DE
Desktop Engineering®

FEBRUARY 2010 • VOL. 15, ISSUE 6 • $9.00

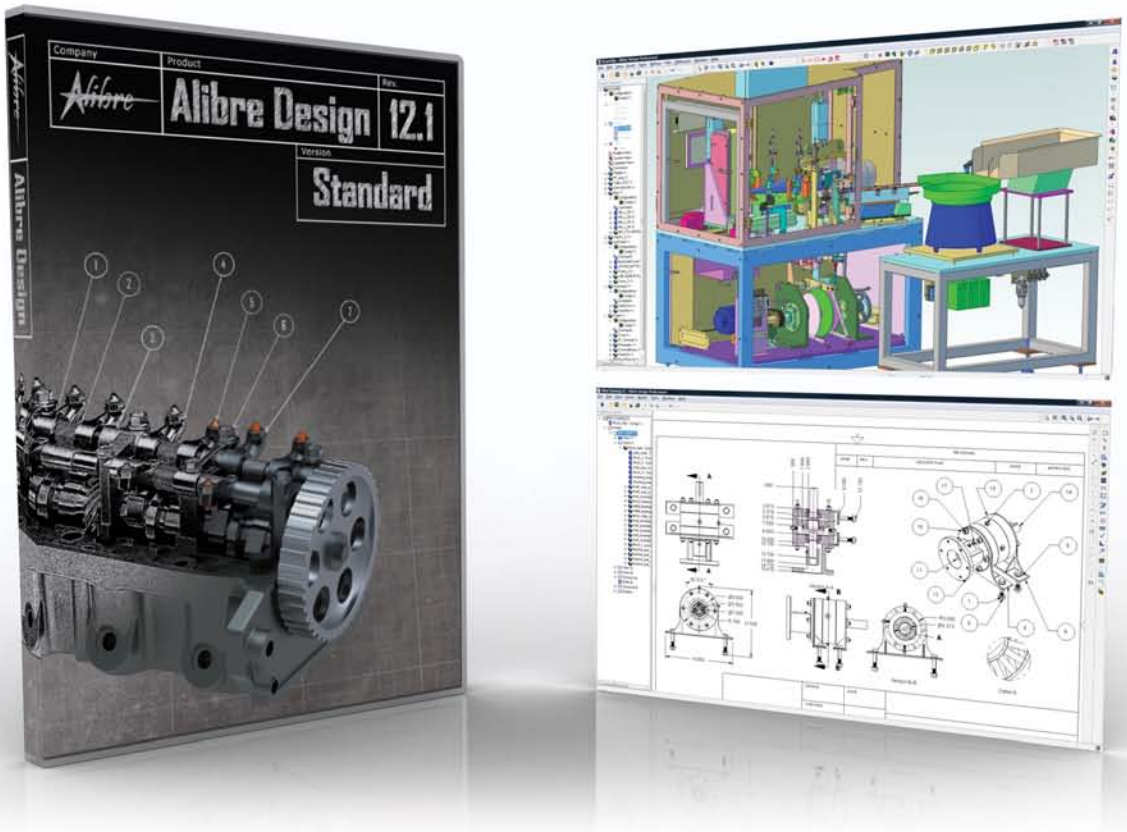
TECHNOLOGY FOR DESIGN ENGINEERING

DESKENG.COM

elements of HPC
> Special Section

NX 7
The Best of Both Worlds

3D Design. 2D Drafting. File Translation. For $97.



3D CAD software for every business, engineer, and individual. Alibre Design's professional 3D and 2D design tools bring any idea to life, with a price that is accessible to absolutely anyone. The era of high priced CAD software is over.

- ✔ 3D Design + 2D Drafting
- ✔ Works with popular formats:
  Solidworks, Parasolid, Pro Engineer, Catia, Inventor, SolidEdge, STEP, IGES, SAT, RHINO, DWG, DXF
- ✔ Easiest to use
- ✔ Most affordable to own
- ✔ Fastest to learn

Free 30 Day Trial at www.alibre.com

Alibre®

Where Do I Go for Data Loggers?

omega.com, of Course!

Your single source for process measurement and control products!

Portable Handheld Data Logger

OM-DAQPRO-5300
Starts at
$995

Visit omega.com/om-daqpro-5300
For Complete Product Details

THE MINI NOMAD® Series

Miniature RFID Data Loggers and Readers

*OM-84 Matchbook™ Series
$101
5-Pack

MADE IN USA

Visit omega.com/om-84
For Complete Product Details

Pressure and Temperature Data Logger

¼ NPT and Submersible Models

Part of the NOMAD® Family

MADE IN USA

OM-CP-PRTEMP1000
Starts at
$649

Visit omega.com/om-cp-prtemp1000
For Complete Product Details

FREE! New Horizons® in Data Acquisition Systems

Visit omega.com to order your FREE copy of The DILBERT BLUECAT® New Horizons in Data Acquisition Systems Version 23

Featuring 120 Classic DILBERT Cartoons!

Portable Data Logger

OM-SQ2010
Starts at
$1500

Visit omega.com/om-sq2010
For Complete Product Details

For Sales and Service, Call TOLL FREE

1-800-327-4333SM

1-800-DAS-1EEE

Dilbert © United Feature Syndicate, Inc.

PATENT PENDING COVERED BY U.S. AND INTERNATIONAL PATENTS AND PENDING APPLICATIONS

Shop Online at

omega.com®

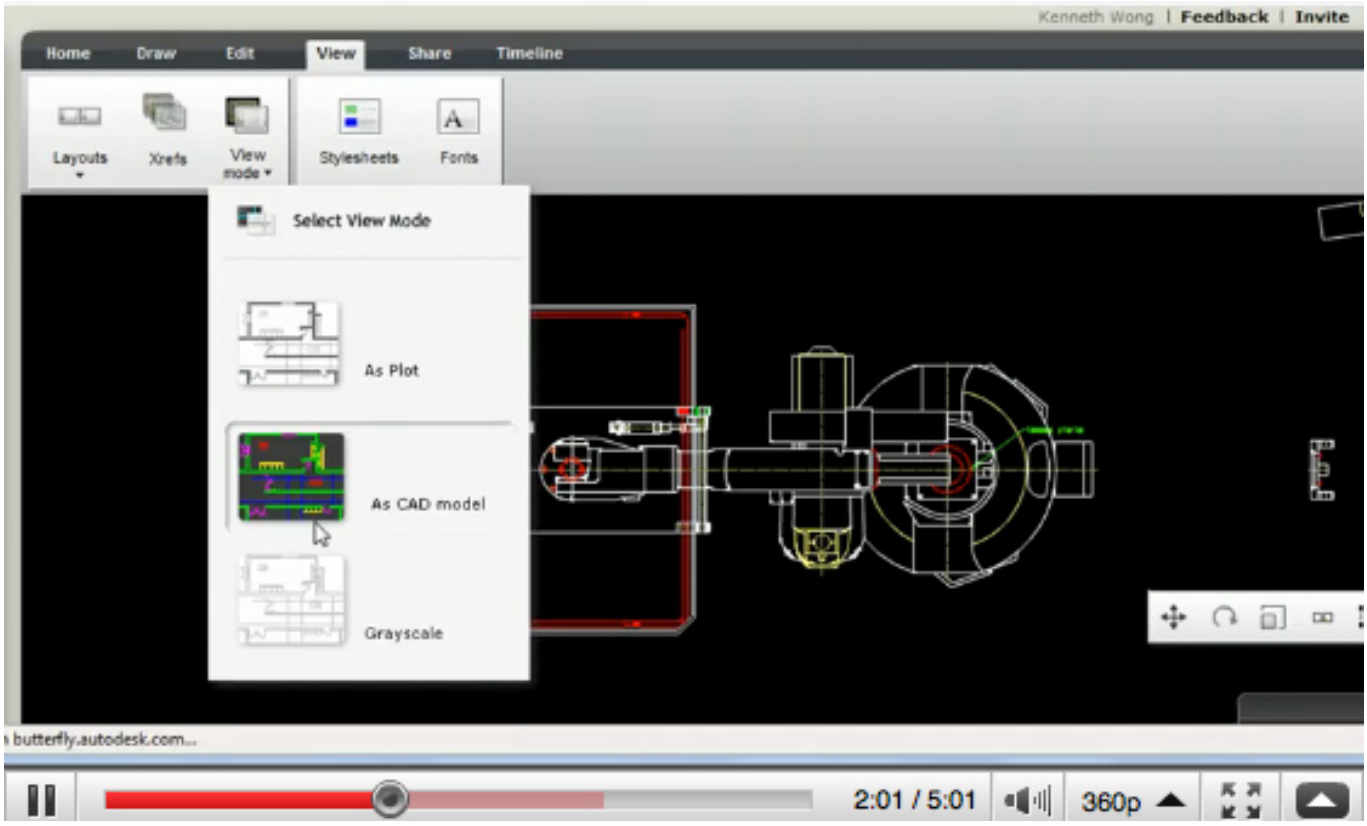
OMEGA®

Autodesk Project Butterfly Comes Out of its Cocoon

KENNETH WONG
kennethwongsf@earthlink.net

Recently, Autodesk Project Butterfly took flight, fluttering towards the computing cloud to join its cousin Project Twitch. Like its predecessor, Project Butterfly teases us with the the promise of browser-based CAD. According to Amjad Hanif, Autodesk's senior director of product management for emerging products, nearly 4,500 people rode on the wings of Butterfly during the week it emerged from the development cocoon.

Click here to learn more and watch a video of it in action. ■



COMSOL MULTIPHYSICS

Capture the Concept™

80% of product ideas never make it to market. Let multiphysics simulation bring your designs to life.

With COMSOL Multiphysics® you are empowered to build the simulations that accurately replicate the important characteristics of your designs. The key is the ability to include all physical effects that exist in the real world. This multiphysics approach delivers results — tangible results that save precious development time and spark innovation.

Get a free Proceedings CD containing over 350 published simulation projects at:
comsol.com/conference/cd

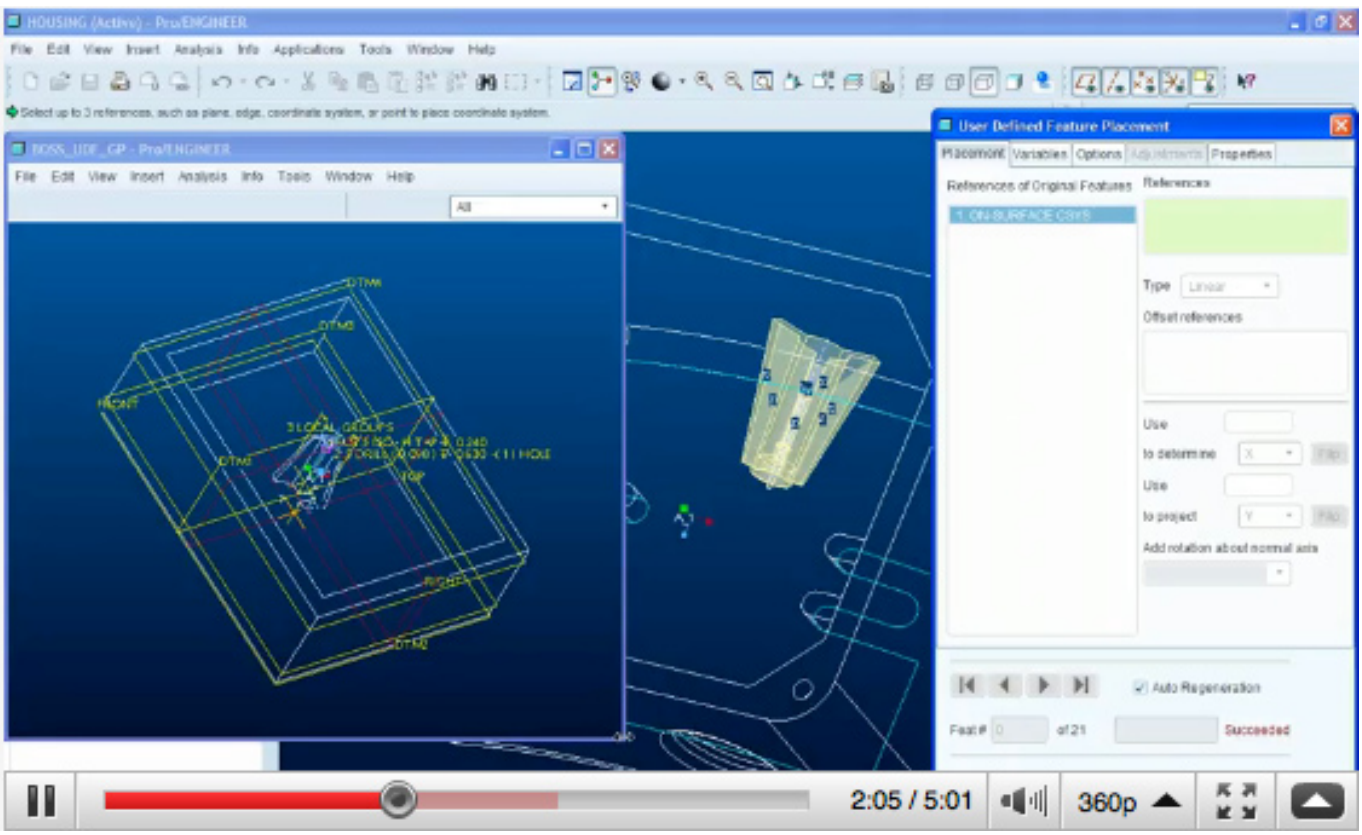
COMSOL

Meet Bob, the Digital Manikin in Pro/E Wildfire 5.0

In release 5.0, PTC's flagship MCAD package Pro/ENGINEER Wildfire takes on some of the characteristics of its direct-modeling cousin CoCreate. The new release marks the debut of Dynamic Edit, or what many of us now refer to as push-pull modeling. But at its core, Wildfire 5.0 remains a parametric program.

The other noteworthy addition is a digital manikin, which I nicknamed Bob for easy reference. If you routinely work with heavy machinery, you may use Bob to verify clearance, ergonomics, and accessibility (for example, making sure Bob doesn't need to be in an uncomfortable pose to operate a certain lever or control panel). To use Bob as a fully functional feature, you need a Pro/E manikin license.

See Bob and Wildfire 5.0's new features in these videos. ■



MAKE YOUR IDEAS REAL

dimension 3D Printers

3D Printers

Create a more productive design process with Dimension 3D printers.

Dear Boss,

Project Delta would get to market sooner using one of these Dimension 3D printers!

- We'd see & test more iterations and decide on the final design faster.
- Functional models are in tough ABS.
- Leasing starts at $275/mo*
- Check out: www.dimensionprinting.com/de

Thanks!
– Larry

Here's the test print of our new strut.

Cool!

*Price for US leasing. Additional options, shipping, applicable taxes/duties not included. ©2010 Stratasys, Inc.

STRATASYS

New Content to Help Make Your Job Easier

STEVE ROBBINS
steverobbins@deskeng.com

When *Desktop Engineering* was launched in 1995, the engineering world was going through a major change. Technology had advanced to a point where design engineers could make use of real, full-blown computer aided design software on their own personal workstations. It marked a period of renewed design creativity with worldwide implications and technological advances that started a cycle of improvements that drove design innovation to new heights and made complex simulations possible on desktop computers.

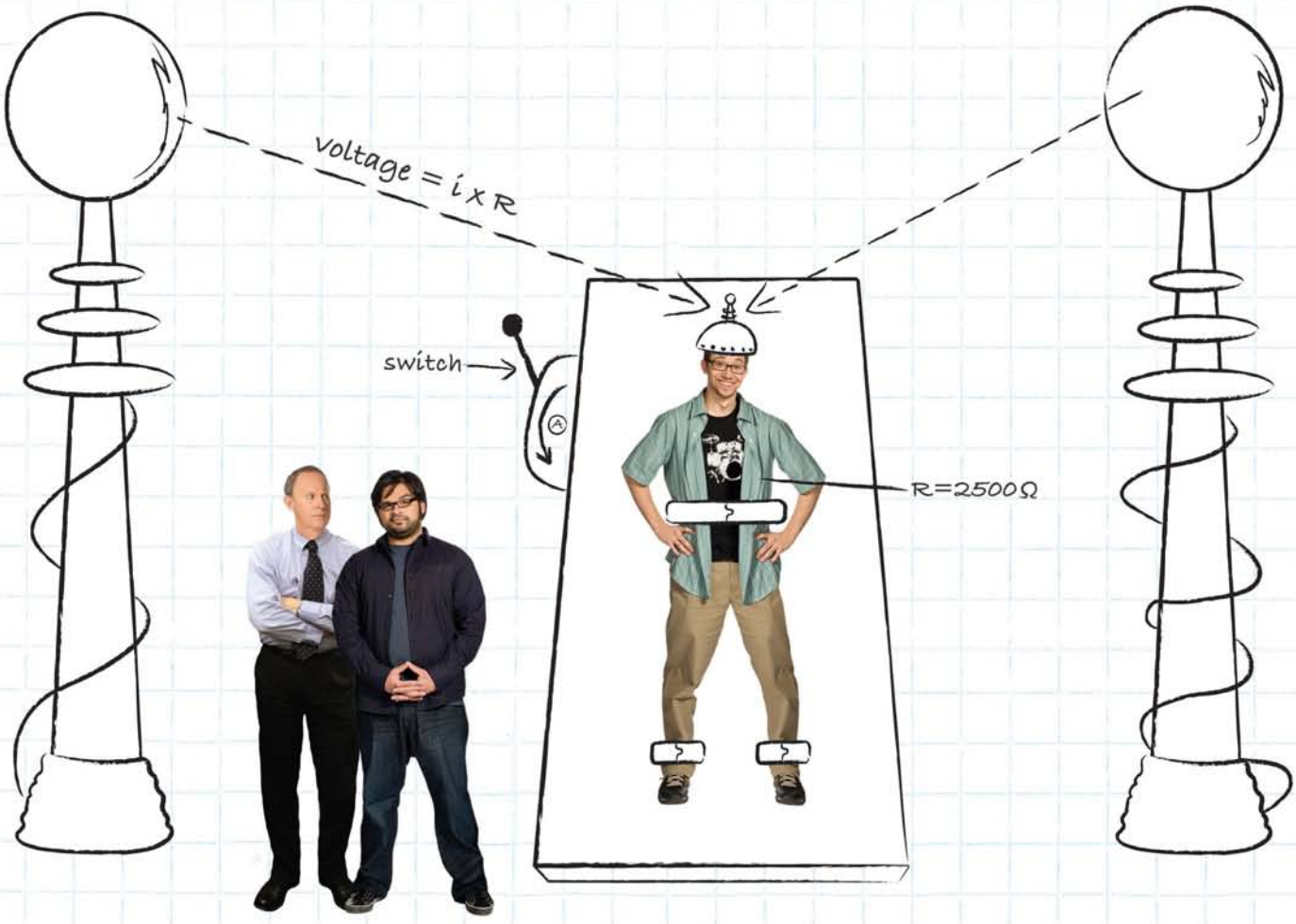
Yet the wall standing between mechanical design and the manufacture of that design persisted. The old saw about how once the design was passed to the manufacturing team everything about it changed continued to hold true. This process was at times adversarial and at best annoying. Back and forth the design would go, eating up the schedule. Finally, the quality assurance engineer would spend even more time making sure the manufactured prototypes were going to perform as promised. It was a costly process.

> Another wall between mechanical and electronic design is crumbling.

Thankfully, over the course of the last decade or so, we witnessed most of these roadblocks removed by efficiencies in the process. Finally the wall crumbled, enabling design and manufacturing to work together, trimming time to market.

Today, another change is taking place. Some call it mechatronics, others co-design. It doesn't matter what you call it, the design engineering team is moving forward because technology is enabling better design tools. Another wall that exists between mechanical and electronic design is quickly moving in the direction of the Berlin Wall of 1989. The further forward in the design process the integration of the mechanical and electrical occurs, the more advanced the manufacturing process becomes and better products are produced.

Design engineering teams are now empowered to include electronic



THE COMPLETE SEASON WILL BLOW YOUR MIND.
ALL EPISODES AND EXTRAS ARE ONLINE NOW.

3DUDES GONE 3D

SolidWorks® presents an online series about three PRODUCT DESIGNERS forced to work in an overflow trailer. Starring a USER COMMUNITY OVER ONE MILLION STRONG, a friendly NEIGHBORHOOD SOLIDWORKS RESELLER, and more than 150 USER GROUPS. And now showing ALL EPISODES, TIPS, DEMOS, DOWNLOADABLE POSTERS, and even NEW RINGTONES.

NR
NOT RATED

WATCH SEASON ONE AT **3DUDESGONE3D.COM**

SolidWorks

systems in their designs and simulate them at the beginning of the process. With new software they can be assured their simulations are accurate and that the integration remains seamless through to the finished product. This enables the design engineer to work directly with the electronic component manufacturer on component design when off-the-shelf devices just won't work.

To keep you up to date on such developments, DE is adding another content silo to go along with the MCAD, PLM, simulation and analysis, rapid technology, and HPC and engineering IT subject areas we regularly cover for you. We are calling it Mechatronics, Embedded Systems, and Sensors. Under this heading we will be covering embedded systems, sensors, microcontrollers, MEMS, FPGA's, software tools, and other components and devices.

You can find Tom Kevan's first report on page 5. It looks into the incorporation of Labview with SolidWorks 2010. I think it's a must-read and hope you find it worthwhile.

As always, we at DE aim to provide you with only the information designers and engineers need to make their jobs easier. We have followed every development that affects your day-to-day job to keep you informed and better prepared. As we expand into coverage of mechatronics, embedded systems, and sensors, we promise to continue that task and cover only those components and systems that you need to know about and that are targeted to the up-front design process.

As we expand into this area we would like to hear from you. Tell us what your needs are and please let us know what you think of this new content. E-mail us at de-editors@deskeng.com ■

***Steve Robbins** is the CEO of Level 5 Communications and executive editor of DE. Send comments about this subject to DE-Editors@deskeng.com.*

EDITORIAL

Steve Robbins — Executive Editor
Jonathan Gourlay — Senior Content Manager
Anthony J. Lockwood — Editor at Large
Margaret S. Gurney — Copy Editor

CONTRIBUTING EDITORS

Mark Clarkson • David S. Cohn • Al Dean
Mike Hudspeth • Tom Kevan • Susan Smith
Peter Varhol • Pamela J. Waterman • Kenneth Wong

PUBLISHER

Brian Vaillancourt (x263)

ADVERTISING SALES

603-563-1631 • Fax 603-563-8192
Brian Vaillancourt — Publisher (x263)
Jeanne DuVal — Account Manager (x274)

ART DEPARTMENT

Darlene Sweeney — Art & Production Director (x257)

A LEVEL 5 COMMUNICATIONS PUBLICATION

Steve Robbins — Chief Executive Officer
Thomas Conlon — President

ADVERTISING, BUSINESS, AND EDITORIAL OFFICES

Desktop Engineering® Magazine
Level 5 Communications, Inc.
1283D Main St., PO Box 1039 • Dublin, NH 03444
603-563-1631 • Fax 603-563-8192
E-mail: DE-Editors@deskeng.com
www.deskeng.com

SUBSCRIBER CUSTOMER SERVICE

Desktop Engineering® Magazine
PO Box 677 • Northbrook, IL 60065
847-559-7581 • Fax 847-564-9453
E-mail: den@omeda.com

Desktop Engineering® (ISSN 1085-0422) is published monthly by Level 5 Communications, Inc., 1283D Main Street, P.O. Box 1039, Dublin, NH 03444, 603-563-1631. Periodicals postage paid at Dublin, NH, and at additional mailing offices. *Desktop Engineering*® is distributed free to qualified U.S. subscribers. Subscription rates for non-qualified: U.S. $108 one year; Canada and Mexico $126 one year; all other countries $195 one year. LIST RENTALS: For information on list rentals, contact Statlistics, Danbury, CT: 203-778-8700.

CONTENTS

Desktop Engineering®

DESKENG.COM

"Part of the inhumanity of the computer is that, once it is competently programmed and working smoothly, it is completely honest."
> Isaac Asimov

CONTENTS

FEBRUARY 2010 VOLUME 15 ISSUE 6

CAM

COMPUTATIONAL FLUID DYNAMICS

COMPUTATIONAL FLUID DYNAMICS

ELEMENTS OF HPC

PRODUCT OF THE MONTH

COMMENTARY

DEPARTMENTS

ONLINE @ DESKENG.COM

DE PRODUCT SHOWCASE

> Hardware, software, and publications. Live links connect to suppliers.

NEWSLETTER REGISTRATION

> *Newslink; Editor's Pick of the Week; Check It Out (Videos, White Papers and Webinars); Virtual Desktop; Elements of Analysis and Simulation; Elements of Engineering IT & Computing; Elements of MCAD; and Elements of Rapid Technologies.*

ON THE COVER > This heavy-duty Tatra truck was modeled in NX 7 from Siemens PLM Software. The inset user interface illustrates the value of high-definition 3D (HD3D) in the latest release of NX. HD3D enables Dynamic Visual Reporting to query models or assemblies for many types of information, providing both power and flexibility. To read Mike Hudspeth's review of NX 7, please turn to page 26.

Autodesk®

AUTODESK INVENTOR TAKES YOU BEYOND 3D TO DIGITAL PROTOTYPING

Autodesk® Inventor® software creates a single digital model that enables you to design, visualize, and simulate your products. Inventor helps you to reduce product costs and get innovative designs to market faster.

