers.

Teamcenter is credited with speeding the project, as well as reducing travel and video conferencing costs. For example, design and tooling issues with suppliers were in some cases resolved twice as fast as on past projects.



**"Club designs are more intricate, but we are still able to get them to market in the same amount of time, or less."**

*—Steve Ehlers, VP, Callaway Golf*

Using **Microsoft Corp.**'s SharePoint portal as a foundation, Teamcenter allows project team members to log onto a secure Web site where they can access design data, CAD models, or lightweight versions of 3D

CAD models in the neutral "JT" format.

The benefit of this virtual team room, says Ehlers, is that it has version control and notification capabilities that keep everyone in sync. "It allowed us to get away from the e-mail days of sending thousands of files to hundreds of people," he says. "Now we have one copy and can do version tracking."

Portal usage has progressed to include more of the roles involved in bringing a product to market. "Since the information is now resident on a portal site and the program manager and others have access to it, we are extending access to those involved in the commercialization process," says Ehlers. "Maybe they are in advertising or marketing and need product information. They can easily access the

right information through the Teamcenter site."

Once the FT-3 design was finalized, bill of material and other design data necessary for production was moved into Callaway's **SAP** ERP system.

Going forward, the establishment of the innovation and advanced design group should help the early-stage development of club and materials designs. The NX tool, says Hocknell, is used to test concepts and select the most feasible ones to pursue.

At the end of the day, Callaway is benefiting both from the application of technology, and management strategies such as the establishment of the advanced design group. As Hocknell puts it, "We've always had talented design teams here, but we consciously made the decision to refocus a group of people on upstream research so that we stay in front with our technology." ■