Find out more about Autodesk Inventor and how it can take you beyond 3D to Digital Prototyping.

www.autodesk.com/beyond3d

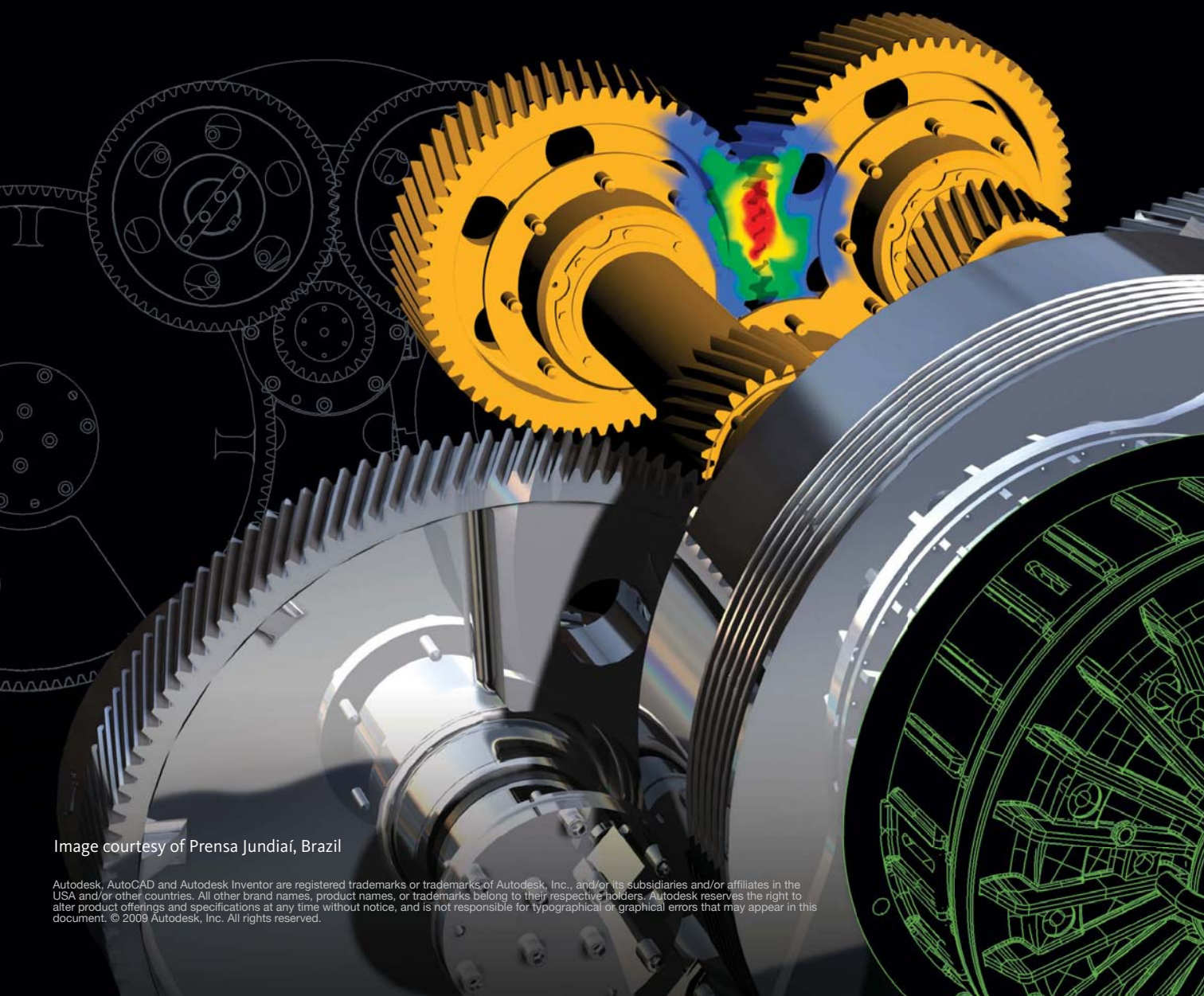
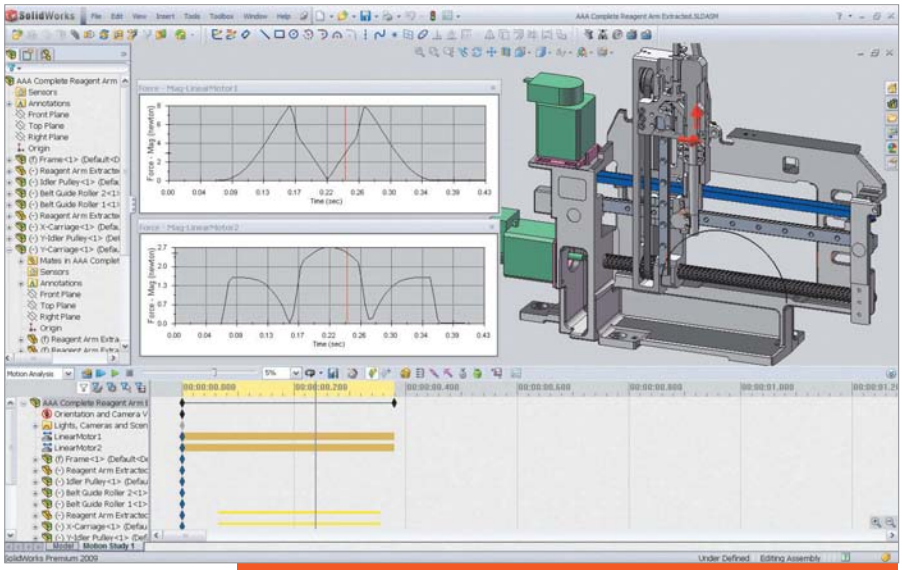


Image courtesy of Prensa Jundiaí, Brazil

NI & SolidWorks Build a New Toolkit

> Enabling next-generation design practices & new roles for traditional technology.

BY TOM KEVAN



SolidWorks' realistic machine simulations enable design teams to visualize the machine operating under the control of LabVIEW function blocks and obtain analysis data for optimization.

This is the debut of a monthly column that will provide a fresh view of design engineering, one that takes into account the growing complexity of the machines and devices engineers are called on to create. It will mirror the increasing prominence of mechatronics, a design methodology that is a reflection of—and an adaptation to—changes that have transformed modern machines.

Today's machines have evolved from rigid, single-purpose devices—based on mechanical gears and cams—to flexible, multipurpose machines that incorporate sensors, actuators, embedded software, and servomotors. The metamorphosis is marked by a shift from purely mechanical devices to electromechanical collections of interconnected subsystems, whose functionality is defined by interdependencies that blur the boundaries separating mechanical, electrical, and software domains.

One of the primary difficulties encountered by engineers designing mechatronic systems revolves around the fact that optimal performance depends on complex interactions among the mechanical, electrical, and embedded control system components in the design. Until recently, your ability to model machines' mechanical, electrical, and motion dynamics was limited. Mechatronic design tools

that reduce the complexity of electromechanical system modeling just didn't exist.

To fill this need, National Instruments (ni.com) and Dassault Systèmes SolidWorks Corp. (solidworks.com), have pooled their resources to create a Mechatronics Toolkit that combines the functionality of LabVIEW, SolidWorks, and COSMOSMotion. The toolset enables virtual machine prototyping and electromechanical simulation, all of which will help you develop complex multiaxis motion profiles for your machine and then validate them through simulation.

With the toolkit, you can design motion profiles, detect collisions, simulate the mechanical dynamics of a machine, estimate machine cycle-time performance, and validate motor, drive, and mechanical transmission selections. Another important feature is its ability to evaluate tradeoffs between mechanical, electrical, and embedded system aspects of your design, reducing risks and development costs.

Some typical applications for the Mechatronics Toolkit include motion trajectory design, visualization, collision detection, and motor, drive and transmission sizing.

For example, you can build motion profiles for operations composed of 2D straight-line, contour, and arc moves. The toolkit can handle 2D coordinated motion profiles and any number of uncoordinated motion axes. Each motion axis in LabVIEW will map to a constrained joint in COSMOSMotion and can then be applied as a displacement vs. time array.

In addition, using motion control profiles and timing/sequencing logic created in LabVIEW, you can animate a 3D SolidWorks model. Visualizing the operation of the prototype enables you to test the feasibility of your design. The integration of the toolkit's software components allows you to transfer the visualization results from COSMOSMotion to SolidWorks Animator, and then convert the data to eDrawings, which can be shared with design team members, sales staff, and customers.

The toolkit will also help you calculate motor torque and velocity requirements for motion profiles.

Using the collision detection functionality in COSMOSMotion, you can validate motion profile designs using a 3D CAD model. You can also check for interferences, evaluate the need for interlock control logic to prevent collisions, and test control system logic without the risk of damaging a physical prototype.

The toolkit will also help you calculate motor torque and velocity requirements for motion profiles. COSMOSMotion simulations factor in mechanical dynamic effects (e.g., payload mass, friction, and gravity), which helps you to make sound design tradeoffs when selecting coupled electrical and mechanical components.

It might be time to add to your mechatronics toolkit. ■

*Contributing Editor **Tom Kevan** is based in New Hampshire and is DE's mechatronics, PLM, and systems expert. Send your comments about this article to DE-Editors@deskeng.com.*

What's that Down the Road? A Head?

With apologies to Red Skelton, this is the question that manufacturers are now asking about 2010. The 2009 recession has been replaced by the 2010 recovery but thus far it is hard to tell one from another. If this is the year of recovery what will that mean? How will this coming year be judged? Against the miserable performances of 2008-2009 or by the boom years that preceded them? In some respects both will serve as reference points.

The four main factors that will affect decision making in the coming year will be familiar to anyone in manufacturing. The first is credit and its availability, the second is the emergence of an inflationary spiral that affects commodities like steel and oil, the third is whether demand factors will recover in time to promote production and the fourth is the impact of various governmental programs and efforts.

The issue of credit has been at the forefront of many manufacturers' concerns since the credit market locked up in the third and fourth quarters of 2008. The ability to borrow has been severely constrained as many of the traditional lenders have vanished and the banks that remain have become much more conservative than they have been in the past. The good news is that the latest surveys from the National Association of Credit Managers shows that credit is starting to loosen up and by the summer lending is expected to look a little closer to pre-boom normal levels.

The threat of inflation is not expected to be a major factor through 2010. The estimated rate of producer price inflation is between 1.5% and 2% for the year and many think it will be much lower than that. Oil prices should stay in the $65 to $80 a barrel range and metals prices will be below 2006 and 2007 levels. There is still a considerable amount of money in the system and should it start to cascade out there will be problems, but on the positive side there should be little wage inflation.

The third factor is perhaps the most vexing. When does demand come back in a consistent manner? There has been some boost in inventories in the last month but this has been a reaction to the fact that the overall rate of

inventory had been so low. The consumer has started to come back but remains cautious and more frugal than in the past. There is not much encouraging to say about automotive yet but there are some signs of life in aerospace and energy.

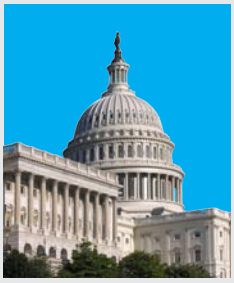
The last factor is perhaps the hardest to predict. The biggest change from the past few years is an expanded role for government. This involvement can be good news or bad news for manufacturers and in many cases the impact will be a little of both. The stimulus money that was supposed to have been spent in 2009 was mostly not allocated and it now looks like fully 50 percent of it will be spent in 2010. Thus far the money has mostly been directed at relieving budget crises in various states but there is an intent to direct more of it to infrastructure projects in the future. The stimulus plan has not had the impact it was expected to have, but there is still time to make some difference to the economy.

—Chris Kuehl, Ph.D., is an analyst for the Fabricators & Manufacturers Assoc. Int'l.

TO READ CHRIS'S FULL ESSAY:

> What's Down the Road?

AMT Sees Obama Administration's Manufaturing Report as Important Step



AMT—the Association For Manufacturing Technology—recognizes the Obama Administration's "Manufacturing Framework for Revitalizing American Manufacturing" as an important step in strengthening America's beleaguered manufacturing sector.

"It is encouraging that President Obama recognizes that a strong manufacturing sector is critical to America's future. It is also important that the President recognizes the challenges manufacturers face to effectively compete in the global marketplace," said Douglas K. Woods, AMT's president.

Woods unveiled AMT's own "Manufacturing Mandate" earlier this fall, calling on the federal government to provide policies that increase global competitiveness and export promotion; support innovation and R&D; assure the availability of capital; minimize structural cost burdens; and develop a "smart force" work force that will take manufacturing to the next level. Woods noted, however, that the goals of a strong, competitive manufacturing sector will not be achieved through government action alone, but through a collaboration between government, academia, and industry.

AMT also supports the President's proposals to expand the advanced energy manufacturing tax credit, reform export control policy, and add to the ranks of the US manufacturing work force. AMT also supports extension of the 50 percent bonus depreciation and enhanced Sec. 179 expensing business tax incentives that were included in the Recovery Act.

FOR MORE INFO:

> Association For Manufacturing Technology

Connex 3D Printing Gets Material of Year Honorable Mention

Geometries' Connex500 and Connex350 have been recognized with a Material of the Year 2009 Honorable Mention. The honor signifies that the printers were among the finalists for the first annual MEDIUM Award from Material ConneXion, a materials consultancy and library of materials.

The MEDIUM Award aims to recognize materials and processes that demonstrate outstanding innovation and the potential to make a significant contribution to the advancement of design, industry, society, and economy. Selected from technologies juried into the Material ConneXion library within the past year, the award leverages the company's insight into the materials, processes, and emerging technologies that are having the greatest impact on design worldwide.

"We are extremely proud to be counted among the finalists for this significant and relevant honor," said David Reis, CEO of Objet Geometries. "It's gratifying to see that our Connex systems continue to receive recognition for their outstanding contributions to 3D printing and the design industry at large."

Objet's Connex500 and Connex350 offer product developers the ability to print parts and assemblies made of several materials with different mechanical and physical properties in a single build process.

The systems' PolyJet Matrix Technology jets materials in thin layers, curing each layer with UV light, a process which yields models that closely emulate the look, feel, and function of an variety of end products. In addition, the systems allow users to create composite materials that have pre-set combinations of mechanical properties.

FOR MORE INFO:

> Objet Geometries

Thomas L. Holder Inc. Launches Online SolidWorks Classes

Thomas L. Holder Inc. has launched its online SolidWorks classes. Courses cover the basics to SolidWorks specialties.

Thomas Holder combines his educational background with real-life machine drafting and design experience. Having taught AutoCAD at the high school and college level, Holder transitioned to SolidWorks and has developed a series of online courses to provide prospective SolidWorks operators with live instruction. Exercises have been developed from his experiences learning SolidWorks while producing drawings for actual projects.

SolidWorks instruction is broken down into short courses presented over several days so students can absorb the material for long-term retention.

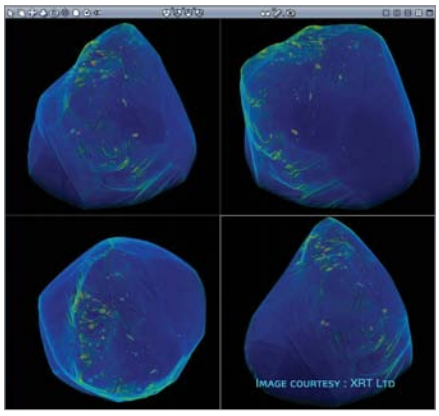
FOR MORE INFO:

> Thomas L. Holder Inc.

Avizo Combines with PCX for Superior 3D

Visualisation Sciences Group (VSG) has announced its Avizo visualization software is being combined with PCX systems to deliver a new solution to visualize and analyze low-density materials. The company says the new solution has applications in materials science, microelectronics, food technology, earth sciences, and other industries.

According to VSG, traditional x-ray techniques seriously limit imaging of very small or weakly absorbing features and make extraction of subtle textural information from the image extremely difficult. But PCX systems, developed and manufactured by XRT, are specifically designed to



capture and retrieve both phase and absorption contrast, enabling high-contrast imaging of low-density materials. And because PCX is now combined with Avizo software, users get 3D visualization and quantitative analysis of micro-CT data, delivering a 3D imaging solution for challenging materials structure analysis.

High-resolution phase and absorption contrast phenomena play important functions in improving contrast for x-ray images with many types of weakly absorbing materials (that can either stand alone or be in the company of more dense structures), even with the most difficult low-contrast samples such as paper, plastics, composites, geopolymers, metal foams, ceramics, food texture, and more.

Avizo is used for materials microstructure evolution, surface analysis, quality control, nanotechnology, industrial tomography, and non-destructive testing. For a free evaluation, visit vsg3d.com/vsg_trial.php.

FOR MORE INFO:

> Visualisation Sciences Group

Dental Lab Uses Sescoi's WorkNC Dental to Manufacture Prostheses

Catadent is a dental laboratory located in Spain that had been searching for the best system to rapidly manufacture dental prostheses at a competitive cost.

"We needed a reliable and easy to use CAM system which would be flexible enough for us to manufacture each unique prosthesis from a solid block in a predictable way," said Pedro Ruiz, dental technician at Catadent.

The company evaluated several systems and selected WorkNC Dental from Sescoi based on its built-in technology. WorkNC Dental includes automated machining wizards to simplify programming required to generate collision free 3- and 5-axis toolpaths. Cutting methodology has been optimized for materials like zirconia, titanium, and alumina.

FOR MORE INFO:

> Sescoi

EOS Presents New Metal Materials, Announces Joint Venture with BESTinCLASs

EOS has announced an exclusive joint venture with Swiss-based BESTinCLASS, a company that has developed the micro-machining process (MMP). The company has also released new metal materials, including EOS NickelAlloy IN718 and EOS Aluminium AlSi10Mg.

MMP applies a mechanical-physical-chemical surface treatment to items placed inside a treatment tank. Resulting from this agreement, FirstSurface Ltd., a joint venture between EOS and BESTinCLASS, will be the exclusive provider of MMP in the UK. Further exclusive locations in Europe are in preparation. Benefits of MMP include surface finishes

that can be controlled selectively up to a mirror-like polish; costs and turnaround times that are predictable and controlled; finishes that can be reproduced to industrial standards for multiple parts; and treated parts free from contamination.

In addition, part geometries are not altered, cavities can be accessed and the process can be applied selectively, according to EOS. Apart from that, the mechanical properties of the treated surfaces are not altered, hardening is minimized, and the process is approved for parts used in medical applications.

In related news, EOS highlighted a number of new materials for EOSINT M 270 systems include EOS NickelAlloy IN718 and EOS Aluminium AlSi10Mg. EOS NickelAlloy IN718 is a nickel-based heat resistant superalloy that corresponds to the commonly-known Inconel 718 alloy. EOS Aluminium AlSi10Mg is the first aluminium alloy to be qualified for M 270 systems.

FOR MORE INFO:

> EOS

Autodesk Acquires Dynamite VSP and Dynamite SIM

Autodesk, Inc. has completed the acquisition of Dynamite VSP and Dynamite SIM visualization software products and related assets. The products were purchased from 3AM Solutions, a UK-based privately owned technology company that develops visualization software for civil infrastructure.

Dynamite VSP and Dynamite SIM technology will help Autodesk automate the process of creating visualizations for projects made with AutoCAD Civil 3D software. Dynamite VSP offers simple and efficient ways to bring AutoCAD Civil 3D software data into Autodesk 3ds Max Design software.

Autodesk intends to integrate core technology from the Dynamite VSP and Dynamite SIM products into 3ds Max Design and other existing Autodesk civil engineering and visual communication applications.

FOR MORE INFO:

> Autodesk

2010 Coordinate Metrology Systems Conference Calls for Papers

The Coordinate Metrology Society (CMS) has announced the call for papers for the 2010 Coordinate Metrology Systems Conference (CMSC). This year, the annual event will be held in Reno, NV, from July 12-16.

Metrology users from manufacturers and science laboratories are invited to submit abstracts for presentations and technical white papers illustrating their successful application of 3D coordinate measurement systems. Abstract submissions will be peer reviewed by the Coordinate Metrology Society and considered for presentation at CMSC 2010. The deadline for abstracts is April 16, 2010. Notification of acceptance will occur on May 7, 2010. For guidelines or more information about presenting a white paper at CMSC 2010, contact Scott Sandwith, technical presentations coordinator at presentations@cmsc.org. Presentation and technical white paper guidelines can be downloaded at 2010 CMSC Guidelines.

In 2009, more than 20 expert presentations were delivered by representatives from Airbus, Audi, NASA Goddard Space Center, The Boeing Company, University of Michigan, Spirit Aerosystems, Lockheed Martin MFC—Dallas, National Research Council Canada, University of Warwick, and other professionals in the field of metrology. A diverse range of topics, applications, and industry best practices were presented at CMSC 2009 from the measurement of the USS Monitor's Dahlgren gun, to the precision alignment and positioning of a large Spectroscopic Telescope, to geometry inspection of precision-forged crank shafts, to measurement assisted assembly of large volume aircraft wing structures.

FOR MORE INFO:

> Coordinate Metrology Society

DataCore Software Super-Sizes Virtual Disks

DataCore Software is stretching the size of its virtual disks from 2 terabytes to 1 petabyte. The company says clients are eager to group multiple disk drives, each exceeding 1TB, into redundant array of inexpensive disks (RAID) sets. With this release, DataCore storage virtualization nodes can control pools consisting of numerous RAID sets, each well over the previous 2TB maximum.

According to the company, demand has also been strong from applications seeking to update and analyze very large datasets that in the foreseeable future will grow well past the 2TB cap.

The new software release is available immediately. DataCore customers under current maintenance contracts are eligible to receive the 1PB software enhancements at no charge.

FOR MORE INFO:

> DataCore Software

Remcom Announces Custom Configured Hardware for Maximum GPU Acceleration

Remcom has announced a new partnership with a computer supplier to provide custom XFdtd systems and brand name hardware solutions to customers. Link Computer Corporation has created a hardware solution designed to exploit XFdtd's graphics processing unit (GPU) capability. To offer more options, Remcom may add solutions from other vendors as the program grows.

"The challenge presented to us by Remcom was exciting—to engineer the ultimate computer for maximum efficiency of their software. With our roots in software development and hardware, we understand the nature of Remcom's mission and can combine that with our expertise in providing custom solutions to customers," said Tim Morder, Link's VP of sales and marketing.

Link's customized solution optimizes XFdtd's performance by

ESI Announces Keynote Speakers for ESI Global Forum 2010

ESI Group has announced its keynote speakers for ESI Global Forum 2010. Designed for ESI customers worldwide, ESI Global Forum 2010 provides an opportunity to share best practices, challenges and successes in virtual prototyping.

ESI Global Forum 2010 will take place May 19-20, 2010 in Munich, Germany. Attendees include designers, engineers, analysts, and managers of customer and partner companies from around the world in the automotive, transportation, aeronautics, aerospace, marine, energy, heavy industry, high-tech and electronics, and other industries as well as leading European academic institutions.

Keynote speakers in ESI Global Forum 2010's plenary session will address the following topics:

• Roger Herdy, program manager, Qualis Corporation on "Vdot: A Software Tool to Optimize Aerospace Applications".

• Stéphane Baril, head of Composite Product Engineering, MU Equipment and Services, EADS Astrium on "Satellite Antenna Reflector Design and Optimization using Rayon Software".

• Dr. Bernd Mlekusch, head of Functional Body Design and Technikmodell, AUDI AG on "CAE Aided Car Body Design".

The plenary session at ESI Global Forum 2010 will be followed by parallel sessions covering casting, composite, crash, impact & safety, electromagnetism, fluid dynamics, sheet metal, vibro-acoustic, and welding.

FOR MORE INFO:

> ESI Group

building the recommended GPUs directly into the product. The system is available with either two or four NVIDIA CUDA-enabled Tesla series or Quadro FX GPUs. This hardware, when combined with Remcom's XStream GPU technology, provides a solution that speeds EM simulation performance and decreases design time.

"Our focus is to continually find creative ways to get our customers' products to market faster than any other EM simulation software provider," said Dr. Stephen Fast, president of Remcom. "Customers responded to the announcement about our GPU acceleration technology with excitement and requests for help in choosing the most optimal computer system to make the most of it. While a custom-engineered system is not necessary, we wanted to eliminate extra steps for those users that prefer additional computer power, allowing them to get up and running with the right tool and to optimize the performance of our products in as little time as possible."

FOR MORE INFO:

> Remcom

CIMdata Releases New Program

CIMdata has released a new Program Review titled, "Meeting the Challenges of Transitioning PLM Implementations." It describes challenges faced by companies as they transition their PLM implementations through the series of version and enhancement releases provided by their PLM supplier. As examples, CIMdata interviewed a number of long-term customers of Siemens PLM Software to assess their approaches and experiences in addressing this often-challenging issue. "In increasing numbers, businesses have committed themselves to transforming the way they operate in order to become more innovative, effective, and responsive to the markets they serve," said Ed Miller, president of CIMdata. "In order to facilitate new processes, companies generally utilize information technologies as primary enablers."

IT-based initiatives offer significant opportunities to organizations, especially broad enterprise-focused ones like PLM, but they also bring their own set of issues, according to the company.

"A major issue that has challenged companies implementing PLM over the years has been the time, cost, and difficulty of evolving their PLM environment through the ongoing introduction of new versions of software that are provided to them by their PLM solution suppliers," said Miller.

In an effort to review Siemens' positioning and success in supporting upgrades and enhancements, CIMdata has interviewed a number of Siemens' customers to gain a better insight into their experiences. This review provides CIMdata's perspectives on the results of those interviews and the recommendations that these companies provided to minimize difficulties. Copies of the review are available at the CIMdata website.

In other news, CIMdata announced its 2010 PLM Vendor Forum schedule and program. These one-day events will be held in Ann Arbor, Mich., USA, on March 25, in Stuttgart, Germany on April 15, and in Tokyo, Japan on April 21.

FOR MORE INFO:

> CIMdata

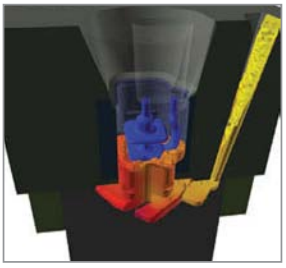
EDITOR'S PICK OF THE WEEK

FROM THE DESK OF **ANTHONY J. LOCKWOOD**, EDITOR AT LARGE, *DESKTOP ENGINEERING*

WOULD YOU TRUST THIS GUY? Well that question has already been answered by thousands of readers who have indicated they already do, implicitly. So here are Lockwood's most recent musings about the products that have really grabbed his attention, and deserve yours.

CAE Software Simulates Industrial Casting Processes

>CD-adapco and Access team up on STAR-Cast for multidisciplinary simulation of casting.



CD-adapco has always been at the front end of CAE technology development. It has done it again by teaming up with a research center in Germany called Access to develop STAR-Cast, a multidisciplinary simulation tool for industrial casting processes.

Now, some of you may not be familiar with Access. I was not. Access is a non-profit, independent research center associated with the Technical University of Aachen in Germany. Access specializes in materials and processes with a special focus on metallic materials and casting processes. They have more than 50 engineers and scientists at work on such stuff.

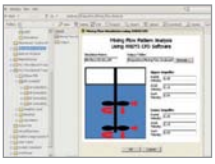
CD-adapco and Access collaborated on a simulation tool that could address a broad range of industrial casting processes such as gravity sand casting, low pressure and counter pressure casting, and continuous casting.

READ MY COMPLETE REVIEW:

>CD-adapco

Knowledge Manager Captures Simulation Data, Best Practices

> ANSYS EKM simplifies simulation data backup, archiving, sharing and reuse.



Years ago as PLM was bursting onto the scene, I was speaking with a guy from a company—many times bought and sold—that developed PDM (product data management) software. Our conversation branched off into a discussion of PDM/PLM for CAE. The basic tenor of the conversation was that it was a long, long way off because of the enormity and complexity of simulation data sets. Well, we're there now, and who else but ANSYS is one of the leaders in the world of simulation PDM?

ANSYS recently introduced version 2.0 of its ANSYS Engineering Knowledge Manager (EKM), a set of applications for managing simulation data and processes as well as knowledge capture. By a set of applications, I mean that ANSYS offers EKM for the desktop, workgroup, or enterprise. It also offers the tools and functionalities to manage simulation data as well as capture processes, enhance data reuse, and foster collaboration.

READ MY COMPLETE REVIEW:

>ANSYS EKM

Lenovo ThinkStation S20 Is a Worthy Successor

> Taking the torch from the standout S10, this new single-socket workstation from Lenovo proves itself as a great midrange CAD system.

Did you get a chance to read David Cohn's review of the Lenovo ThinkStation S20? As usual, David does a bang-up job of taking a workstation for a ride to see what that baby can do. David's conclusion? "The ThinkStation S20 joins its predecessor as an absolutely perfect midrange CAD workstation."

David Cohn is not one for hyperbole. He does not use words like "perfect" unless he means it. The problem is, what does that leave me to say about Lenovo's flagship desktop system?

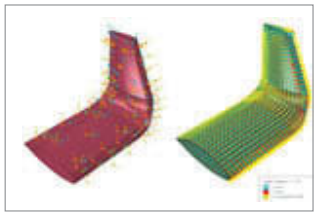
I mean really, David already tells you that the ThinkStation S20 is well engineered for users of graphically and computationally intensive applications like CAD, CAM, and CAE. He tells you why its Xeon processors and NVIDIA Quadro and ATI FirePro graphics are important for you. He even talks about how the ThinkStation S20 uses 50 percent recycled plastic, meets Energy Star 5.0 criteria, and is certified for GREENGUARD. And he tells you that the ThinkStation S20 is virtually silent after its initial startup. In other words, I'm stumped. He didn't leave me much. OK, he forgot to mention it's RoHS-compliant.

READ MY COMPLETE REVIEW:

>Lenovo

Dassault Systèmes Announces New Release of Abaqus FEA

> Features improved realistic sim capabilities.



Abaqus FEA from SIMULIA has been a gold standard solution set since before Dassault acquired the company long ago. From the get-go, the idea behind Abaqus has been to get you accurate simulation results quickly, lowering your development costs and speeding time to market. With the introduction of Abaqus 6.9 Extended Functionality (6.9-EF) SIMULIA/Dassault notches it up to another level.

First, a bit of housekeeping. Abaqus/FEA is not designed solely for high-end, ultra challenging nonlinear problems and large-scale linear dynamics applications. It's flexible and adaptable enough for what you might call routine design simulations. The suite is comprised of three main modules—Abaqus/CAE, Abaqus/Standard, and Abaqus/Explicit—and a set of complementary tools that extend its capabilities to such specialized areas as PCB modeling, crash dummy models, and durability prediction. In short, Abaqus/FEA lets you create a multiphysics environment that lets you predict and optimize the behavior of your design in the world where it will operate. Always cool.

READ MY COMPLETE REVIEW:

>Dassault Systèmes

FASTApps

> FOR COMPLETE APPLICATION STORIES CLICK HERE

CD-adapco STAR-CCM+ Optimizes Sail for the BMW ORACLE Racing

> In this interview, CD-adapco's Anthony Massobrio discusses the BMW ORACLE Racing team's Rigid Wing Project with Mario Caponnetto, the team's CFD manager. The project evaluated the wing's design and performance to determine if it should be used on the team's trimaran in the America's Cup.

The team used STAR-CCM+ to evaluate the wing's aerodynamics. The software handled the entire process in a single integrated environment, simplifying simulations by automating CAD prep, meshing, model setup, and iterative design studies.

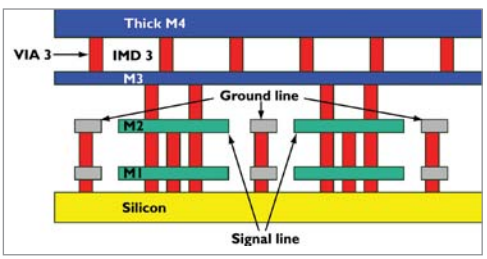
In the simulation, the team took advantage of the software's client-server architecture, which allowed them to use a remote supercomputing cluster. STAR-CCM+'s scaling made it possible to handle meshes, which can reach several million elements.

The software's CFD engine performed all the pre- and postprocessing phases, allowing engineers to build one complete workflow and then perform iterative optimization studies.

> More info

COMSOL's Multiphysics Enables Quality Control Testing in Semiconductor Manufacturing

> As part of one of its quality control program, semiconductor manufacturer STMicroelectronics conducts an electrical wafer sort (EWS) process. EWS is conducted on each IC to evaluate its functionality before assembling it in a package for its final application. The testing involves making contact with a chip pad, using a probe. The pressure of the probe's tip on the pad's surface must be limited to avoid cracking the ILD layers. Metal extrusion inside the cracks can lead to electrical failures.

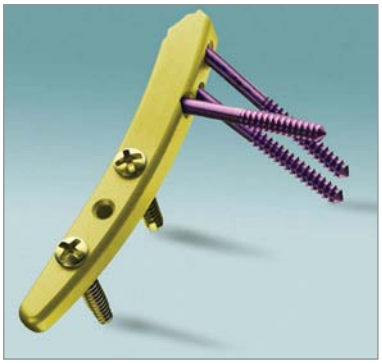


A team of engineers selected COMSOL Multiphysics to determine what happens when a probe tip hits the pad's surface. With the COMSOL model, the team determined the areas of peak stress and better understood how failures arise. Data gleaned from the investigation led to the optimization of the probe's geometry and size. The modified design resulted in better contact between the tip and the pad, less contact force, and reduced damage to the pad's surface.

> More info

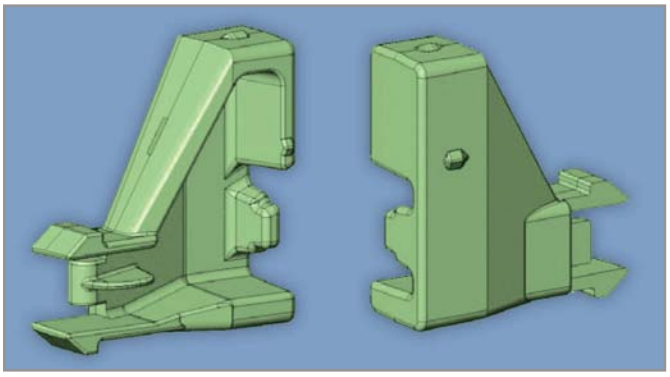
Siemens Teamcenter Drives Competitive Advantage Through PLM

> Wright Medical Technology Inc. is a global orthopedic medical device company, specializing in the design, manufacture, and marketing of reconstructive joint devices and biologics. Its products include large-joint implants for the hip and knee; extremity implants for the hand, elbow, shoulder, foot, and ankle; and both synthetic and tissue-based bone graft substitute materials.



The company needed to trim its development cycle, ensure compliance with FDA and other regulations, improve innovation, and enhance its product and process data management. Using NX and Teamcenter from Siemens PLM Software, the company improved its digital product development, extended data access and re-use, shortened design turnaround, leveraged virtual prototyping, and enhanced its government and industry regulation compliance. In addition, by extending and improving collaboration between employees and customers, it achieved greater innovation and improved customer satisfaction.

> More info



Bringing Rapid Prototyping In-House with Stratasys's Fortus 3D Improves Innovation

> Spacelabs Healthcare is a leading maker of medical devices. The equipment is used to monitor patient vital signs, including heartbeat, blood pressure, and oxygen levels. Besides monitoring and connectivity systems, the company manufactures equipment for anesthesia delivery and ventilation, as well as diagnostic cardiology.

For any manufacturer, it's important to control component and manufacturing costs during the design phase. Initially, Spacelabs either machined prototypes in-house or outsourced them to rapid prototyping service bureaus. Recently, the company moved to in-house rapid prototyping, with the acquisition of Stratasys's Fortus 3D Production System. Fortus uses the FDM process. The move increased innovation by allowing the company's engineers to explore more ideas and prove them out before going to tooling. The biggest benefits are quicker turnaround of prototypes, shorter time to market, and reduced costs.

> More info

Siemens PLM's NX 7: The Best of Both Worlds

> Enhancements to synchronous technology enable users to alternate between parametric and explicit modeling for easier and faster design.

BY MIKE HUDSPETH

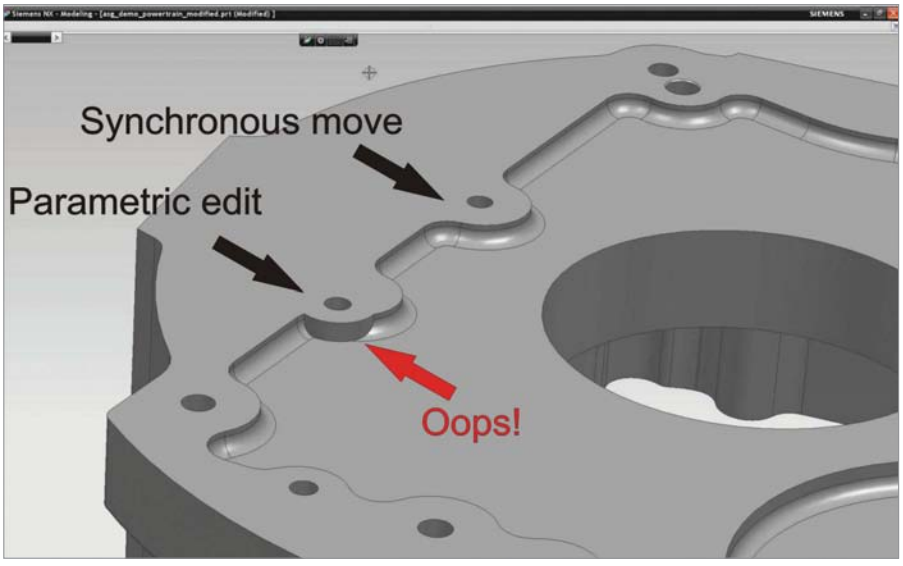


Figure 1: The first boss was moved parametrically, revealing other features built beneath it. The same thing happened on the underside of the model, increasing the complexity and time of the change. The second boss feature was moved with synchronous technology in one fell swoop.

Just like Hannah Montana, users of NX 7 get to work in two separate realms and pass between them seamlessly. Hannah (if you don't know who she is, ask your child, grandchild, or niece) alternates between her teenaged pop-star identity and her secret country-girl identity so she can lead an ordinary life… in Malibu. NX 7 users alternate between parametric and explicit modeling so they can design great products easier and faster. As in Hannah's theme song, they get the best of both worlds.

One world, that of parametric modeling, is completely controlled. When changes are made to a design, you must follow the rules set up by the original modeler. In the other world, that of explicit modeling, you deal with the actual topology of the design's geometry and there are no defined rules; you can change anything, at any time, in any way you want. And changes might be made that go against the original designer's intentions. The one world is fairly rigid. The other is very flexible.

Synchronous Technology

Designers using NX 7, from Siemens PLM Software, get the best of both via synchronous technology. Synchronous technology (introduced in NX 6, but enhanced in the new version) allows the modeler to use parameters to set up the model according to whatever rules he needs to apply, then go

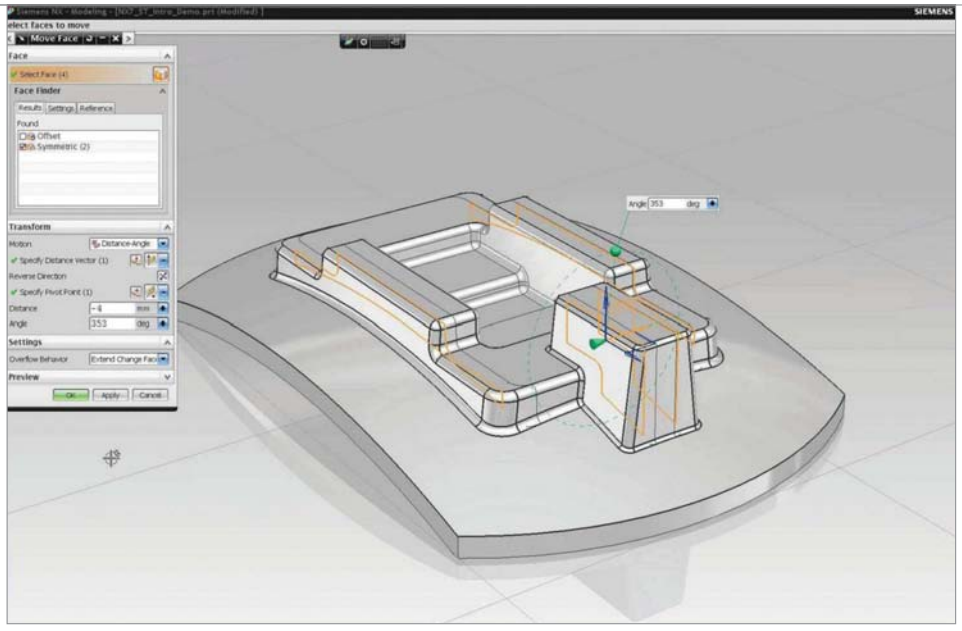


Figure 2: When you set up the Face Finder to look for symmetrical faces it will allow you to establish a relationship between them on the model.

back in and make changes that don't affect the model's sketches or the parameters used in feature creation.

Theoretically you would always get it right the first time, but in the real world, changes will need to be made because you can never account for everything in the life of your part. And, when a change order comes in, it's seldom that the original modeler will be doing the work, so even when you are diligent with your models, there are going to be things that will be hidden (see Figure 1), complicated, or waiting to explode. Therefore, you need access to the model's topology.

Then there are the times when you get a model from somewhere else. Company acquisitions and outsourcing mean you are constantly having to work with files made offsite with other modeling systems. One of these days you will be able to open them right in your software and recognize all of its intelligence, but until that time comes, you will generally find only the model's topology—its shape data—with no parameters. It will be a dumb solid.

The synchronous technology (ST) in NX 7 does a great job of recognizing features and even geometric conditions. For example, if the part you open has symmetrical features, ST will use Face Finder to look at the model's topology and recognize them and treat them accordingly (see Figure 2). It gives you a list from which you can specify the conditions you want to see. You can turn conditions on or off as you see fit.

Up until now, dealing with unparameterized models has been difficult: while you have always been able to move faces, oftentimes it didn't work because you would have to move them beyond their edges. Compounding that was the fact that blended edges would explode because the program tried to add or delete some edges. The system just didn't know how to handle them. You then had to build new geometry to apply a patch of sorts onto the model—a long and tedious process. Now, synchronous technology enables you to drag most faces just about anywhere you want—and the blends then update without trouble.

A change made in NX 7 is faster to implement than traditional modeling because with ST you don't have to update the whole feature tree. It just adds a feature to the bottom. Siemens says that ST is about getting the parts out the door—and we can all appreciate that. There are many other functions in NX 7 that make it worth your while.

You can replace faces—just like you've always been able to do—but without building any new geometry and you can also apply an offset right in the command. So you end up with a different face that takes its shape from the extension of an existing one. Cool, huh?

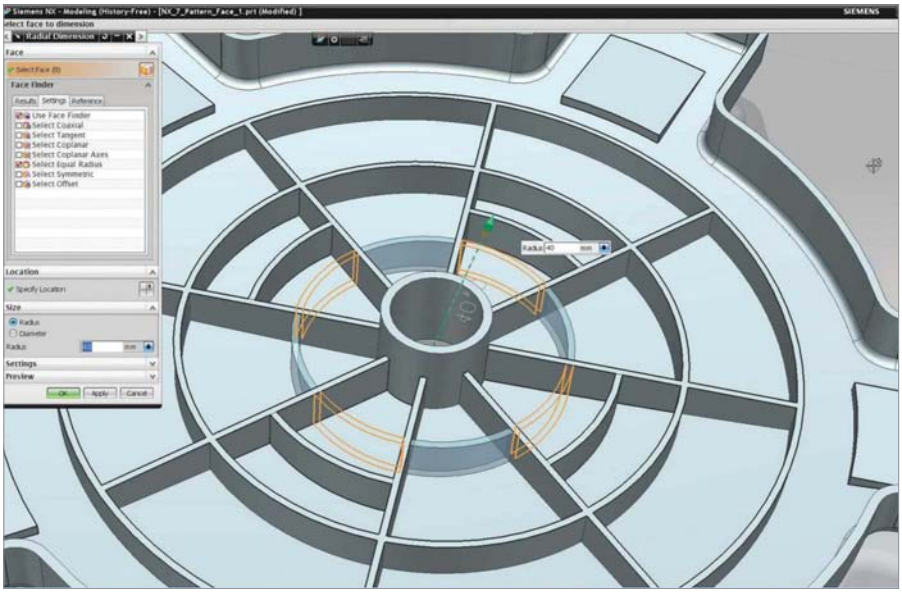


Figure 3: Sometimes you want to stagger ribs for structural strength. Synchronous technology allows you to do that with a simple cut and paste—and a change in radius.

3D Dimensioning

Another exciting, brand-new capability debuting in NX 7 is 3D dimensioning. Here, you can create persistent relationships between faces much like you can in a sketch. For a blend—even one that is unparameterized—NX 7 enables you to directly access the theoretical underlying edge. (How long have we waited for that?) You can then lock the dimension against inadvertent changes (currently, there is no visual cue that dimensions are locked, but I am told you'll probably see an icon or color change for that in NX 7.5). You can link 3D dimensions and even bring those dimensions onto your drawing. You can edit a model by making a 2D section and then editing the cut edges like a sketch. (This "sketch" is transient so don't waste your effort fully dimensioning it. Just put on what you want to change.)

NX 7 functionality makes modeling easier whether you are creating your own geometry or editing someone else's. You can create all sorts of features by cutting and pasting (see Figure 3). Once you paste a feature, you have the option of making changes to it—such as resizing or rotating it. It's like a user-defined feature (UDF) but with less work involved. You don't have to constrain things the way you would with a UDF. Call it scrapbook modeling; you can create a library of custom chunks to paste into your models. Synchronous technology patterns differ from regular patterns in that you don't have to edit the original instance to make a change to the pattern. Any instance will do as they are all linked.

At the assembly level you can select faces from multiple parts and everything moves. NX 7 treats the assembly almost as if it were a part file. You can create symmetry in particular areas of your model instead of the entire thing. Say, for example, you are creating a snap feature at the edge of a thermo-formed tray. You can specify the center of a slot as the plane of symmetry and build mirrored features around it, giving you more control. It used to be that the smart modeler would hold off

blending a model until the very end. Now blends are no longer problematic. NX 7 will handle most conditions without trouble. You can even build your own chamfer out of faces that are already on the model.

HD3D

NX 7 has what Siemens calls HD3D (for high-definition 3D). This allows you to do Dynamic Visual Reporting whereby you query your model or assembly for information and the results appear in the graphics window. You can tag things to see where and what they are. NX 7 tags are aware of what's near and far to avoid clutter. And the tags are interactive so when you click on them they will expand to give you detailed information. With NX Check-Mate—you can create reports that sort by everything from "supplier" to "heavier than." You can even keep track of what parts are completed and released to production and which ones are behind schedule. You can then export the results to wherever you need to, including Excel and other formats so you can access your data without having Siemens' Teamcenter product (which would add even more power and flexibility). In the future you'll be able to get info from many databases, and that'll mean you can draw information from all across your organization directly into NX.

While NX 7 sounds like a big release (it's actually more of an incremental one), look for NX 7.5 to include more industrial design enhancements to make styling easier.

While NX 7 sounds like a big release (it's actually more of an incremental one), look for NX 7.5 to include more industrial design enhancements to make styling easier. NX 7.5—due sometime in mid 2010—will recognize cliff-edge blends. Make no mistake, though, there's so much more in NX 7 than there's room to explore here, yet prices for NX 7 haven't really changed from NX 6. They depend on what packages you get, but in general NX 7 starts around $9,000.

NX 7 functionality has definite real-world applications, enabling users to accomplish things they've wanted to for years. NX 7 has real multi-CAD functionality, so you can pull—and actually use—geometry from anywhere. Because it can use both parametric and explicit geometry and still build flexible and truly useful models, NX 7 really is the best of both worlds. ■

***Mike Hudspeth**, IDSA, is an industrial designer, illustrator, and author who has been using a wide range of CAD and design products for more than 20 years. He is DE's expert in ID, design, rapid prototyping, and surfacing and solid modeling. Send him an e-mail about this article to DE-Editors@deskeng.com.*

FOR MORE INFO:

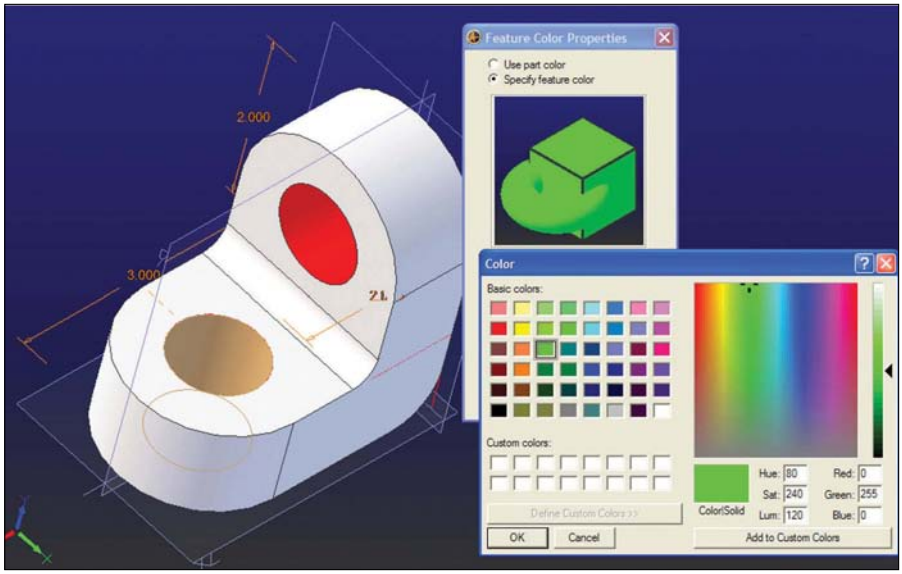
> Siemens PLM Software

Affordable MCAD: Alibre Design V12

> As with earlier releases, the new version comes in three different flavors, all loaded with new features.

BY KENNETH WONG

After grabbing headlines going from a regular price of $999 to $99 in August, Alibre Inc. most recently released Alibre V12. As with earlier releases, the new version comes in three different flavors: Alibre Design Standard, Alibre Design Professional (reviewed here), and Alibre Design Expert. The Professional edition offers more than the bare essentials of the Standard Edition, but without the data management, motion analysis, and integrated CAM functions found in the Expert edition.

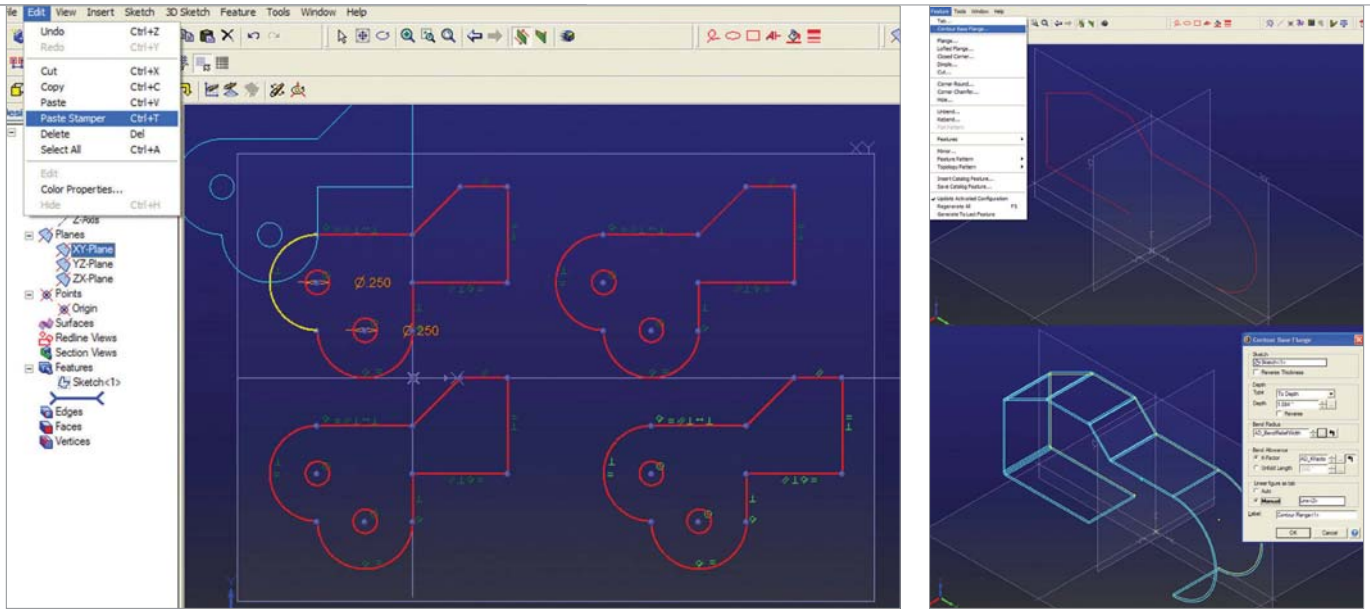


Alibre V12 lets you apply separate colors to individual features, allowing you to differentiate identical features to avoid confusion.

2D Sketch Mode

In 2D sketch mode, V12 introduces Real-Time Dimensioning. With this function turned on (by going to Sketch > Real-Time Dimensioning), you can enter the length, angle, ratio, and other values of your lines and arcs while sketching. The software automatically completes the sketch with the numeric values you entered. This approach, which is different from sketching a rough profile first and modifying its dimensions later, gives you a way to develop your sketch with precision from the start, as you might in 2D drafting packages like AutoCAD LT or DoubleCAD XT.

Normally, when you copy and paste a sketch in Alibre, the duplicate copy is placed slightly off center to the original. But with the new Paste Stamper function (Edit > Paste Stamper), you can place the duplicate items precisely where you'd



Above left: The Paste Stamper function lets you drop identical copies of a sketch at precise locations. Above right: Using the Contour Flange command, you can turn your 2D line drawings into sheet-metal parts.

like. If you need to position a series of identical sketches on a surface in a certain alignment, this tool makes the task easier. The tool is available only in the 2D sketch mode (Sketch > Activate 2D Sketch).

Color-Coded Features and Embossed Text

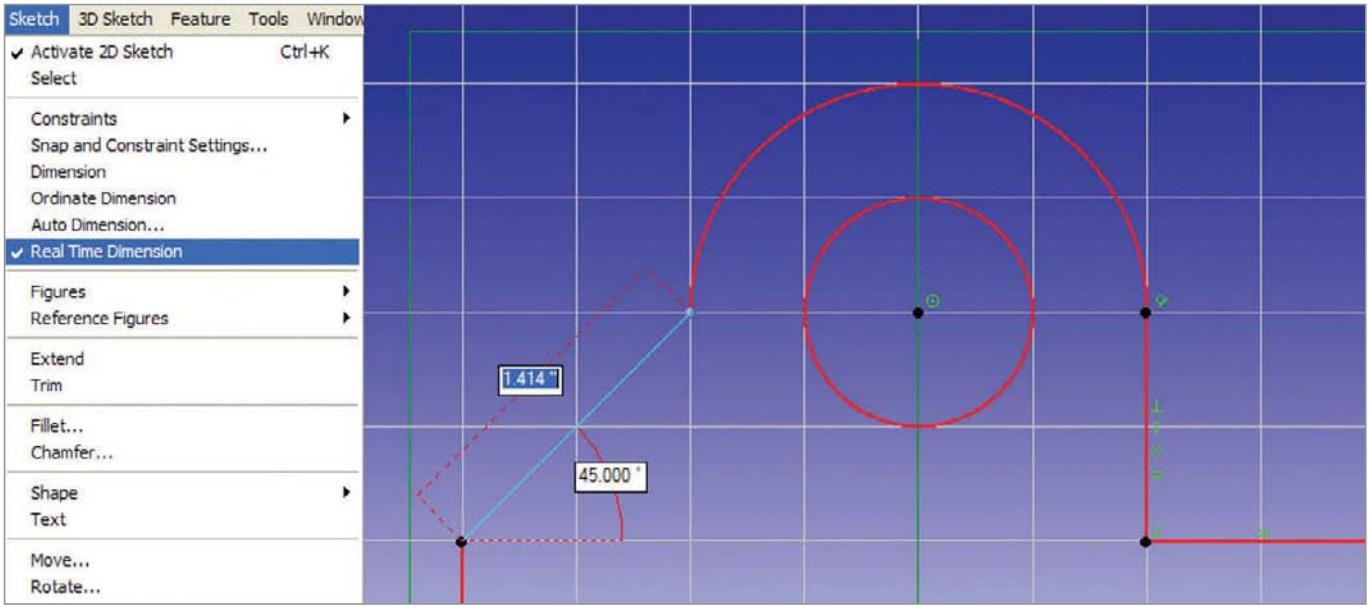
If your part happens to contain various identical features (say, a pair of holes), but each serves a different purpose (one for fitting a shaft, another for fitting a boss), Alibre V12 gives you a way to color-code these features. To access the dialog box, you can right-click on the feature, then select Feature Color > Specify Feature Color to activate the color palette. Since you can also color-code a part in a shade of your choice, you may use this color-coded feature to ensure your parts get mated to the right features and surfaces in the assembly mode.

In V12, you have the option to project a string of text onto a surface (doesn't work on curved surfaces), then extrude it to create an embossed look. You can access the dialog box by selecting a surface, then choosing Sketch > Activate 2D Sketch > Text. The dialog box gives you a way to shrink or enlarge the text string and position it on the chosen surface in preview.

Lines and Profiles to Sheet Metals

In Sheet Metal mode (not available in Alibre Design Standard), V12 gives you the option to convert a 2D line or profile into a flange. After developing your sketch, you can select it, then go to Feature > Contour Base Flange to activate the dialog box. This gives you the ability to specify your flange's thickness, bend radius, then automatically generate a sheet metal part corresponding to your sketch's profile.

Using the Lofted Flange function (Feature > Lofted Flange), you can create sheet metal parts by selecting two profiles (for example, a rectangle for bottom, a circle for top), then specify the dimensions of the profiles, alignment of the two profiles,



This is an illustration of the real-time dimension function in Alibre V12. It is shown here with an enlarged view of the menu (left panel).

thickness, and automatically generate the lofted flange. The input dialog box provides the user with a controlled way to create the flange, but it also works to prevent you from freely exploring the lofting options that are available by positioning the bottom and top profiles at various points in 3D space.

Direct Edit

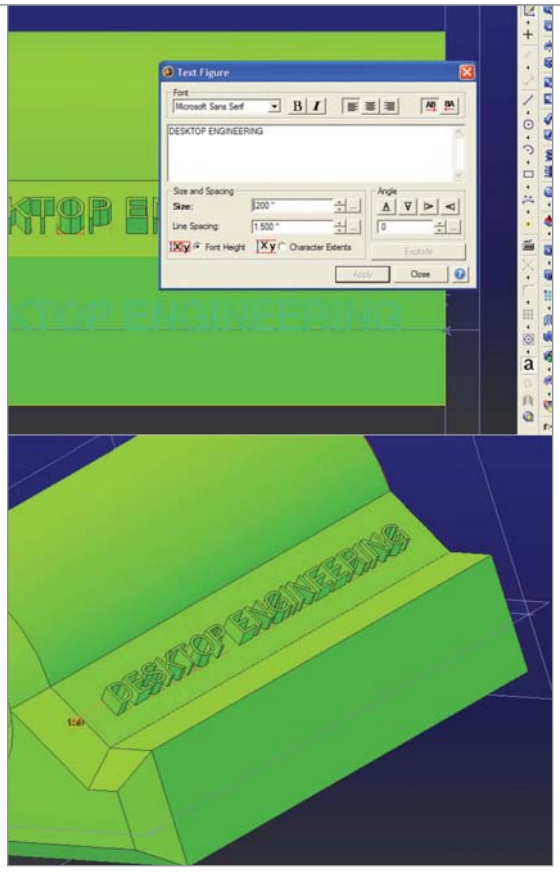
Alibre Design Professional comes with a series of direct-editing functions. (Note: some may argue they're not direct manipulations of geometry but merely parametric transformations that mimic the history-free modeling methods. Nevertheless, they work in a similar fashion: You can reshape your model by pushing and pulling on certain faces and edges.)

Alibre is, and has always remained, a parametric modeling program at its core, so the direct-editing tools to be found in it are somewhat limited. You'll find them under Feature > Direct Edit. As with other direct editing programs such as SpaceClaim or Solid Edge with Synchronous Technology, you'll be able to select a face, an edge, or a circle radius and simply push or pull it to reshape your model. The operations work efficiently on planar surfaces, but tend to run into problems when you deal with surfaces involving, say, rounded edges or blends.

Analysis and Rendering

Alibre Design Professional comes with ALGOR DesignCheck, a first-pass stress analysis application, and HyperShot, a rendering application from Bunkspeed. ALGOR offers ALGOR DesignCheck as a free download, so even if you're not running Alibre Design Professional, you can install ALGOR as a standalone program and use it in conjunction with Alibre Design Standard, or any other CAD programs supported by ALGOR.

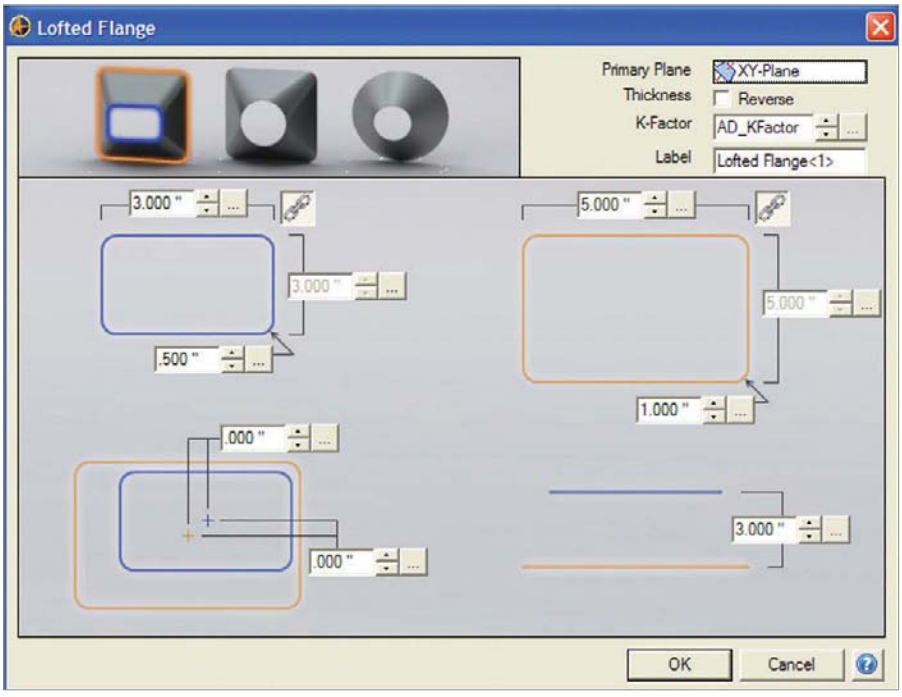
Both Alibre Standard and Professional come



Also new in V12, you can create extruded text string using the Text dialog box.

with basic import options (DXF, DWG, IGES, SAT, STEP, SolidWorks) and export options (DXF, DWG, IGES, STEP, SAT, STL). But to make it fully interoperable with other popular formats, you might need Alibre Translate, an add-on that gives you additional import (Autodesk Inventor, Pro/E, CATIA, Parasolid, Solid Edge) and export (SolidWorks, Parasolid) options.

Often in 3D mode, and especially in 2D sketch mode, selected edges and lines are difficult to discern in the default color scheme, because the bright-blue highlight blends into the light-blue gradient backdrop. To address this, you can go to Tools > Options > Color Scheme, then pick an entirely different color scheme or change



This screenshot illustrates Alibre V12's dialog box for generating lofted flanges.

the background color.

In V12, you can control how many virtual lights you want in your modeling environment. You can adjust it by going to Tools > Options > General tab > Number of Lights. The purpose of this option is to let you improve the visibility of your modeling field, thus making it easier to select certain edges. But sometimes a brighter look makes it harder to discern the highlighted edges. You may find that changing the selection highlight and backdrop color scheme (for example, a dark-blue backdrop, offset by yellow highlights) is more helpful than increasing the number of lights.

You could deploy Alibre as a primary CAD program if you choose to, but the low cost also makes it a good supplementary CAD seat to refine, edit, and modify files supplied by others, created in another CAD program.

Regularly priced at $1,499, Alibre Design Professional is one of the most affordable and comprehensive bundles of 2D, 3D, analysis, rendering, and sheet-metal tools. If you're familiar with parametric CAD, you should be able to master Alibre with minimal effort, because its menus and commands operate similar to the ones in standard CAD packages. You could deploy Alibre as a primary CAD program if you choose to, but the low cost also makes it a good supplementary CAD seat to refine, edit, and modify files supplied by others, created in another CAD program. ■

Kenneth Wong *writes about technology, its innovative use, and its implications. One of DE's MCAD/PLM experts, he has written for numerous technology magazines and authors DE's Virtual Desktop blog at deskeng.com/virtual_desktop/. You can follow him on Twitter at KennethWongCAD, or send e-mail to DE-Editors@deskeng.com.*

FOR MORE INFO:

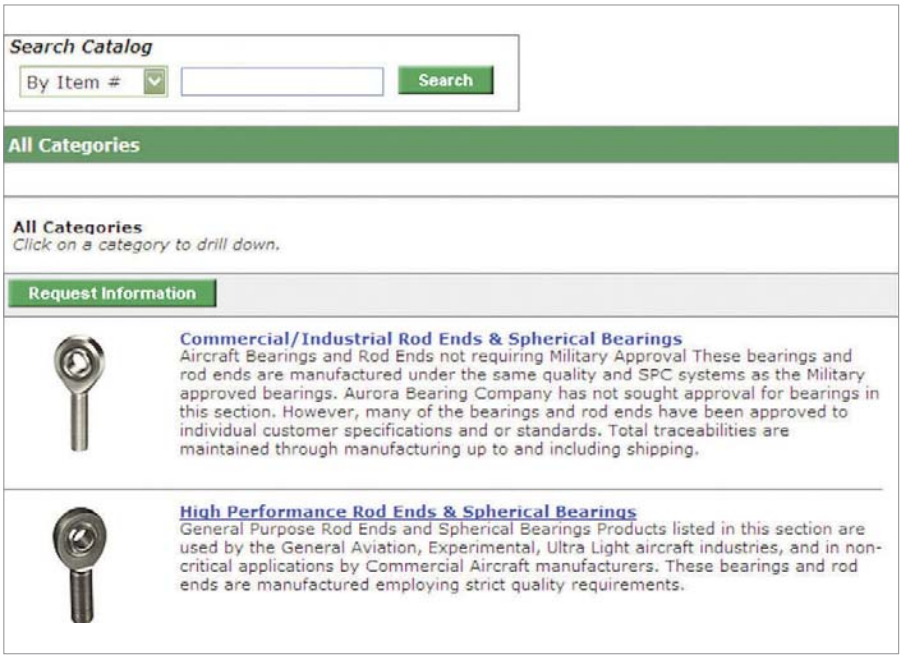
> Alibre

ThomasNet CAD Online Offers ROI for Everyone

> This online solution eases the engineer's job by researching needs and finding useful industrial products and services in a vast marketplace.

BY PETER MOONEY

Manufacturers and engineers are responding to today's "need it now" marketplace by turning to online CAD publishing technology that improves design productivity and precision, reduces costs, and speeds time to market. In fact, this technology is migrating traditional conversations, e-mails, and faxes between design engineers and suppliers to the Internet—streamlining communications and eliminating errors inherent in multi-step processes along the way.

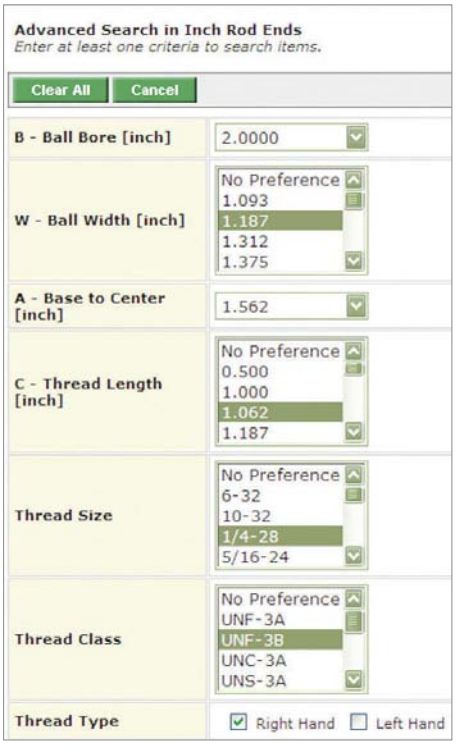


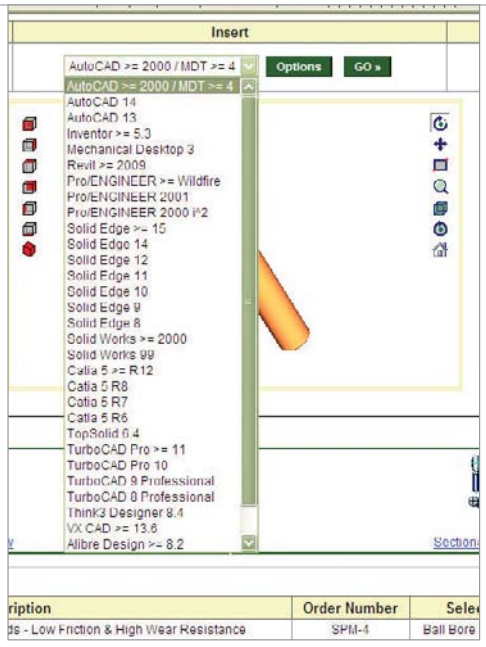
ThomasNet WebCAD features a CAD viewer to make it simple for engineers to find the parts they need. This shows a sample search result for industrial rod ends on a supplier's website.

Consider this more traditional method of communicating: A design engineer talks with a supplier about his need for a particular part; perhaps a bearing. He tells the supplier what the bearing will be used for and describes the exact dimensions that he requires. The supplier will then provide a drawing by fax or e-mail, and 30 minutes or more of conversations will follow as both sides ensure that their precise needs are met. Along the way, errors may be introduced due to a poor fax transmission that no one catches.

Newer technological capabilities enable engineers to search a supplier's site for the part they need, use parametric searches to narrow down their options, and "build" that part by downloading a 2D or 3D drawing, inserting it into their design, and immediately assessing its fit. The direct insert also reduces risks of "$100,000 mistakes," which can easily occur

ThomasNet's WebCAD offers Parametric Search functionality that allows engineers to search by their specifications.





ThomasNet's WebCAD is compatible with all the CAD Systems used by design engineers.

when one wrong spec gets picked up by an individual engineer, who copies it into several colleagues' systems. These can lead to errors in the field later on.

ThomasNet, which researches the needs of engineers seeking industrial products and services online, has developed its own CAD solution to make the collaboration between engineers and their suppliers more efficient. Suppliers working with ThomasNet to improve their websites have access to this WebCAD technology, which is part of the ThomasNet Navigator Platform. WebCAD features a CAD viewer, plus the ability to configure drawings to create customized parts—literally millions of design variations are possible.

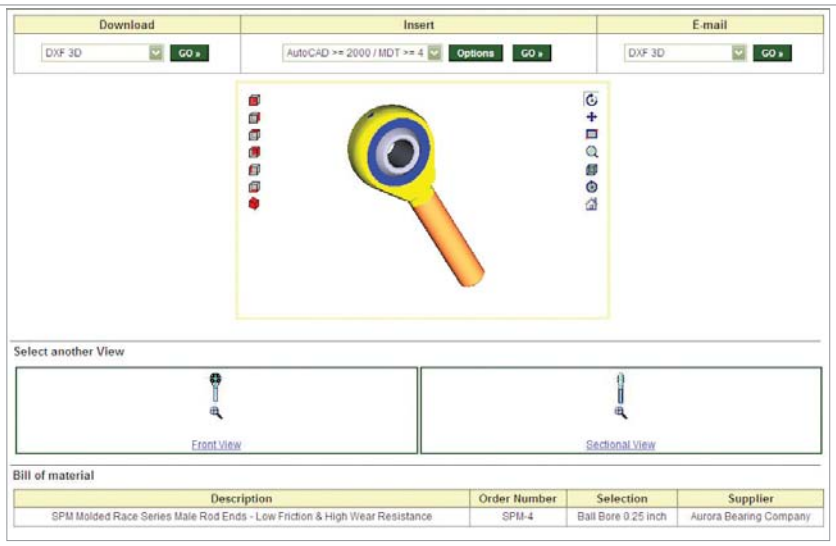
Engineers can use the technology in just a few steps. For example, if your design calls for a 3/8 in. rod end, you can quickly source and find the exact part you require. It's a simple 1-2-3 process to find and specify parts.

You can search manufacturers for the parts you need. Companies that offer CAD drawings via the Internet are all searchable on ThomasNet.com, which features more than 607,000 suppliers of industrial and business products—including their online catalogs, CAD drawings, and other content for decision-making purposes. The site is free for engineers, purchasing professionals, and all other users.

Once you have identified relevant suppliers that offer CAD drawings, you can conduct a parametric search on ThomasNet to narrow down results by your detailed specifications.

Then you can compare parts side by side, and download the closest matches. You can also search the sites of those suppliers of interest for related information (pricing, related products, certifications, etc.) to help with decisions.

The WebCAD solution is compatible with all CAD systems, including SolidWorks, AutoCAD, Inventor, and many others. Once you specify a part, you select the CAD system you're working in and hit a Go button to automatically download and insert the desired part directly into your design. Engineers can choose a variety of views—front or back, top or bottom, or right or left side. (For an



ThomasNet's WebCAD dynamically generates 3D CAD models based on engineers' specifications and allows engineers to download and insert the model directly into their designs. The download includes the bill of materials for purchasing.

online demonstration, go to: http://websolutions.thomasnet.com/caddemostration/index.html.)

Another very helpful feature of ThomasNet's WebCAD technology is that it generates and delivers the bill of materials for the part inserted, including the manufacturer's name, the specific part number, and all of the detailed specifications for that part. This makes it easy for everyone involved in the buying process and virtually eliminates the possibility for error during specifying and purchasing.

Engineers are increasingly depending on these online CAD capabilities for their jobs. And, ThomasNet research indicates that up to 80 percent of the time a buyer or engineer downloads and specs a CAD drawing into a design, that part is purchased.

Specialty Manufacturing Corporation, a manufacturer of a variety of standard, custom, and specialized products from valves to dental components, is a case in point. The company classifies the buying of their company's products as being an "engineering-driven process." Specialty Manufacturing offers online CAD capabilities to help its engineering customers.

"In our . . . custom valve model, what we have found is the key . . . decision-makers are engineers," says Dan McKeown, president of Specialty Manufacturing. "Most of our products come from engineers going to our website. They have a unique application and they're looking to solve that problem. We're trying to provide them the opportunity to find that solution online. . . . Our products can be customized to uniquely fit within their application. And, through ThomasNet, not only can they find the valve and configure it online, but they can actually build a complete CAD file that they can insert right into their drawing. . . . It's really an engineering-driven process versus a buying process."

Online CAD solutions have transformed the industrial buying process and offer a precise way to easily do business today. For design engineers working with suppliers, online CAD solutions are all about exchanging information and tools needed to specify and buy. Online CAD solutions save time, encourage productivity and generate greater ROI (return on investment) for everyone. ■

Peter Mooney *is product manager of CAD Solutions at ThomasNet (thomasnet.com), an online destination connecting industrial buyers and sellers worldwide. To comment on this article, please send e-mail to DE-Editors@deskeng.com.*

FOR MORE INFO:

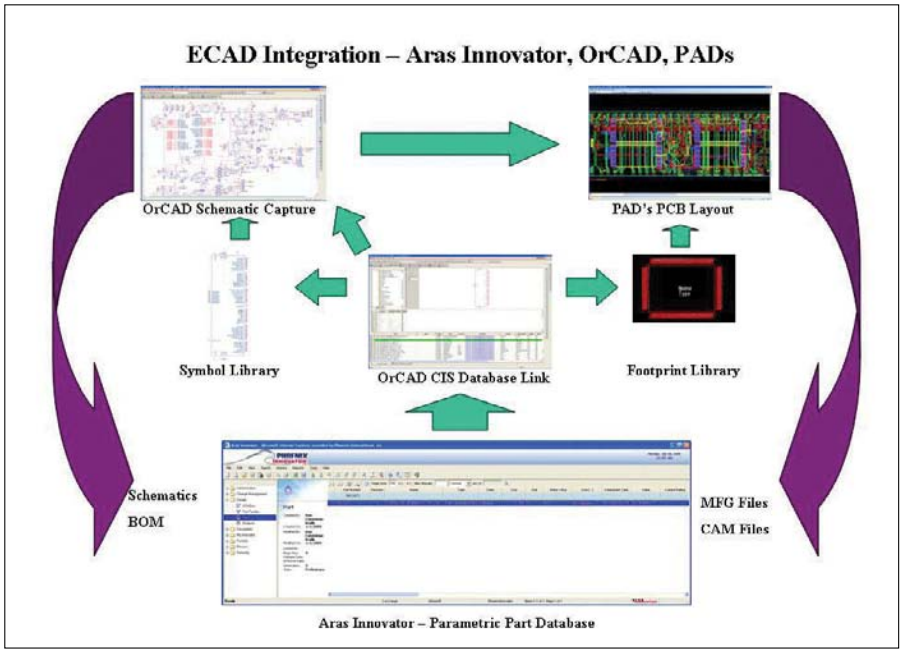
> ThomasNet

Aras Innovator: PLM on a Shoestring

> PART 2: Phoenix International's implementation of Innovator, done homebrew style, was the hard part.

BY BRENT EVERS

This is the second in a series of three articles on Phoenix International's internal implementation of Aras Innovator. This segment discusses the realities of that process—where the effort was in understanding the system and the moves Phoenix made in making the product more useful to our engineering group and business.

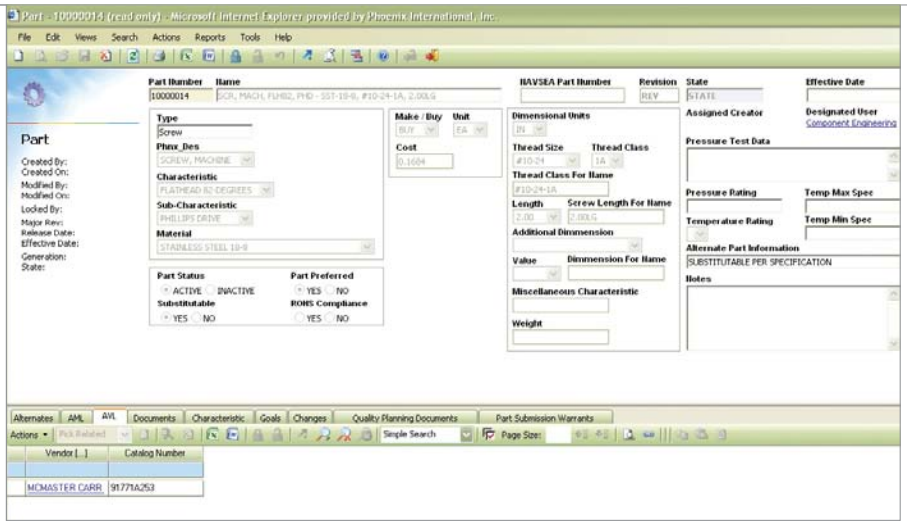


Phoenix's Aras Innovator ECAD integration provides a tight coupling of Innovator parametric part data, OrCAD Capture, Orcad Component Information System, and PAD's PCB Layout.

The evaluation and selection process that led Phoenix to choose Aras Innovator was somewhat challenging, but we found that its implementation was where the real work was.

While working with the test installation, we were learning but weren't making any progress on actually putting the system to use. It took a few dedicated engineers (with a little more time on their hands than we would have liked) to get the ball rolling. At the end of 2008, we finished a few projects and elected to put some of those engineers onto the development of our Aras implementation. Fortunately, each of them was sufficiently frustrated with our existing (lack of) systems so they had a vested interest in making Innovator sing.

The ability of Innovator to work seamlessly with our existing CAD platforms was a primary requirement. We knew that success in implementation would only come if our engineers had buy-in, which



Phoenix developed parametric part data for each part type, providing a rich, searchable database and a single source of all engineering data.

meant their workflow couldn't be impeded with a burdensome process. Innovator had to add value for the people it would most affect day to day, and it had to be easy to use. Significant manual manipulation of files to move data was unacceptable.

Integrating OrCAD and PADs

Our first serious thrust was in integrating our OrCAD/PADs toolchain with Aras Innovator. Phoenix had recently completed generating an electrical parts database that assembled all of the parts used in our existing designs in one place. We extended the depth and breadth of that database by adding a rich set of parametric data—more than 40 fields of characteristics—that improved each engineer's toolset in selecting the correct part for an application from the pool. Symbol and footprint libraries were standardized and centralized, eliminating the need to manage multiple libraries. This ensured that each of our electrical engineers designed using one correlated set of data from the initial schematic to the board layout and from the fabrication package to documentation.

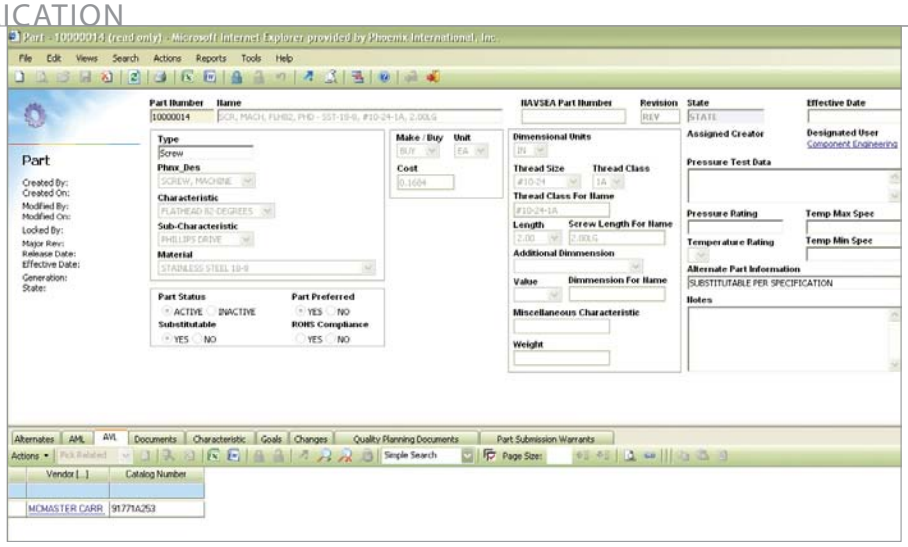
Our company's 'homebrew' OrCAD integration is tightly coupled to Aras Innovator. Parts are uploaded directly to Innovator and appear near instantaneously in OrCAD Capture Component Information System (CIS). Each electronic part's characteristic is entered by the user via a drop-down menu of predefined variables, precluding variation and ensuring that parts are entered accurately. Part descriptions are generated from characteristics, ensuring consistency and avoiding duplication. OrCAD CIS pulls the parametric data directly out of Innovator and drops it in the schematic, matching it with the correct schematic symbol and the PCB footprint information embedded for PADs. Phoenix chose to do a complete Innovator-OrCAD integration ourselves since we had the skills; others might opt to review the available third-party Innovator-OrCAD integrations.

Solidworks: Off the Shelf Solutions

Buoyed by the success of having all of our electronic part data in Aras Innovator, we continued with mechanical part data and our own drawings and assemblies. Several third-party providers have developed CAD connectors for Solidworks, and along with the possibility of brewing our own solution, we wanted to review all our options. Once we determined the capabilities we wanted, we evaluated a number of packages.

The Solidworks/Innovator connector from xPLM of Dresden, Germany, showed us that for about

the cost of two seats of a popular integration solution we could have a solution with all the functionality we required tailored to the Innovator framework, for 15 Solidworks seats. Phoenix intends to implement this MCAD connector in the near future.



Phoenix developed parametric part data for each part type, providing a rich, searchable database and a single source of all engineering data.

Database Development to Add Value

While Innovator can be implemented right out of the box, we found that customizing our installation with a rich database of consistent, parametric part data added significant value. Part of our implementation process included reviewing and cleaning up almost all of our part and document data. Without having solid business processes in place from the beginning, each engineer had developed his or her own way of naming parts, saving part data, etc. We had cleaned up a lot of that data and wanted to ensure that Innovator provided the structure to help engineers enter data in the future and prevent a return to our previous way of doing things.

The formalization of those processes is executed in the way we developed our Aras Innovator database. Through the use of forms for data entry, Innovator users are guided through the entry of a document, part, assembly, BOM, etc. so that the data gets entered the same way each time. Sure, we have some legacy parts that don't conform and aren't worth changing, but by and large, going forward we will generate clean, consistent parametric data for every item entered in Innovator. This greatly aids in the future selection of parts, as a user will be more or less guided to use the same parts we have been using, precluding the constant divergence of material and part sources.

Digging through the Basement

In the past, we at Phoenix have committed some serious PLM sins, like issuing blocks of part numbers to a project but not closing the loop on the unused numbers status. We've stored most of our project data through a series of folders on a network drive that are essentially managed by the project manager, and each has done so in a different way. The depth of documentation and documentation control applied to a project has varied according to the whims of the project manager, the needs of the customer, and whether it was correctly budgeted for (more often not). The previous systems were put in place to be cost effective and allow each project some flexibility, but we often ended up paying multiple times to stand up multiple systems. We've made stabs at

engineering change processes, but have never been successful at getting it right and making it stick.

No software application can correct all this, but having the tools in place and a proven framework to follow sure helps. Aras Innovator has provided that framework and we are much further down the path to a defined and accountable development and documentation process than previously.

The process of evaluating our data and our processes in preparation for upload to Aras Innovator and the need to understand its processes and how they meet or don't meet our needs has been a challenge. It's taken some time, but it's helped us learn what we need and what we needed to change in Innovator. At this time we've nearly completed that process.

In the final installment, I'll discuss some of the ramifications of going live, lessons learned, and where we'd like to see Aras Innovator's development go in the future. ■

Brent Evers *is the engineering manager at Phoenix International Holdings, Inc. Send comments about this article to DE-Editors@deskeng.com.*

FOR MORE INFO:

> Aras Corporation
> Phoenix International Holdings
> xPLM Solution GmbH

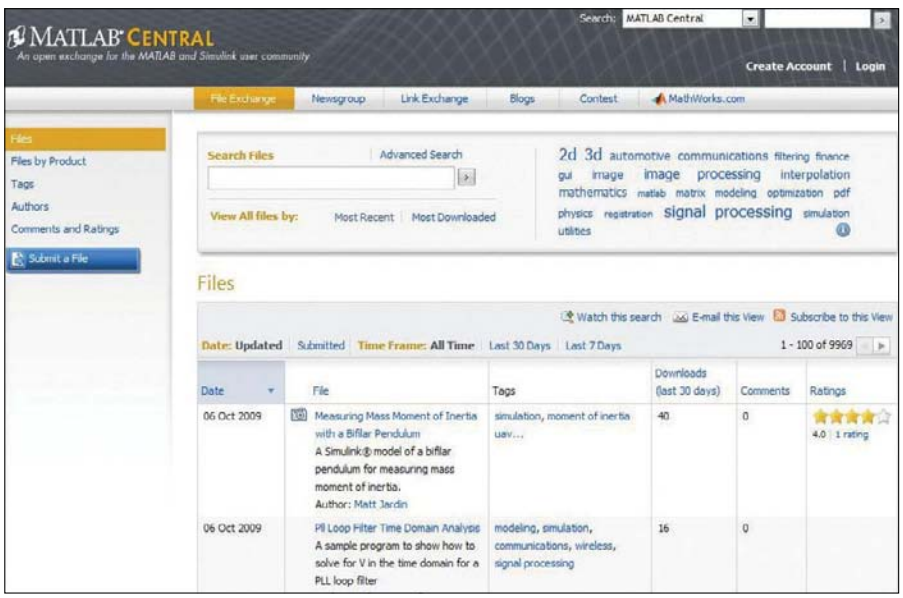
MATLAB Central Has Answers to Share

> The social product development capabilities of user communities brings like-minded designers and engineers together to share ideas.

BY NED GULLEY

Last month I installed some educational software for my son on the home PC. I had to reboot the machine to complete the installation, but when I did, the machine wouldn't boot.

The fix was easy. Rather than get on the phone to technical support or sift through pages of an official support site, I did a quick search on the error message and found a page written by someone like me who had run into this problem before. It wasn't long before I was up and running again.



This is the MATLAB Central landing page where users have been helping each other find answers.

When it comes to fast, effective solutions to my real-world problems, the person I turn to is you. My online peers. People who have been in the same situation have, by far, the best track record at solving difficulties.

The world has changed. The Web is social, and even engineers are often finding that their most valuable problem-solving resource is a community of like-minded peers. This is certainly true of the MATLAB Central community. I was surprised a few years ago when I heard people say that MATLAB Central was the first place they went when they ran into a problem. I'm not surprised anymore. Now we hear from customers who are returning to the site several times a week, or even several times a day.

MATLAB Central is a website that serves the com-

munity of people who use MATLAB, Simulink, and other MathWorks products. It is the fastest-growing and nearly busiest part of the overall MathWorks website. It consists of four major sections: the File Exchange, where people upload and download code; a discussion forum called the Newsgroup; a place to share bookmarks and Web links called the Link Exchange; and a collection of blogs written by MathWorks employees.

Those of us on the MATLAB Central development team know that we're serving a community that already exists; the site is not the community. When we launched the site back in 2001, MATLAB had already been available as a commercial product for 17 years. A dedicated community of users was already in place when we started. The main thing the MATLAB Central development team needed to do was respect what was already working. The File Exchange started as an FTP site where people traded files. It now hosts more than 9,700 files, with half a dozen new ones coming in every day. The discussion area grew from the NNTP newsgroup comp.soft-sys.matlab and is now a dedicated web portal for that newsgroup and has about 2,400 posts per month.

Removing Barriers to Access & Use

If your site already brings together like-minded peers, then you, as the creator, mostly need to stay out of the way.

Earlier this year we got an e-mail from a large engineering company in Europe. Using the File Exchange, engineers there had downloaded Professor Joe Sommer's popular and well-reviewed POLYGEOM program for calculating centroids and moments of inertia. They liked it so much that they wanted to incorporate it into their own code and distribute it. Sommer agreed to apply the BSD open source license to his code in File Exchange, and engineers worldwide now have unlimited access to it.

In another move to improve access to community-generated code, The MathWorks built a gateway to the File Exchange from within MATLAB. In the latest version, you can search for and install community-sourced content without leaving the product—no browser required.

A Better Customer-Vendor Relationship

Communities are also changing the relationship between vendor and customer. Stuart McGarrity, a product marketing manager for MATLAB, often works with calibration engineers in the automotive space. A few years ago it became apparent that calibration engineers were frustrated that they couldn't import some special data files (ETAS INCA files) into MATLAB. Rather than wait to add an INCA files importer into a general release, Stuart worked nights and weekends to create the MDF Import Tool. As soon as it was complete, he uploaded it directly to the File Exchange so that it could be used not only by the engineers he was in direct contact with, but by anybody in the world, all at no cost.

"I enjoy making things," says McGarrity, "and this was an opportunity to work closely with the people who needed the tool." He also notes that the File Exchange is "changing the relationship between the customer and the supplier. The resulting relationship is less formal. It's such a great way to connect with customers."

MATLAB Central acted as a low-hassle distribution channel, one in which McGarrity was effectively a peer with his customers. They understood the need, and he understood the product, but however it came about, the end result was a free and effective solution to a real and vexing problem.

The Power of Community

Communities emerge because people want to learn the lessons only peers can teach. They thrive because it's great fun to participate, contribute, and stay in touch. Whether it's finding cool MATLAB code, reading book reviews at Amazon, or rescuing my PC from a bad installer, I'm relying more and more on communities that put me in touch with people like me. I know from experience that I get better results when that's the case. You, my peers, have helped me in the past, and you'll help me again in the future. Which reminds me: Thanks! ■

Ned Gulley *is part of the MATLAB development team at The MathWorks. Send comments about this article to DE-Editors@deskeng.com.*

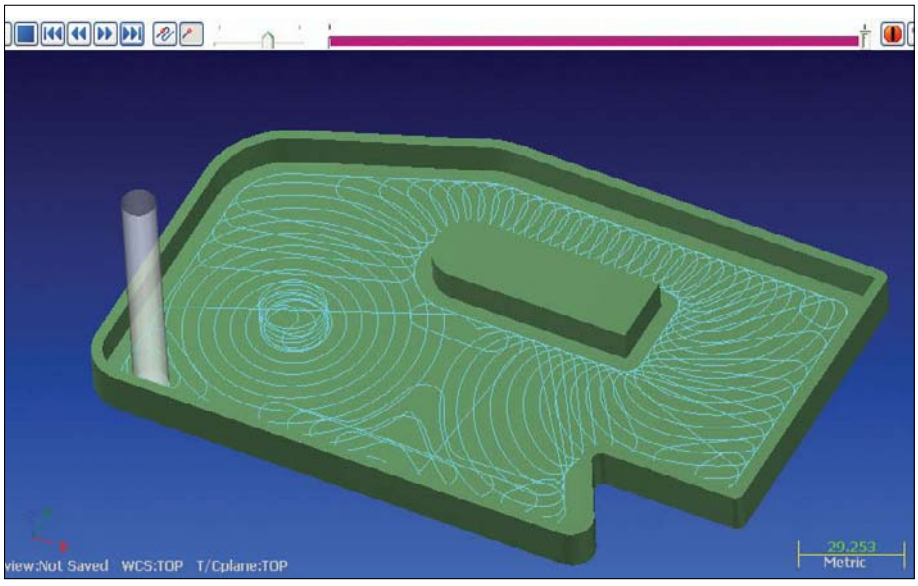
FOR MORE INFO:

> The MathWorks

Mastercam Algorithms: Power Under the Hood

> When shopping for a CAM program, it's important to look beyond the toolpath options, GUIs, and libraries to make sure the algorithms can take you the distance.

BY WILLIAM BENTRUP



Mastercam's new Dynamic Mill algorithm (available in Mastercam X4) gives users the ability to use the entire flute length of the cutting tool while maintaining more consistent cutting conditions.

The last time I visited an automobile showroom, I was struck by the fact that the salespeople aren't interested in showing you what's under the hood anymore. Have you noticed?

It seems that what's under the hood is a side issue that might divert you from buying a car. After all, you might be simply looking for safe, cost-effective transportation or a dsplay of your good taste and economic status. So the salesman gets right to the ownership experience.

Like automobiles, CAM (computer-aided manufacturing) software will get you from point A to point B in your manufacturing process with varying degrees of smoothness, precision, speed, and safety (for your equipment and product), depending on the model you happen to drive. If I wanted to sell you a CAM system today, I might list all of the features—libraries, toolpath options, graphic user interfaces, etc.—that will contribute to your CAM user experience, but not get into what's under the hood.

But rather than sell you a CAM system, I'd like to point out something elemental about CAM software, so you'll be able to look under the hood yourself. What you'll find is quite relevant to whether the product will meet your needs today, and for years to come; it's the algorithms.

Before (left) and after (right) toolpath refinement. The 3D toolpath refinement algorithm used in Mastercam X4 allows unsurpassed control on surface toolpaths, resulting in optimized cycle times and better finishes.

Recipes for CNC Success

There's a vast sea of numbers in there—math functions that seem to stretch on for eternity—that are organized into groups that serve as recipes to tell the CAM system how it is to go about performing all its various functions. A modern CAM system has hundreds of algorithms—large and small.

Algorithms govern every phase of CAM from the clean importation of any number of CAD models for programming to the ultimate postprocessing of CNC programs for efficient manufacturing on specific equipment. Of course, the algorithms of most interest to machinists and manufacturing engineers are the ones that govern CNC toolpaths. The care with which these algorithms are created has a direct bearing on the ability to meet tolerances and machining-throughput goals, answering the all-important questions: Can I do the job? and If so, will it be profitable?

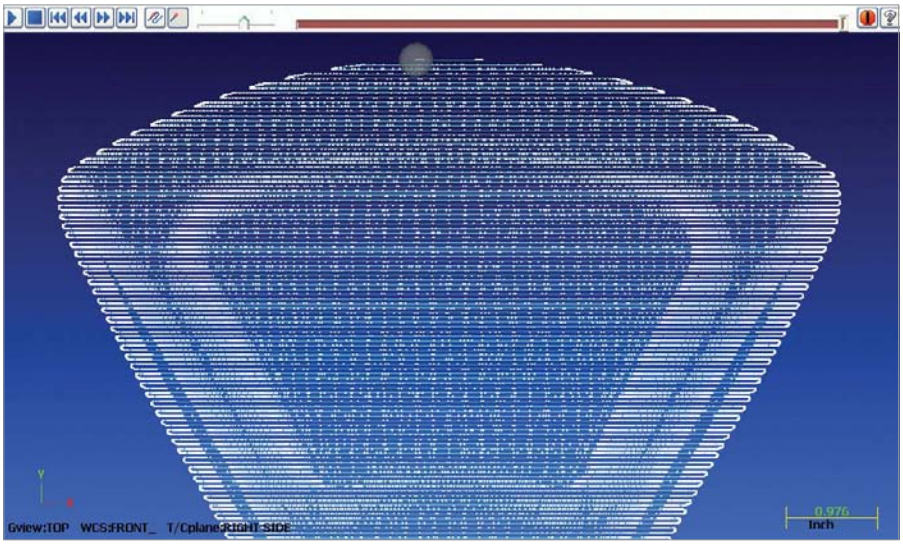
Some toolpath algorithms are quite simple—a 2D zigzag pocket might only take into consideration the pocket shape, the cutter shape, and a fixed stepover parameter. The algorithm might be short, involving only a few steps and a brisk calculation time. A three-axis toolpath algorithm might also be relatively simple; it might be a 2D pattern projected along the tool axis to pick up the Z motion. The Z projection step can add to the toolpath calculation time, especially if many surfaces or solid faces are involved. A three-axis toolpath algorithm might be complex if the 3D passes are truly calculated in 3D (a must to yield smaller cusps in steep areas). And five-axis toolpaths usually have all the complexity of a three-axis toolpath and require more work as both the tool tip and tool axis change from location to location. These are just the building block algorithms for a growing variety of advanced roughing and finishing toolpath functions.

A new trend in toolpath algorithm development is a push to take advantage of multiprocessor machines. One way to exploit multiple processors is to run the old single-processor algorithms in a separate thread behind the scenes. This leaves the user free to continue working while that toolpath calculates. Another way to exploit multiple processors is to modify the algorithm so that certain steps can be calculated simultaneously. The next

step in the recipe waits until all the spawned threads complete.

Increasing Complexity

As a software engineer, I spend a good part of my life developing these algorithms, stringing many of them together to perform specific machining functions and then testing them to see if they actually do what was intended. I also have to make sure these algorithms play well with a myriad of data sources as well as other algorithms with which they must interact. At CNC Software, Inc. of Tolland, CT, another 34 individuals do work similar to mine—all in support of our Mastercam CAD/CAM software line.



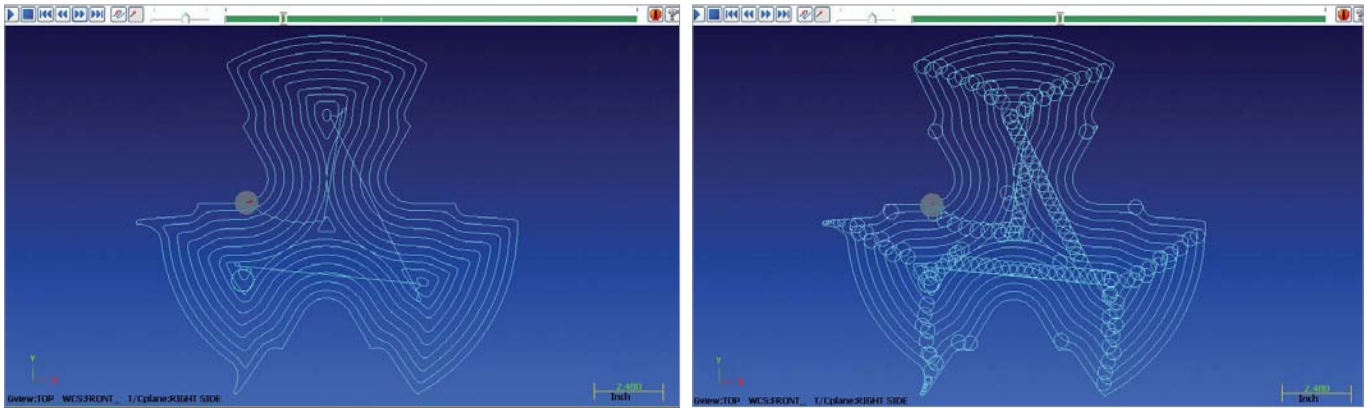
If standard toolpaths don't provide the desired finish, an Advanced Toolpath Refinement algorithm (available in Mastercam X4) analyzes the density of G-code points and redistributes them.

The algorithms we write must be flexible so that they can be used over and over again in a variety of ways. They become the building blocks for the CAM functionality of the future. Great care must be taken to get it right the first time, because of the long-term implications. As a result, creating useful algorithms can be very time consuming. For example, Mastercam's toolpath refinement algorithm for generating improved surface finish took nearly a year to develop.

Development time for toolpath algorithms can increase when more variables are added to the list of ingredients. It is quite common now for toolpath algorithms to take into consideration more than just the part and cutter shapes and a few simple control parameters. Toolpath algorithms now consider the aspects of the cutter (number of teeth, flute length, special material entry needs for toroidal cutters), and aspects of the material (for chip management, for feeds and speeds). Toolpath algorithms also allow users to specify one stepover for steep areas and another for shallow areas.

Toolpath algorithms today are beginning to manage the material load on the tool, easing its transition to full load and building cutter passes based on material, not solely part shape. Toolpath algorithms now also consider the dynamics of the machine. Small but important changes can be made to help the machine make more gradual direction changes and smoother moves overall.

The good news for me is that if I continue to do my job well, there appears to be good job security in the field of CAM software algorithm development. While my company has just released the latest version of its software, my co-workers and



These images show Mastercam's High Speed Roughing toolpaths with and without trochoidal move turned on. This algorithm produces tiny looping movements which avoid excessive engagement of the tool in confined spaces to prevent breakage and extend tool life. (Trichoidal moves are on in the photo above and off below.)

I are already writing and testing algorithms for the next release. The work we are doing today will have to dovetail with a roadmap for the product that looks out at least five years.

What It Means To You

While you might not care about my job security, you should understand the algorithms behind your manufacturing software. Here are three reasons:

1. All algorithms are not alike. Most CAM systems have functions that sound similar, but in everyday use, there can be a world of difference. For example, some algorithms are like road maps that show only the main highways, while others also facilitate travel on all of the side streets. The latter gives users the flexibility to alter or exchange toolpaths as needed to meet their unique manufacturing requirements.

2. The CAM systems of tomorrow are built on the shoulders of the CAM systems in use today. If your CAM vendor does not have a significant investment in algorithm development, the improved functionality you will need to stay competitive and profitable may not be forthcoming.

3. Compared to CAD software, which is relatively mature, CAM software is still an emerging technology. So you ain't seen nothin' yet. Perhaps you are frustrated because the special functionality you crave has yet to materialize. If it is possible and worth doing, you can bet that some CAM developer out there is probably working on it under the hood and has a plan for launching the algorithms as soon as they are dependable. Find out who he is and take a peek over his shoulder. ■

William Bentrup *is a software engineer at CNC Software, Inc. Send comments about this story to DE-Editors@deskeng.com.*

FOR MORE INFO:

> CNC Software, Inc.

Renewable Energy Options Multiply with CFD Solutions

> Designers tap fluid analysis for high performance renewable energy solutions.

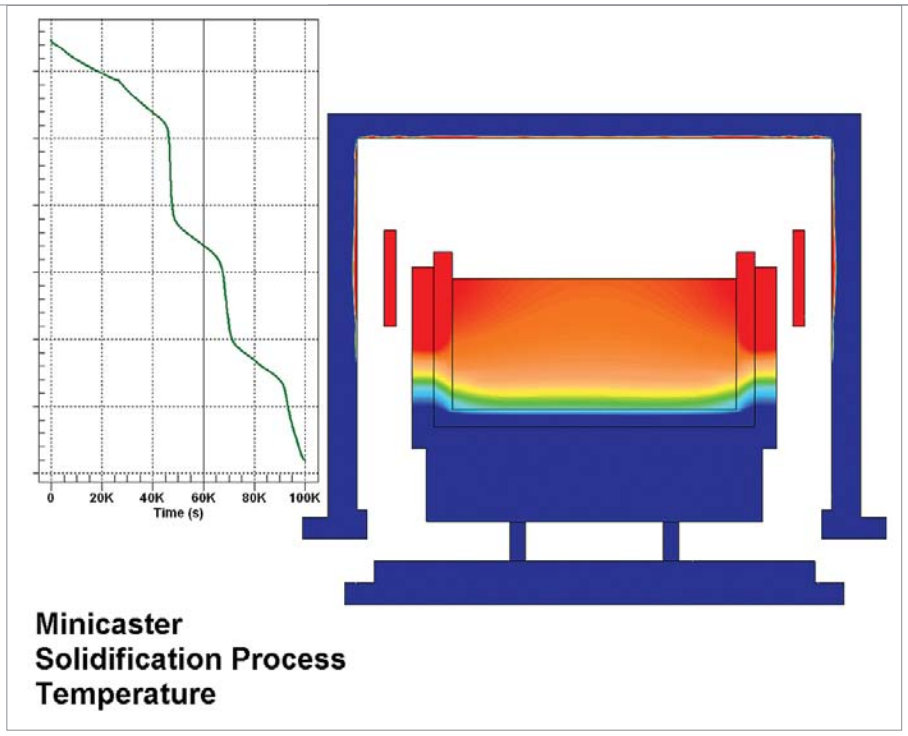
BY PAMELA J. WATERMAN

CFD analysis brings its own type of power to the renewable energy push, replicating and predicting results for systems that tap the wind, rivers, oceans, sun, and fuel cells. DE takes a look at applications in each of these realms and examines why specific software has proven invaluable for success.

Wind-streams analyzed with NX Advanced Flow CFD software from Siemens PLM. *Image courtesy Siemens PLM*

Capturing the Wind

Few landscapes are as surreal as that of a wind farm sporting thousands of white-bladed pylons for generating electricity. Companies that take on such building projects need to evaluate a myriad of operating factors, from evaluating blade shapes to determining just where to best site wind turbines. Blade design has traditionally been almost a hand-craft, with personal experience heavily weighting the chances for success, but now CFD software is improving both the designs themselves and the process to create them.



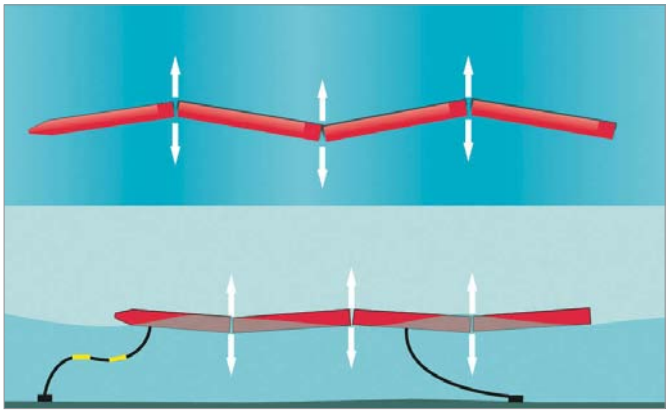
Two of Siemens PLM's general-purpose tools, NX Advanced Flow and Femap Flow, let users analyze the air flow around turbine blades and offer a direct link between fluid and structural analyses. Rotating frames of reference simplify capturing blade motion, while boundary-layer meshing techniques resolve lift and drag effects close to the blade surface.

Remi Duquette, Director at MAYA HTT Ltd., uses NX tools for the company's consulting business. He says, "With Synchronous Technology we can make quick changes in geometry and it triggers automatic CFD model changes. The new HD3D visual environment in NX also lets us easily communicate synthesized engineering results derived from the CFD and multiphysics composites structural analyses but delivered in the CAD context, which helps us efficiently guide the windmill blade design team."

The shroud around a WindCube concentrates airflow per the Bernoulli Principle, increasing its velocity and therefore power for generating electricity. CFD analyses were done using CFdesign from Blue Ridge Numerics. The small footprint makes it suitable for urban use.
Image courtesy GreenEnergy Technologies

The shroud around a WindCube concentrates airflow per the Bernoulli Principle, increasing its velocity and therefore power for generating electricity. CFD analyses were done using CFdesign from Blue Ridge Numerics. The small footprint makes it suitable for urban use.
Image courtesy GreenEnergy Technologies

The engineering services team at CD-adapco recently applied tits CFD expertise to demonstrate the validity of a revolutionary wind-turbine concept from the German company Windgiant. The compact design accelerates wind flow through a multi-bladed fan using several concentric aerodynamic shrouds and delivers energy at wind speeds as low 1.5 mps. Production units now in operation are working as predicted, generating high energy-per-unit-surface-area with low noise output—a system quite suitable for urban residential use.



The Pelamis system deploys long, jointed metal segments that rock and roll with ocean movements to transfer wave-energy to generators. The company used Abaqus software from SIMULIA to model fluid-structural interactions. A second-generation system will go online offshore from the UK in 2010. *Images courtesy SIMULIA*

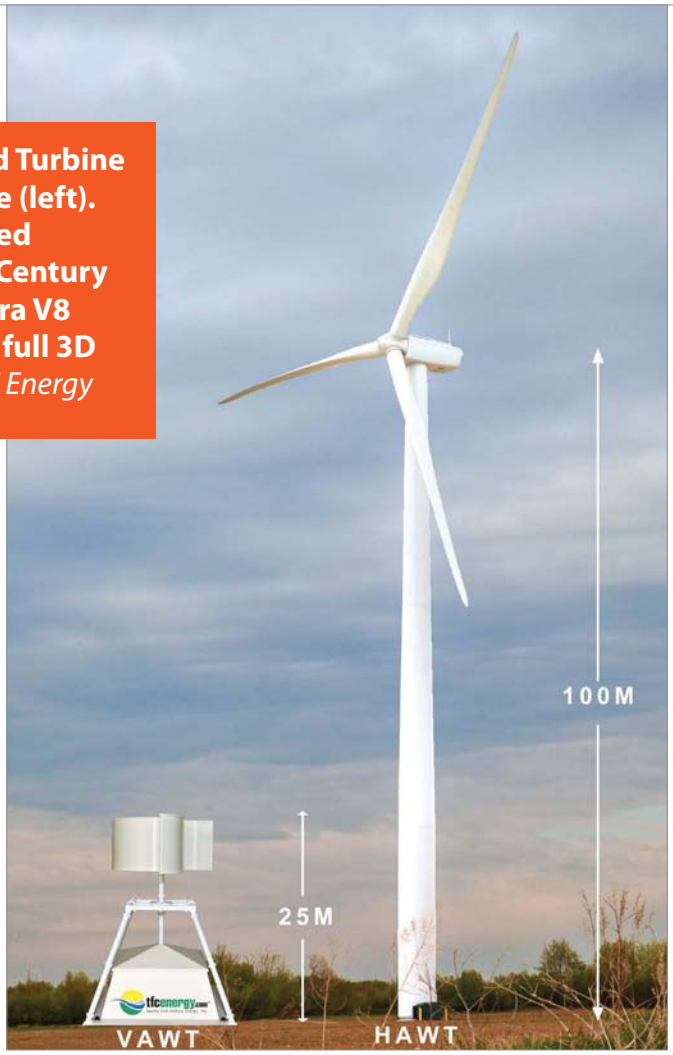
Green Energy Technologies has tapped CFdesign software from Blue Ridge Numerics for the development of its unusual WindCube turbine system. Applying Bernoulli's Principle, the WindCube uses a funnel-shaped shroud to capture and concentrate the wind, increasing the local velocity. This design produces more energy in a smaller footprint, making it suitable for urban areas.

In a third departure from classic wind turbines, designers at TFC Energy are working to capture low-speed winds (approximately 10 mph) using relatively short, curved panels mounted vertically. This contrasts to the traditional horizontally mounted blades high on pylons that work best at speeds from 18 to 20mph. Such a design works regardless of wind direction and therefore requires no expensive tracking system.

Until June of 2009, TFC Energy Chief Engineer Doug Bogart had been refining his designs based on test data gathered in the company's wind tunnel. However, Dr. George Huang, a CFD expert at nearby Wright State University, recommended using SC/Tetra from Software Cradle. He explained that the software could handle a full 3D analysis and operate on parallel processors. This latter fact has been particularly helpful as the company has added more processors to its computer systems. User friendliness of SC/Tetra has also been a key feature, letting Bogart, new to CFD analyses, quickly come up to speed expediting the development process.

Hand in hand with the need for precise blade design is the siting task. Two of the biggest challenges in identifying prospective locations for wind farms are predicting wind power density across complex terrain and identifying local flow features likely to affect system durability. Vestas, a veteran Danish wind-turbine manufacturer, developed an automated methodology for this complicated task by wrapping a specialized application around CD-adapco's STAR-CCM+ CFD code.

Having distilled the entire CFD process into essentially a push-button operation, the new STAR-CCM+ GUI allows any Vestas site engineer to produce a report detailing the suitability of a region for wind turbine deployment, including visualization of the flow field in Google Earth. Dennis Nagy, CD-adapco's vice president for the Energy Industry, notes that previous wind-park simulations either oversimplified the physics or were too time consuming for realistic use. He adds, "(This) is paradigm changing—allowing large areas of terrain to be analyzed for twelve different wind directions in less than three hours, with little or no manual input."



Size comparison of typical Horizontal Axis Wind Turbine (right) to a prototype Vertical Axis Wind Turbine (left). The latter systems, optimized for low wind-speed operation, are in development by Twenty First Century Energy (TFC Energy). The company used SC/Tetra V8 CFD software from Software Cradle to perform full 3D analyses of fluid flow fields. *Image courtesy TFC Energy*

Two other approaches to wind-park layout design have involved CHAM's PHOENICS CFD software. A third-party product from Windsim, powered by PHOENICS, helps users identify possible turbine locations with high wind speeds but low turbulence to maximize energy production. PHOENICS analyses have also been applied to determining micro-scale flow models that accommodate the flow details of such complex sites as steeply mountainous locations.

Harnessing Water In Motion

Through the ages, flowing water has powered flour mills, paddleboats, and elaborate clocks. In more recent centuries, rivers have been the workhorses behind mammoth hydroelectric facilities around the world. Flow Science is one company whose clients have used its FLOW-3D software to simulate such large-scale movements as river diversion during dam construction. For the proposed Keeyask (Canada) Generating Station, engineers at Manitoba Hydro used FLOW-3D to verify flows on two different physical scale models. They found the simulation let them easily and quickly extract velocity, water level and flow rates anywhere within the CFD model domain, thanks to its turbulent mode and implicit pressure-velocity solver. Nested mesh blocks also supported detailed analysis where needed, yielding thousands more data points than could be measured from the physical model.

Waves, tides, and ocean currents form other relentless water sources. In recent years innovators have deployed dozens of mechanisms to convert their motion into electrical energy, and again CFD (along with fluid-structure interaction (FSI) studies) has played a critical role in each one. These mechanisms involve driving a pump, a piston, or a turbine, producing either mechanical motion or fluid pressure; the resulting approaches all look very different.

Manchester Metropolitan University in the UK has used Flow Science software for numerical modeling of a wave energy conversion device

called WRASPA, a Wave-driven Resonant Arcuate-action, Surging Power Absorber (arcuate refers to a curved or bow shape). Flow Science's FLOW-3D single-fluid model was used to model the response of the hinged collector mechanism to wave pitch motion. FLOW-3D does not require extra cells at the free surface, which reduced both setup and runtime. The software's General Moving Object fixed mesh method proved to be compute efficient, particularly when used with the shared-memory parallel version of FLOW-3D.

Advancing and optimizing designs to save energy is a core goal at Concepts NREC. This pioneer in the turbomachinery community offers a suite of software called Agile Engineering Design System, including PushButton CFD. Working with Oceanlinx, Concepts NREC is analyzing a set of 300kW-equivalent turbine generators based on oscillating water-column technology. Mark Anderson, Concepts NREC VP of software, says, "Our PushButton CFD product works in concert with our geometry generator AxCent. Its strength is in its tight coupling to [this] geometry package parameterized for aerodynamic design."

A Blend of CFD, FSI & Multiphysics

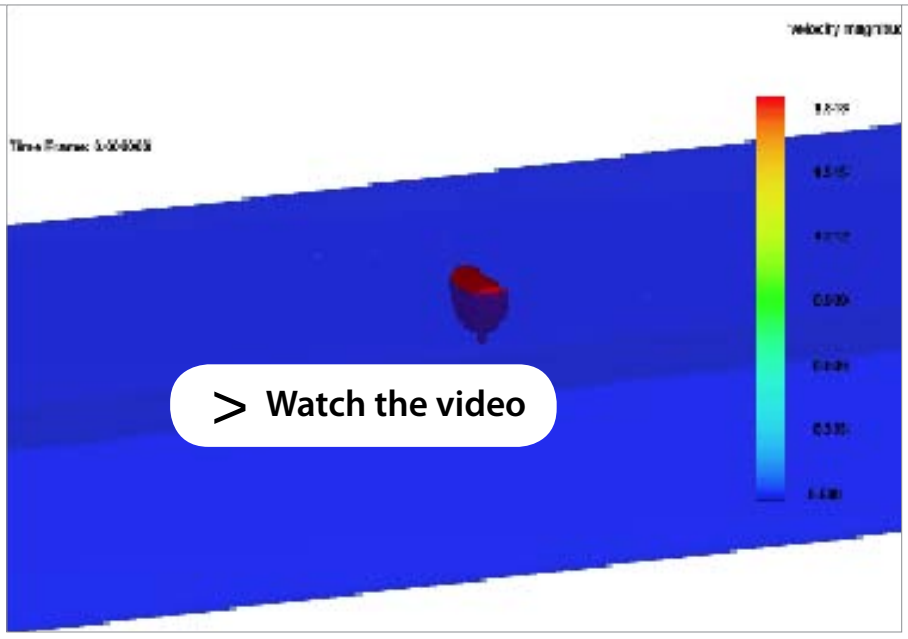
For many projects, CFD analysis plays a critical role in iterative design work involving multiphysics effects. Typical situations involve either fluid-structure interactions or fluid-thermal influences. Examples of work in the former area come from Capvidia. Its FlowVisionHPC software was used by the Portuguese consortium that built the first commercial wave-energy farm of articulated metal segments, dubbed Pelamis.

Researchers at the University of Gent also used FlowVisionHPC to investigate fluid-structure interactions in a composite material buoy-power station, identifying stresses and predicting system lifetime as components slammed into water. The Gent group used the CFD package in conjunction with Abaqus FEA software from SIMULIA.

Solar energy research, development, and commercialization includes a long history of tapping the power of CFD packages, such as those from Autodesk's Algor and COMSOL. Solar Power Industries, a manufacturer of solar cells and related products, used Algor multiphysics software to perform a coupled fluid-flow and thermal simulation to optimize filling and heating their silicon ingot minicaster system. Being able to account for the effects of natural convection was critical to success.

Researchers at the Fraunhofer Institute for Solar Energy Systems have been studying fluid dynamics in solar collectors made of heat-absorbing polymers instead of expensive metals. A full analysis must consider heat transfer due to fluid flow, heat-induced structural deformation/stress and, for some solar module structures, humidity. COMSOL software was the choice to incorporate all these tasks (see DE December 2009).

SIMULIA's Abaqus software has been used by the IDOM Group of Spain in concert with CFD analyses to quantify wind load levels on solar tracking systems. Another project assessed methods to protect offshore wind turbine towers against accidental impacts from small ships or boats using the fluid-filled equivalent of an automotive airbag to act as a "bumper." Abaqus contains a specialized surface-based fluid-cavities capability that simplifies setting up the model for this analysis. —PJW



A FLOW-3D® simulation of the WRASPA (a wave energy conversion device) in a numerical wave tank. The device was subjected to incident linear waves that varied in amplitude from 10mm to 20mm and had a frequency of 1 Hertz.
Image courtesy Flow Science

Wave-motion systems designers have also tapped other powerful CFD packages for performance analysis and optimization. Fred.Olsen Renewables has used NISA 3D FLUID from Cranes Software to study buoy-motion for its Olsen Wave Energy project. A unique project at Tidal Sails involves using CHAM's PHOENICS CFD software to analyze the forces and movements of underwater sails as energy converters, where a string of such units are anchored at each end, with one end connected to a generator.

And Green Ocean Energy has identified ANSYS hydrodynamic and structural tools as critical to its product simulation efforts. The UK-based renewable energy company is developing two devices (Ocean Treader and Wave Treader) designed to bob on the surface of the ocean while floating "arms" convert wave motion into electricity via onboard generators (see DE December 2009).

Fueling Our Cars and More

We could dedicate an entire article to fuel cell design and the role that CFD analysis plays in designing these renewable energy systems fed with hydrogen. Two design forms currently of great interest are polymer exchange membrane fuel cells (PEMFC) and solid oxide fuel cells (SOFC)—the former appropriate for vehicles and the latter for generating stations.

PEMFCs have high power density and a relatively low operating temperature (from 140 to 176 degrees F). German researchers at FZ Julich chose ANSYS general-purpose Fluent software to analyze the flow in a PEMFC autothermal mixing chamber, which supplies the proper mixture of air, steam and evaporated fuel to the catalytic reaction zone. Fluent's pressure-swirl atomizer model was well suited to modeling the process and helped identify areas with poor flow and insufficient heat exchange.

LMS International has developed a targeted LMS Imagine.Lab Fuel Cells simulation solution based on energy exchange validated by physical modeling. With this approach, users can model physical elements, test control strategies, and experiment with different materials and gases. The software handles single-cell stacks as well as entire fuel-cell systems.

In ESI Group's CFD-ACE+ software, users have the choice of a full or simplified interface depending on the depth of simulation desired. The package

can handle all the physics involved in fuel cell design, yet can be set up by analysts for designers to easily perform what-if studies.

Besides the wind applications mentioned above, CHAM's PHOENICS software has been used to model flow combined with heat- and mass-transfer (including electrochemical reactions), such as for SOFC design. CD-adapco has also had customers use its STAR-CD package to perform fully three-dimensional CFD studies on SOFC stacks. ■

*Contributing Editor **Pamela J. Waterman**, DE's simulation expert, is an electrical engineer and freelance technical writer based in Arizona. You can send her e-mail to DE-Editors@deskeng.com.*

FOR MORE INFO:

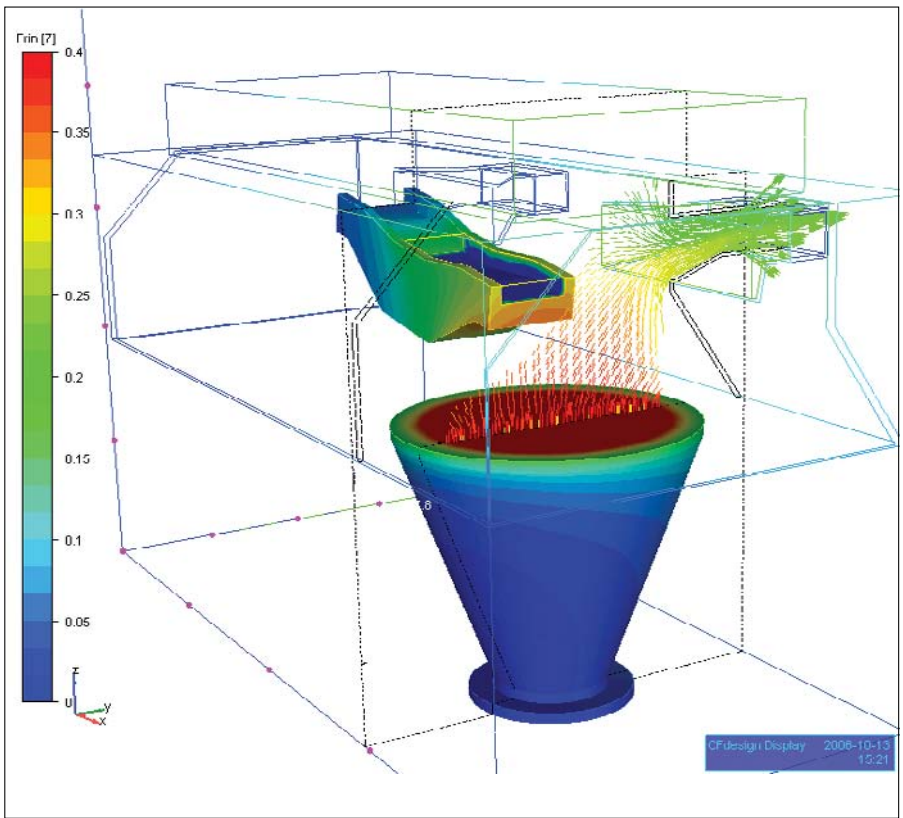
- > ANSYS
- > Autodesk (Algor)
- > Blue Ridge Numerics Inc.
- > CD-adapco
- > CHAM
- > COMSOL
- > Concepts NREC
- > Cranes Software Int'l
- > ESI Group
- > Fred.Olsen Renewables
- > Flow Science
- > Green Energy Technologies
- > Green Ocean Energy
- > LMS
- > MAYA HTT
- > Manitoba Hydro
- > Oceanlinx
- > Siemens
- > SIMULIA
- > Software Cradle
- > Solar Power Industries
- > TFC Energy
- > Tidal Sails
- > Vestas
- > Windgiant GmbH
- > Windsim

CFdesign Helps Steel Plant Meet EPA Rules

> Severstal uses upfront CFD from Blue Ridge Numerics to ensure emission control performance of new casthouse design.

BY JAMES EARL, BRIAN BAKOWSKI, AND E. JOSEPH DUCKETT

When Severstal North America—one of the largest steel manufacturers in the U.S.—needed to rebuild one of its blast furnaces, it faced the challenge of designing the emission control system for a new casthouse. The project would have been difficult—maybe nearly impossible—without upfront computational fluid dynamics (CFD) software.



A simulation generated by CFdesign software shows a plume of particulates coming off the ladle of molten steel. Red arrows indicate a high-level of particulates being drawn into an exhaust duct.

Under U.S. Environmental Protection Agency (EPA) regulations, casthouse particulate emissions must be controlled with what is called Maximum Achievable Control Technology (MACT). MACT compliance is measured by stack emission concentrations and the opacity of emissions that escape from the casthouse building. The Michigan Department of Environmental Quality (MDEQ) also has established an opacity limit. In our case, the casthouse, which

SUMMARY OF KEY RESULTS FROM CFDESIGN SOFTWARE			
Source	**Operations**	**Volume (acfm)**	**ACFM Capture Efficiency (%)**
Taphole	Drilling	175,000	98.1
	Casting	150,000	98.1
	End of Cast/Plugging	175,000	98.1
North Tilting Runner	Casting	65,000	98.0
East Tilting Runner	Casting	65,000	98.5
Slag Shanty (N & E)	Slagging	45,000	98.0

would include a new set of hoods, ductwork, fabric filtration equipment, and fans, had to meet both U.S. and Michigan environmental regulations by capturing 98 percent of particulates.

MACT compliance is usually based on actual observations of casthouse operations to determine emission intensities, crosswind speeds, and vertical rise rates. But Severstal could not do that because the rebuilt casthouse was very different in configuration and operation from previous designs.

Our solution was to use CFdesign software from Blue Ridge Numerics to conduct a comprehensive design study that simulated the new equipment under every conceivable operating condition.

Setting up the Model

The first step in our project was to set up the CAD geometry in CFdesign to include the physical boundaries and internal blockages to fluid flow within the casthouse. The geometry of the model, in this case created in MicroStation software from Bentley Systems, included the physical bounds of the casthouse as well as the furnace, tuyere platform (the outlet through which air is blown into the furnace), iron and slag runners, hoods, and other equipment.

After setting up the geometry in Micro-Station, the model was meshed in CFdesign, which provides built-in tools for simulating the conditions that the new equipment and structure would face. For the casthouse model, we needed to simulate the temperature and velocity of incoming air; temperature, velocity, fume, and combustion components associated with the casting and pouring of hot metal; and air-flow rates for the tilting runner duct, taphole hoods, and slag pot shanty duct.

Information describing these processes must be incorporated into the model as boundary conditions to accurately evaluate the operation of the fume hoods that control emissions. Input was derived from previous experience at similar casthouse operations, where heat and material balance calculations were coupled with video analyses.

Establishing the Parameters

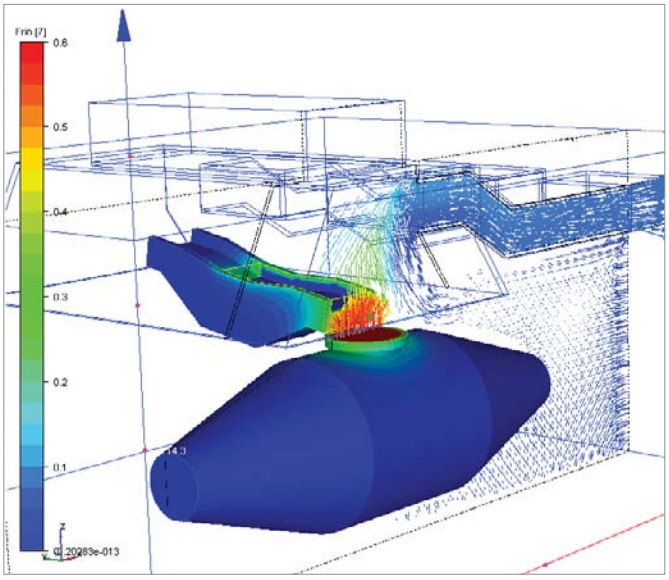
After the model geometry and simulation infor-

mation were entered, the initial hood designs were incorporated into the model to evaluate their performance.

Once again, heat and material balance calculations and video of similar casthouses were analyzed to establish fume rise velocities, intensities, and horizontal movement, especially at the taphole, from which the most concentrated emissions flow. From these previous studies, the following parameters were established:

- metal temperature: 2800 degrees F
- slag temperature: 2700 degrees F
- rise rate: 900fpm at the taphole
- cross drafts: 450fpm at the taphole (5 mph) and 900fpm under tilters.

Other values that were assigned were based on previous studies.



CFdesign accurately predicted performance of a Severstal casthouse emission control system in early design stages. This simulation shows particulates flowing off an iron tilting runner into an awaiting bottle car. Red indicates a high level of particulates and dark blue indicates air without particulates.

Simulating Real-world Conditions

After establishing the fundamental geometry and base set of conditions, finding the optimal design was an iterative four-step process. First, using initial hood designs and ventilation rates, we determined capture efficiencies for tapholes, iron tilters, and slag pot areas. Second, if initial hood/ventilation combinations did not achieve the 98 percent emission control rate, we would revise the geometry. Third would be to re-run the model with the revised design. And four would be to repeat steps 2 and 3 until acceptable emission control is achieved, then apply the acceptable model parameters to the emission control system design.

Each time a simulation was run, CFdesign performed a series of complex calculations and then compared them to determine the degree to which they agreed. The software then automatically adjusted the model and reran the simulation to achieve close convergence for small sub-sections in terms of temperature, velocities, and other parameters. It required 225 to 250 iterations of each model to achieve convergence and calculate a valid capture efficiency.

Capture efficiency was computed as the probability that a fume particle generated at each source (taphole, tilter, or slag shanty) would be captured by each hood and drawn through the ductwork to the bag house. The next—and most important—step in the calculation was to determine fume capture percentages for each individual operation.

The entire study entailed dozens of CFD simula-

tions to arrive at an optimal mix of hood configurations and ventilation volumes. A summary of the key results from CFdesign is shown in the table. In addition to numerical results, CFdesign provided static and dynamic images that created a better understanding of what was occurring during the simulations (see images).

Accurate and Cost-effective

Upfront CFD using CFdesign software proved to be indispensable in optimizing design of the emission control system. It enabled us to successfully establish ventilation volumes, hood configurations, and volume distribution profiles for 50 operating scenarios for the new blast furnace in three months, without costly physical testing.

The new furnace is fully operational and in compliance with the MACT regulations. Upfront CFD proved to be an accurate and cost-effective method to predict actual performance under real-world conditions. ■

James Earl *works for Severstal North America. Brian Bakowski and E. Joseph Duckett work for SNC-Lavalin America. Send comments about this article to DE-Editors@deskeng.com.*

FOR MORE INFO:

> Bentley Systems
> Blue Ridge Numerics
> Severstal North America
> SNC-Lavalin Amercia

DE MARKETPLACE

FEBRUARY 2010 • VOL. 15, ISSUE 6 • A SPECIAL SUPPLEMENT

DESKENG.COM

KNOWLEDGE TO SUCCEED NOW AND TOMORROW

elements of HPC®

This partial image of the new NVIDIA Fermi GPU die reveals an architecture with more than three billion transistors and up to 512 CUDA cores. It promises to enhance computational performance over CPU-only servers by 20x on a single GPU.

Image courtesy NVIDIA

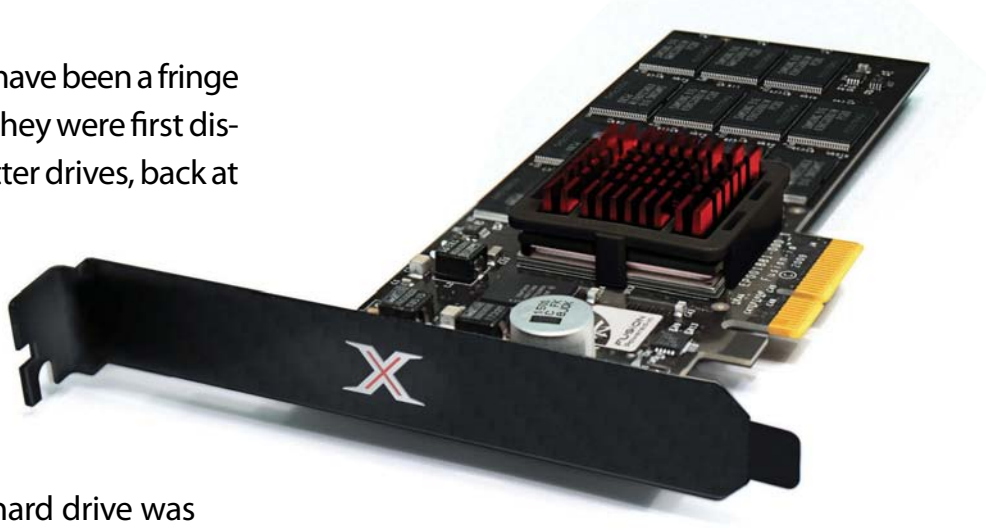
By Mark Clarkson

Solid-State Drives: Speed and Efficiency

> The advantages of systems from Fusion-IO, RocketDisk, Sun, and Texas Memory are many, but full integration is still a few years off.

Solid-state drives (SSDs) have been a fringe technology ever since they were first displaced by spinning platter drives, back at the dawn of history. But that's changing: in the past two years, tremendous development has taken place in modern SSDs.

It seemed like high time to find out if a credible, solid-state replacement for the modern hard drive was finally here. The answer is yes … and no. And it depends on who you are.



The ioXtreme from Fusion-io is a PCI Express solid-state drive that sits on the system bus, bypassing traditional disc interfaces.

SSDs are Fast

SSDs have a number of advantages, but primary among them is raw speed. Properly engineered and deployed, SSDs are very, very fast—orders of magnitude faster than spinning platter discs, depending on the application and the metric.

"Our devices reach eight to ten times the bandwidth of a normal disc drive," says David Flynn of Fusion-IO. He explains, "the A10 Warthog fleet has been grounded because of stress cracks in the wings, and the Air Force is using Nastran [FEA software] on a cluster to see why that should be. Those models were taking days to run. They brought the time down to several hours—about one-twelfth of the time—simply by changing the storage subsystem [to Fusion-IO SSDs]."

A Few Drawbacks

Compared to hard drives, SSDs are also rugged, cool, robust, and cheap to run. They require a tiny

fraction of the power and cooling. What's not to like?

For starters, there's the price. For $100, I can put a terabyte (1,000 GB) hard drive in my workstation. That same money won't even buy 64 GB of flash SSD. RAM-based SSDs are even more expensive.

Of course, very high-performance hard drives are much more expensive than $100 per terabyte but even so, in terms of cost-per-gigabyte, SSDs simply don't currently make sense.

Despite being solid state, flash memory wears out. NAND flash has a life expectancy of somehere between 10,000 and 1,000,000 cycles. Reliability is a prevalent concern, but today's enterprise solutions are very reliable.

But let's reconsider that 10,000-cycle lifespan. How often do you actually fill up and empty your drive? If you write most data once per day, 10,000 cycles will last more than 25 years; that's plenty of endurance for consumers.

On the other hand, "in the data center space," says Flynn, "it may be thousands of cycles per day. So we use a different type of flash that can withstand millions of cycles."

And remember this: disc drives fail too—you just never know when it'll happen. "There's a whole bunch of misinformation from the disc industry," says Flynn, "because they've got a product that decays with a half-life of five years. An SSD might last five years, but you can guarantee how long it's going to last."

Flash memory is slower to write than it is to read, and performance can drop off steeply when drives begin to fill up. Properly engineered drives surmount all these problems via redundancy, error correction, RAM buffers, and smart engineering.

MemoRight SSDs from RocketDisk are designed to swap in for traditional hard drives.

And many of these issues are peculiar to flash memory; not all SSDs use flash.

RAM Drives

"Assuming solid-state storage means flash is not correct," says Neal Ekker, of Texas Memory Systems (TMS), manufacturer of RAM-based SSDs. "Is it a little nichy? Yes. But it's real. That was our entire business until a year-and-a-half ago.

"The flash problems don't exist. [Our drives] can take all the reads and writes from now till hell freezes over, and they'll all be at 15 microseconds. And it's totally persistent. It's as safe as any hard drive on the planet, probably more so."

TMS' RAM-based products back up to flash, and TMS now makes flash-based SSDs, as well.

The Form Factor Feud

Another consideration is packaging this new technology. If you stick it in a standard 3.5-in.

enclosure with a SATA bus connector, you can tell the operating system it's a hard drive and everything will just . . . work. The operating system and applications recognize it. You can boot from it. What's not to like?

"For most customers it's a no-brainer," says Jonny Brownleader of SSD distributor, RocketDisk. "They simply switch the hard drive and change nothing else in their environment. Without much work or research, they eliminate the main bottleneck: the rotating, mechanical 25-year-old media.

"The majority of users don't have the time or the budget to do anything other than switch hard drives around."

Fusion-IO, on the other hand, takes a very different stance; their products plug into PCI Express slots. "Solid-state technologies," says Flynn, "need to be connected closer to the system bus, so as to get unimpeded performance, and not be trapped behind SATA and SCSI.

Flynn adds, "We've deployed the flash directly on the system arteries, with unimpeded access to the system so you can get more performance in every dimension, not just minor dimensions as IOPS."

RocketDisk's Brownleader sees it differently: "In business, you've got to look ahead. But if you look too far ahead, and don't concentrate on the need right now, you find yourself missing the boat. At the end of the day, we miss opportunities by not having the PCI Express option, but I feel we'd miss out on far more opportunities the other way."

Depending on who you are and what you do, switching to SSDs could be an expensive disappointment or an instant moneymaker.

New Technology, and All that It Implies

"We're embracing this technology," says Michael Cornwell of Sun Microsystems. "We feel that it's one of the most exciting things to happen in the server space for the last 25 years."

But? "But you don't see the type of improvement you could get if you assume a new type of storage medium."

Developers, Cornwell says, are still writing applications that assume disc drives and SSDs are a whole 'nother technology. For example, SSDs can perform up to 64 parallel operations. "Which means applications need multithreaded IO," says Cornwell. "You had to do parallelization to take advantage of multiple processors; you're going to have to do the same to take advantage of parallelization in SSDs.

Three Orders of Magnitude

SSDs really shine at I/O operations per second (IOPS). A fast hard drive will deliver in the neighborhood of 300 IOPS. A fast SSD will deliver in the neighborhood of 120K IOPS, an improvement of three orders of magnitude. The very fastest SSDs—based on DRAM rather than flash—can deliver a staggering 600K IOPS. —*MC*

Texas Memory Systems's RamSan 400 is a rack-mounted SSD. Employing RAM rather than flash, it delivers over 400,000 IOPS and 4GB/s random sustained throughput.

"At the system level, we need better integration of SSDs into the architecture. And we're going to need a high-speed standard, which doesn't really exist today," adds Cornwell. "We think SSDs are a couple of years from being a standard item that's supported in every operating system."

Is the End in Sight?

Depending on who you are and what you do, switching to SSDs could be an expensive disappointment or an instant moneymaker. Cheaper drives, especially those communicating via legacy disc interfaces such as SATA, can actually be slower in overall bandwidth. For now, tread carefully; know your application requirements and your vendor.

Solid-state storage does portend the death of traditional hard drives. But not just yet. The next five years will see SSDs penetrate further and further into enterprise and desktop storage, from above and below. In fact, by 2015, the hard drive will be as passé as the floppy drive.

Hard drives won't go away entirely for some time after that; tape drives are still around, though you probably don't have one on your desktop. Hard drives are the tape drives of the future. ■

*Contributing Editor **Mark Clarkson** is DE's expert in visualization, computer animation, and graphics. His newest book is "Photoshop Elements by Example." Visit him on the web at markclarkson.com or send e-mail about this article to DE-Editors@deskeng.com.*

FOR MORE INFO:

> Fusion-IO
> RocketDisk
> Sun Microsystems
> Texas Memory Systems

Click here for more information on this topic.

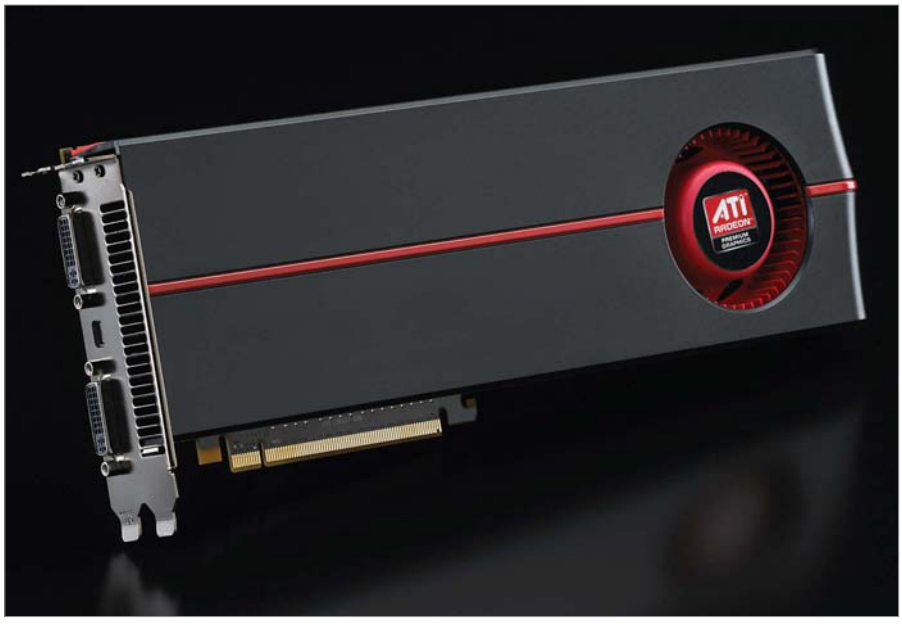
By Peter Varhol

NVIDIA & AMD Boost GPU Computing

> Once strictly a gaming chip, the graphics processing unit is poised to serve high-performance computing needs.

Almost since its inception, one of the major hallmarks of desktop computing has been the quest for ever-faster, smoother, and more realistic graphics processing and display. Obsolete names such as Hercules and Number Nine are part of the history and folklore of this quest for faster and more realistic graphics.

Today, fast graphics are primarily the province of NVIDIA (Santa Clara, CA) and ATI as part of AMD (Sunnyvale, CA). Any serious gamer, design engineer, or simulation specialist knows which graphics cards are best for their applications. But a funny thing happened in the drive to build better and faster graphics processors. These same processors became good at other types of processing, including to some extent general-purpose processing—that is, the ability to execute any application built for them.



AMD's ATI Radeon GPUs supports the company's Stream architecture, which supports parallel computation for high-performance computing.

But where they really excel is in the mathematics of graphics, called floating point processing. This also extends to any computation involving numbers, so any computation-intensive application can benefit. This includes graphics processing and rendering, structural analysis, fluid dynamics,

and simulation, as well as fields outside engineering like financial modeling and chemical analysis.

How much of a speedup are we talking about? It varies on the application, but on a parallel graphics processing unit (GPU) system with a highly parallel set of computations, it is possible to see an improvement of a hundred times over that of a single Intel processor. In general-purpose computations, the overall performance increase will be less impressive.

It's important to remember, however, that GPU systems are inexpensive compared to similar traditional CPU systems. This is perhaps best brought into perspective by the highly parallel Tesla systems introduced more than a year ago. The 960-processor configuration was priced at just under $10,000. The system is rated at 36 TeraFLOPS, making it theoretically possible to solve all but the most computationally intensive problems. It is, in effect, a supercomputer for many types of applications.

There is a catch, of course. The GPU uses a different instruction set than the standard Intel processors. Applications compiled to the Intel instruction set won't run on any GPU. This means that to take advantage of GPU computing, your software vendors must build their applications to that processor, or alternatively, you need to have your own source code to convert it on your own.

Commercial GPUs for General-Purpose Computing Probably the best-known GPU family geared toward general-purpose applications is from NVIDIA. For parallel operations, NVIDIA supports the CUDA (compute unified device architecture) parallel-computing architecture. CUDA gives developers access to the native instruction set and memory of the parallel computational elements in CUDA GPUs. Using CUDA, the latest NVIDIA GPUs effectively become open architectures like CPUs. Unlike CPUs however, GPUs have a parallel multiple-core architecture, each core capable of running thousands of threads simultaneously.

On a parallel GPU system with a highly parallel set of computations, it is possible to see an improvement of a hundred times over that of a single Intel processor.

Last fall, NVIDIA introduced its new GPU architecture, code-named Fermi, supporting up to 512 CUDA cores featuring the IEEE 754-2008 floating-point standard. Fermi, which is scheduled to be available in production quantities shortly after this is printed, makes it easier to port existing applications, both commercial and custom, as it supports the C++ language natively as well as several other languages. It also takes care of on-chip hardware error checking, something that traditional CPUs have done for a long time.

For developers, NVIDIA also announced a development tool that operates as a plug-in to the ubiquitous Microsoft Visual Studio. This tool, called Nexus, is unique in that it enables developers to trace and debug application code from the CPU running on Windows into the GPU, including parallel applications on the GPU, and back to the CPU. While writing parallel-execution GPU code that interacts with both Windows and the Intel CPU remains a significant technical challenge, Nexus goes a long way toward easing the process.

AMD also supports general-purpose computing on its GPU families, the ATI FireStream and Radeon series. ATI's technology for using the Radeon for computation is called Stream. ATI Stream technology is a set of advanced hardware and software technologies that enable AMD graphics processors (GPU), working in concert with the computer system's CPU, to accelerate many applications beyond graphics.

Most GPU systems have a single industry-standard CPU, usually running Windows or Linux. An application written for a GPU typically has a front end running on one of these operating systems. When a computation is required, the relevant data is passed off to executable code loaded onto the GPUs. When that execution has been completed, the results are returned to the CPU and displayed.

Of course, if the display of those results involves rendering highly detailed graphics, that code may also continue through the graphics processor for rendering on the screen. Depending on the architecture of the system, that can be computed on parallel GPUs, or on a separate GPU-powered graphics card.

If you have your own custom analysis code, you would write a small program running on the CPU that would kick off the code on the GPU, and receive its results for display. Mostly these would be text results, unless your programmers have built a complete front end for your code.

Parallel All the Way

Many engineering applications, especially those that do analysis or simulation, spent much of their time performing the same sets of computations on different sets of data. These types of applications can have those parts broken apart and run on separate processors, then combined again at the end to produce the result. This is broadly known as parallel computation, and can be done when parts of an application have no dependencies on one another.

The GPU is especially good at parallel computations. In addition to architectures such as CUDA that support large numbers of processors, individual GPUs can also support large numbers of independently executing threads. This means that computations can be done more efficiently, improving overall performance still more.

There is a catch, of course. Applications can't break themselves into parts and reassemble those parts automatically; they have to be programmed to do so. And such programming is difficult and not well understood by most software developers. While new techniques are being developed, and developers are acquiring new skills, this will remain the biggest obstacle to taking full advantage of GPUs.

If you have your own source code, ideally it is in the C programming language (many C++ preprocessors convert that language to C before compilation, making C++ also feasible). However, the number of supported languages is expanding. The Portland Group of Portland, OR, recently released Fortran compilers for GPUs, making it possible for engineering groups with their own high-performance analysis code to easily convert it to run on GPUs. And there are some Java bindings available for specific libraries, enabling Java developers to use C interfaces to execute on the NVIDIA processors. Also, recent

NVIDIA's Tesla system family provides for multiple GPUs to work with a single industry-standard CPU in a single computer, making it possible to run Windows or Linux while taking advantage of parallel GPU operations.

improvements to the processor architecture make porting existing code easier.

If you are dependent upon commercial software vendors for design, analysis, rendering, and simulation, find out what those vendors' plans are for supporting GPUs. No doubt many are at least considering it, but they need to hear from their users. Today, at least AutoDesk's AutoCAD is available for the NVIDIA GPU, as is the iray rendering solution from mental images of Berlin, Germany, and Adobe's Flash graphics development toolkit.

Get Ready for GPU Computing

You should be looking into GPU computing if your important software vendors offer versions that support it, or if you have source code that you are willing to parallelize and rebuild for GPUs. Without one or both, you can't run anything on the GPU.

Fortunately, both are becoming easier. If you have your own code, porting it to a GPU is becoming easier. You still have to manually identify opportunities for parallel computation, and insert the appropriate code into your program. This is the difficult part, and it requires skilled programmers.

It's important to note that general-purpose GPU computing is in its infancy. There's no guarantee that it will move into the mainstream; many promising computing technologies remain stuck in a niche rather than breaking out. Intel, for example, is attempting to prove that its CPU standard, implemented in the upcoming Larrabee architecture, is sufficient for the types of engineering and scientific applications currently being targeted by GPUs. (Intel is having technical difficulties finalizing Larrabee chips, but is committed to delivering processors with multiple pipelines for graphics and floating point applications.)

But the cost and computation advantages, especially for heavy mathematics or graphical applications, are likely to prove compelling. And with an increasing number of commercial software vendors either supporting the popular GPUs, or announcing future support, it is definitely on the upswing. Many engineering applications can use this computational boost to make you more productive on the desktop. ■

*Contributing Editor **Peter Varhol** covers the HPC and IT beat for DE. His expertise is software development, math systems, and systems management. You can reach him at DE-Editors@deskeng.com.*

FOR MORE INFO:

- > Adobe
- > AMD
- > Autodesk
- > Intel
- > mental images
- > Microsoft
- > NVIDIA
- > Portland Group

ITI TranscenData Releases CADIQ 6.1 CAD Model Validation App

> **ITI TranscenData** has announced the release of CADIQ 6.1, the company's latest edition of its CAD model validation application that identifies model-based design issues that adversely impact downstream processes, such as tooling, simulation, and manufacturing.

Engineers tasked with long-term data retention and archival initiatives use CADIQ to certify translations and conversions for 3D CAD models prior to archiving, through geometry and semantics-based validation. CADIQ validates 3D models, assemblies, corresponding features, and product manufacturing information against the source data, and provides automated predictive diagnostics. These diagnostics are used to identify, forecast, and troubleshoot legacy conversion issues. CADIQ is packaged in versions for both desktop and server environments.

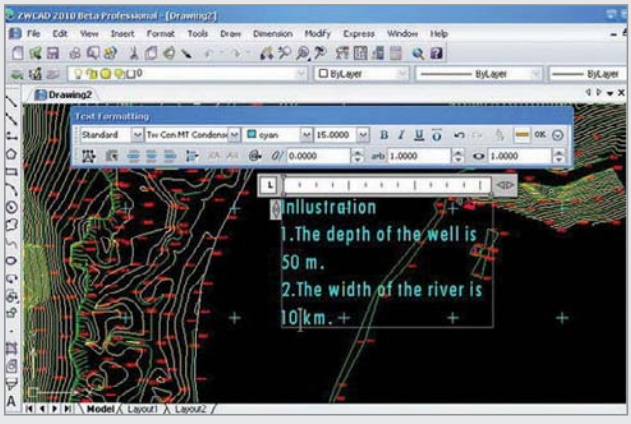
OriginLab Releases Origin 8.1 Analysis and Graphing Software

> **OriginLab Corporation** has announced the release of Origin 8.1 analysis and graphing software, explaining one of its most significant additions is a batch-processing feature that builds upon the Analysis Template and Recalculate features introduced in Origin 8.0. Origin users can now automate repetitive data handling by creating a custom analysis template, and then using the batch-processing tool to apply that template to a group of files. The tool then generates a summary report using settings saved in the template.

ZWSOFT Releases ZWCAD 2010 Beta for Evaluation

> **ZWCAD Software Co., Ltd.** (zwcad.org)has announced the availability of ZWCAD 2010 Beta software for public evaluation. ZWCAD 2010 is designed to integrate with Windows 7 and communicate with other Windows applications. It is now available in 14 languages.

The software features memory optimization with compressed processing and new optimized arithmetic that improves the efficiency of commonly used commands and reduces CPU usage and memory. ZWCAD 2010's new In-Place MTEXT Editor includes a text formatting toolbar, paragraph dialog box and display options menu.



ZWCAD 2010 Beta also includes improvements to Hidden Plot, Render, Refedit, Splinedit, Undo, and Hatch. It also includes enhanced APIs like Lisp and VBA, with 13 new functions added to the Lisp Vlax and Vlr series.

Stratasys and Autodesk Produce Full-scale Turbo-prop Aircraft Engine Model

> At Autodesk University, **Stratasys** (stratasys.com) and Autodesk (autodesk.com) unveiled the first full-scale turbo-prop aircraft engine model produced using Stratasys FDM (Fused Deposition Modeling) technology.

The engine's design was created using Autodesk Inventor 2010 mechanical design and engineering software, and it was produced on both Fortus 3D Production Systems and Dimension 3D Printers from Stratasys. The engine model sets a new precedence in scale, and it showcases the potential of 3D printing.

The engine's gear box includes two sets of gears, which operate two sets of propellers that move in counter rotation to each other. With an engine length of over 10 ft., a blade-span of 10.5 ft., and 188 components, the engine model is massive in size. It includes several large parts, such as six propeller blades, each measuring 4.5 ft.

Building this physical model with FDM helped improve its design by identifying four opportunities to make components fit or operate with better precision. Assembling a physical model helps design engineers be certain of component form, fit, and function. The turbo-prop engine was designed by Nino Caldarola, a freelance designer for Autodesk. The 3D printing item received the most visitors in the month of December.

In graphing, a new slideshow feature enables the presentation of large numbers of graphs and exportation of graphs directly to Microsoft PowerPoint. New graph types have been introduced in Origin 8.1, including Ternary Contour, Windrose, and Probability Plots. In addition, there is a new tool for making multiple axis plots.

The analysis capabilities have been extended in this version with the introduction of new tools for data reduction, pivot tables, signal decimation, signal envelopes, rise and fall time analysis, X-error bar support for linear regression, and computation of surface area for matrix-data and XYZ data.

This new version introduces password protection of Origin projects, plus the ability to maintain an audit log of user-name and time-stamp when a project is saved. These new features allow Origin users to follow security measures required for submitting Origin projects to government agencies.

ArtVPS Launches Shaderlight 1.0 for 3ds MAX

> **ArtVPS** has announced the availability of Shaderlight 1.0, the first full release version of its interactive rendering plug-in for 3ds Max. Shaderlight 1.0 marks the culmination of two years of research and development, and is designed to unlock the workflow bottlenecks faced by 3D artists, with its new approach to rendering.

Shaderlight is a physically based, progressive

ray-tracer that enables interactive changes to be made to materials, environments, lighting and textures (MELT) at any stage within the rendering process. 3D artists are able to make changes to an image and see the results in real time without compromising on image quality or restarting the render.

New features in Shaderlight 1.0 include: Zoom and scroll; Super-sampling; image-based lighting; GI improvements; texture filtering; MELT allocation and memory usage; and improved stability. Shaderlight 1.0 is available to download now for $895. ArtVPS is offering a 50 percent discount to anyone who downloaded pre release versions 0.1, 0.2 or 0.3. New users can take advantage of a free 14-day trial.

OMEGA Releases PCM4 Pulse Control Module

> **OMEGA Engineering Inc.'s** PCM series of pulse control modules facilitates conversion of a 4 to 20 mA output to an on/off time proportioning output. It mounts directly to the input terminals of an OMEGA DC input SSR and supports single or 3-phase operation.

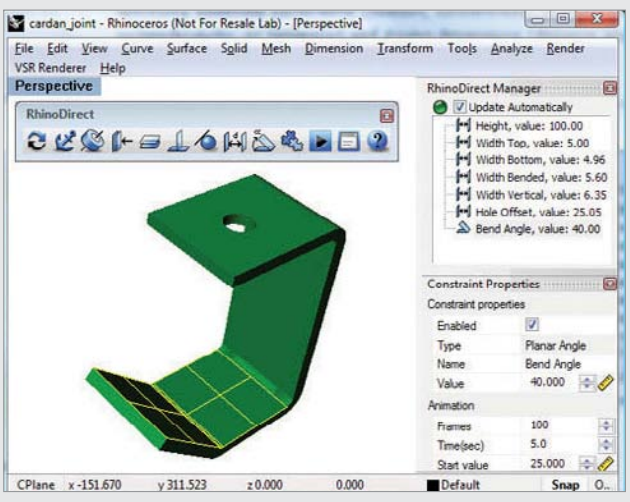
It is recommended for applications including HVAC, lab use, and automotive-engine testing. Prices for the PCM4 start at $120.

LEDAS Releases RhinoDirect 0.1

> **LEDAS Ltd.** has announced the public beta release 0.1 of its new product, RhinoDirect. This new plug-in for Rhinoceros 3D modeling software by Robert McNeel and Associates is built on the functions provided by the RhinoAssembly plug-in released last month by LEDAS.

RhinoDirect allows Rhinoceros users to assemble mechanisms composed of rigid and non-rigid parts. Three-dimensional shapes of non-rigid parts are adjusted automatically to satisfy the geometric constraints and driving dimensions set by the user. Moreover, RhinoDirect allows users to apply constraints and dimensions directly between the faces and edges of one part.

With the first beta version of RhinoDirect, solids can be modified if their boundaries consist of planar faces with sharp or filleted edges, round holes, and protruding cylinders. These limitations will be overcome by later beta releases. The next beta ships in February.

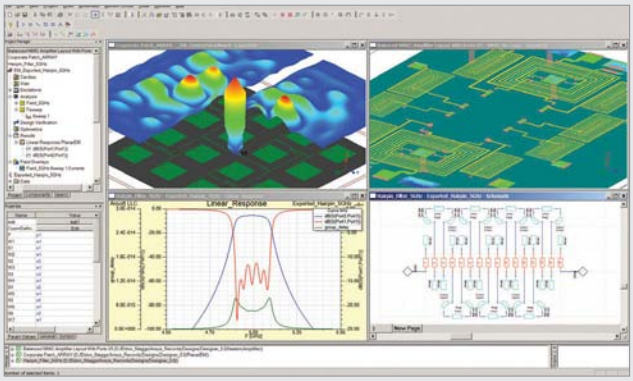


Version 0.1 of RhinoDirect is compatible with Rhinoceros 4.0 SR5B and higher, and runs on 32-bit versions of Windows XP, Vista, and 7. A set of tutorial videos are available. RhinoDirect is available as a free download.

ANSYS Releases ANSYS 12.1, Ansoft Designer 5.0, and Nexim 5.0

> **ANSYS, Inc.**, has announced the availability of ANSYS 12.1, which incorporates tools that further automate the product development process. The company has also released Ansoft Designer 5.0 and Nexim 5.0, which include new features that compress the electronic design and analysis cycle.

ANSYS 12.1 extends the integration of its products with several industry applications—for electronics, polymer and glass-forming, and hydrodynamic applications—into the ANSYS Workbench environment, resulting in faster modeling times and cross-physics integration. New to release 12.1 are tools that extend the already existing capability of real-world simulation authoring in the ANSYS Workbench platform, including the ability to record, customize, and automate analysis steps through journaling and scripting. For release 12.1, ANSYS integrates three



of its industry-specific applications within the ANSYS Workbench framework—for electronics, polymer and glass-forming, and hydrodynamic analyses.

ANSYS also announced Ansoft Designer 5.0 and Nexxim 5.0. This engineering simulation platform and integrated technology supports simulation driven product development of electronic products. For example, links with ANSYS DesignXplorer software enable design of experiments, sensitivity studies, and six-sigma design.

Aras Releases Innovator Suite of PLM Software

> **Aras**, an enterprise open source product lifecycle management (PLM) software solution provider, has announced the availability of the Aras Innovator suite of PLM software solutions enabled on Microsoft Windows Server 2008 R2 and Microsoft Windows 7.

"Our ISV community is alive with innovation, and we're committed to helping our partners drive the next generation of software experiences," said Ross Brown, vice president of ISV and solutions partners for the Worldwide Partner Group at Microsoft. "Adding compatibility for the latest Microsoft operating systems helps ISVs to stay ahead of the competition and give their customers access to cutting-edge technologies."

"Aras is excited to be both the first enterprise PLM software suite and the first open source solution enabled on Microsoft's new operating system platforms," said Peter Schroer, president of Aras.

Aras Innovator is designed and developed on Microsoft Windows Server 2008 R2 and Windows 7 to take advantage of the capabilities offered for global corporations that require scalability, high availability, and comprehensive administration.

SolidProfessor Launches New Product Line for SolidWorks 2010

> **SolidProfesso**r (solidprofessor.com), a SolidWorks Certified Solution Partner, has announced

the release of a new line of products for SolidWorks 2010. The new products named SolidProfessor Standard, Professional, and Premium include content aligned specifically to address the needs of SolidWorks users based on the version of SolidWorks they are running.

SolidProfessor Standard includes a library of 20+ hours of content for new users and advanced users that own SolidWorks Standard. SolidProfessor Professional adds content for Workgroup PDM, PhotoWorks/PhotoView 360, Advanced Surfacing, and a SolidWorks Certification Prep Course for SolidWorks Professional users and users looking to gain their CSWA/CSWP certification. SolidProfessor Premium adds content for Simulation, Routing, and TolAnalyst to reflect the Premium version of SolidWorks.

Customers who purchase one of these new products will also receive content updates for the next year.

Dassault Systemes Delivers Isight 4.0 for Simulation Automation and Design Optimization

> **Dassault Systèmes** has announced the availability of Isight 4.0, its simulation process automation and design optimization solution from SIMULIA.

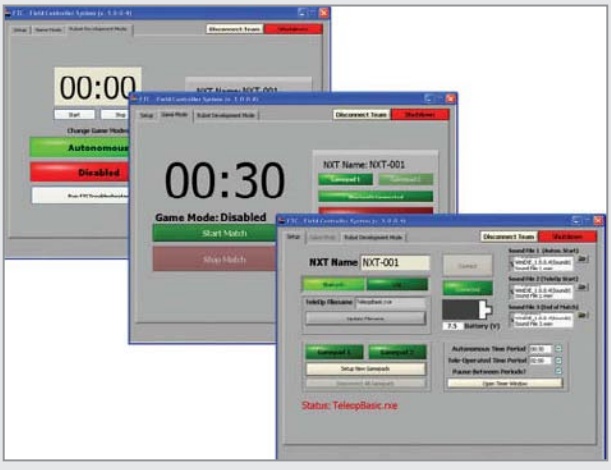
Enable Training and Consulting Develops LabVIEW Field Controller System for FIRST Robotics Tech Challenge

> **Enable Training and Consulting, Inc.** is collaborating with FIRST Robotics in the development of upgraded LabVIEW-based field control software for the 2009-2010 season of FIRST Tech Challenge (FTC).

"We're long-time users of LabVIEW, and we're excited to be helping competitors learn the many advantages this programming language has to offer," says Ben Zimmer, Enable president.

The new software is being used as a control system during this year's competition.

"Ben Zimmer and his group worked with FIRST Tech Challenge to develop a robotic control tool via LabVIEW for use by over 13,000 youths and volunteers worldwide," says Ken Johnson, FTC director. "This was a time-critical job and had to mesh with our season kickoff—or the season



would have been in jeopardy. Ben and his team worked with us to understand the challenge, develop solutions, and test those solutions. The result is a system that is more functional than we've had before with a better user interface and more reliable performance."

Isight provides engineers with an open system for integrating design and simulation models, created with various CAD, CAE, and other software applications, together into a simulation process workflow.

Isight users can use the workflows to run hundreds or thousands of simulations without manual intervention. Using optimization methods such as Design of Experiments, Approximations, and Design for Six Sigma, engineers are able to explore the complete design space to identify optimal performance parameters.

Isight 4.0 provides an Abaqus Unified FEA application component as part of the base Gateway package. Enhanced support for scripting has been added for customers and partners who use the Isight component software development kit to develop their own custom components.

NVIDIA RealityServer 3.0 Cloud Computing Platform Now Shipping

> The **NVIDIA** RealityServer is a new cloud computing platform for running 3D web applications. The platform consists of an NVIDIA Tesla RS GPU-based server cluster running software from mental images. It was originally announced at the Web 2.0 conference in October, and is shipping now.

The NVIDIA RealityServer streams interactive 3D applications to any Web-connected device. RealityServer software uses mental images iray technology for a physically correct, ray-tracing render. Because ray tracing is one of the most demanding computational problems, iray technology is designed to take advantage of the massively parallel CUDA architecture of NVIDIA GPUs.

Solido3D Launches the SD300 Pro Desktop 3D Printer

> **Solido3D** has launched the new SD300 Pro 3D printer at the Euromold 2009 exhibition. The SD300 Pro produces transparent models, hinges, and requires no post build curing.

The company offers three packages: Platinum, Premium, and Gold with options to permit flexibility during the decision-making process. Customers may upgrade from the Premium Plan to the Platinum Value package until Feb. 28, 2010.

Technological innovations have made the SD300 Pro a faster and more accurate machine than its predecessor at a lower cost to the end user.

Every SD300 Pro modeling kit ships with a prepaid recycling kit, which enables designers and engineers to easily send the PVC waste to the company for free recycling.

DE honored a Solido project in its Change the World Challenge. Read more about the Full-Scale Folding Bike Built on Solido SD300 at deskeng.com.

VX Corporation Releases Version 14.2 of VX 2009, Contains Manufacturing Enhancements

> **VX Corporation**, a developer of integrated CAD/CAM solutions, has released VX 2009 v14.2. This release contains many enhancements in drafting, modeling, and 2-5 axis CAM, as well as

performance enhancements to the direct edit shape morph technology and improved sectioning of unhealed imported parts.

As a step to increase performance, customers can now build a "lightweight" morph feature that can be edited and tweaked more rapidly. This enhancement is especially important to customers who use shape morphing for non-stylistic applications, like bending and unbending parts, model repair, back draft correction, and applying over bend.

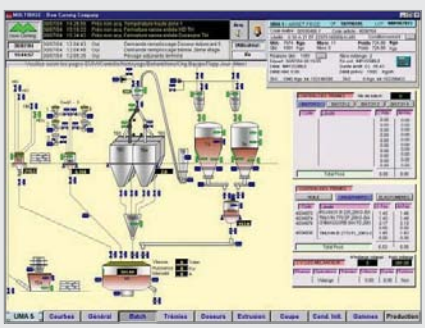
Customers running earlier versions of VX 2009 can download and install the update from support.vx.com. Customers running older versions of VX (VX 2008 V13.xx and earlier) can purchase an update to V14 from the VX web store or from their local reseller.

Corsair Launches 24GB Dominator DDR3 Memory Kit for HPC Applications

> **Corsair** has released a 24GB Dominator triple-channel DDR3 memory kit for high-performance desktop and workstation computing applications.

Corsair's 24GB Dominator DDR3 memory kit has been tested in high-performance platforms based on the Intel X58 motherboard chipset for Intel Core i7 [Bloomfield] processors. It comprises six 4GB DDR3 DIMMs that operate at a frequency

PcVue 9.0 SCADA Software Released



> The new version of the PcVue software, edited by **ARC Informatique** (arcinfo.com), emphasizes opening up links to new protocols, such as integration of OPC KEPWARE servers and Smart Generator Step7. Version 9.0 features innovations that help to cut deployment and operating costs for process monitoring projects and utilities. PcVue was created in 1985, and it is now a new-generation SCADA software package. It shortens development and deployment lead times for supervision applications covering industrial processes and utilities, whether they are in assembly factories, or on chemicals, pharmaceuticals or food processing sites, or used for motorway, transport, or power transmission.

Right from the start of the development work on PcVue 9.0, the emphasis was placed on opening up the systems and integrating new protocols. To begin with, servers from OPC KEPWARE were integrated. Bundles were added to enable integration of over a hundred new automatic controller protocols. Smart Generator Step 7 was added to cut development time by federating the monitoring database with that of Siemens automatic controllers.

PcVue 9.0 is validated on Windows 7, Windows Server 2008, and SQL Server 2008, but is also compatible with Windows XP, Windows VISTA, and Windows 2003 server.

of 1333MHz, at latency timings of 9-9-9-27, with 1.65V VDIMM.

The 24GB Dominator memory kit also features Corsair's DHX+ heatsink technology. The modules, equipped with signature American Racing Blue heatsink fins, are found on select Corsair Dominator DDR3 memory for Intel Core i5 and Core i7 platforms in 8GB and 12GB kits.

Spatial Components Provide CAD Translation for Armonicos 3D

> **Armonicos Co., Ltd.**, a CAD/CAM and Computer-Aided Testing (CAT) provider, has recently released the latest version of spGate, a multi-data exchange platform, and spGauge, a 3D inspection solution for industrial products. Both rely on Spatial Corp.'s (spatial.com) 3D InterOp components to provide CAD file translation for data reuse.

Since 2003, Armonicos has used Spatial 3D software components in the development of its software solutions. The partnership enables Armonicos internal resources to focus on the development of value-add capabilities, rather than CAD translator development, while reducing their time-to-market.

Armonicos provides data translation, inspection, and reverse engineering solutions. spGate is a multi-data exchange platform that reduces or eliminates translation problems commonly encountered when translating between design, analysis, manufacturing, and inspection systems.

SYCODE Releases CATIA V4 and V5 File Import Add-Ins for SolidWorks

> **SYCODE** has released CATIA V4 and V5 file import add-ins for SolidWorks that give SolidWorks the ability to read CATIA V4 and V5 parts and assemblies without the need of a CATIA license.

The add-ins are powered by the 3D InterOp technology from Spatial. 3D InterOp is used in many CAD systems. Besides data exchange, 3D InterOp also offers repairing and healing features that are extensively used in these add-ins.

Repairing involves checking the file for corrupted data and fixing invalid data. Healing corrects the differences in precision. The add-ins also create log files, which are useful in identifying data translation problems and aid in locating and fixing errors.

The add-ins have been tested to work with the 32- and 64-bit versions of SolidWorks, and are available as a fully functional trials. They come with installers and documentation in the form of compiled HTML help files that contains tutorials.

3Dconnexion 3D Mice Now Support PTC Pro/ENGINEER Wildfire 5.0

> **3Dconnexion's** 3D mice now support PTC Pro/ENGINEER Wildfire 5.0, complementing the productivity improvements, user interface, and model editing enhancements in the new 3D environment.

3Dconnexion 3D mice allow users to navigate and position models by pushing, pulling, twisting, and tilting the 3D mouse controller cap. This allows Pro/ENGINEER Wildfire 5.0 users to simultaneously pan, zoom, and rotate models or camera views.

When using a 3Dconnexion 3D mouse, Pro/ENGINEER Wildfire 5.0 users can use one hand to engage the 3D mouse to position the model, while

the other hand simultaneously uses the traditional mouse to select or edit. Certain 3D mouse keys are pre-configured for the most commonly used Wildfire 5.0 commands.

Geometric Releases NestLib 2009 R3

> **Geometric Limited** has released NestLib 2009 R3 with improvements in algorithms for material use for sheet metal punching.

Highlights of the new version include: Introduction of a new algorithm that allows punch profiles to be nested outside the sheet boundary; extension of support for inclined guillotine cuts for the wood working industry; a new feature that allows sharing of punch profiles only with copies of the same part; and enhancements to the Grid Fit module, which lets users specify their preferred nesting direction when optimizing nested layouts.

NestLib is available for 32- and 64-bit Microsoft Windows OS as well as for Sun Solaris and Linux platforms. It can be ported to Mac OS on demand. NestLib also supports multi-core computing for both dual core and quad core computers.

Agilent Technologies Announces Stereo Viewer w/ NVIDIA 3D Technology

> **Agilent Technologies Inc.** has announced a stereo 3D viewer capability for the Momentum G2 Element and FEM Element electromagnetic (EM) simulators in its ADS EDA platform. The new stereo 3D viewer uses NVIDIA (nvidia.com) Quadro graphics processing units (GPUs) and NVIDIA's 3D Vision quad buffered stereo technology to render electric and magnetic fields and currents in high-resolution 3D.

The stereo 3D viewer consists of a support download that enhances ADS 2009 Update 1. It requires an NVIDIA Quadro FX 3800 or higher professional graphics solution, NVIDIA 3D Vision stereoscopic glasses, and a 3D Vision ready 120Hz display.

Geometric Releases GeomCaliper Version 2.4 for Pro/ENGINEER

> **Geometric Limited** has announced the release of version 2.4 of GeomCaliper, supported and integrated with the PTC Pro/ENGINEER GRANITE Interoperability Kernel to provide improved accuracy.

Advancements in this release include more accurate and improved thickness analysis results for Pro/ENGINEER CAD models and support for Windows Vista OS (32-bit and 64-bit).

GeomCaliper facilitates measurement and checking of wall thickness of 3D CAD models. It accelerates the design review process for manufacturability, enabling faster prototyping and production of designs.

IMSI/Design Launches DoubleCAD XT Pro V2

> **IMSI/Design** is releasing DoubleCAD XT PRO v2 due to rapid development.

DoubleCAD XT Pro v2 includes new features and enhancements, including Drawing Compare for all visual differences; Hatch Pattern Creator with control over scaling, orientation, and position; Exploding Viewports; New and Enhanced 2D CAD Tools with Revision Cloud, Chain Polyline, Bisec-

tor Line, Minimal Distance Line, Select By Query, Transform Recorder, Surface Area Measurement, Double Point Arc tools, and more.

There is enhanced .DWG compatibility (now includes Index Color and CTB print style support); enhanced .SKP compatibility (now import circles and arcs as those entity types); enhanced .DAE (COLLADA) compatibility; and tool for batch file conversions.

HEM DATA Releases Mini ADAC

> **HEM Data** has introduced a new data logger, the Mini ADAC. The multi-function, 8-channel logger acquires a variety of inputs including voltages, currents, temperatures, and converts pulses to counter/timer signals. Its small size makes it easy to install for in-vehicle and other field applications. The Mini ADAC Logger works for a range of applications including performance, monitoring, R&D, and duty cycle measurements. Its on-board storage is a 2GB Micro SD card.

An optional companion product, the DAWN Mini Logger, acquires controller area network (CAN) data from the in-vehicle network to acquire automotive OBD and enhanced diagnostic data, and the J1939 heavy-duty protocol. Together, the Mini ADAC Logger and DAWN Mini Logger simultaneously acquire analog and in-vehicle network data.

The Mini ADAC Logger's A/D is 16 bits with a maximum rate of 100 samples/sec per channel. The 8 channels are single-ended. The standard voltage ranges are 0-5V and 0-36V. Other voltage ranges can be ordered. Temperature inputs are K type thermocouples. Current range is 0-40mA.

ADVERTISER INDEX

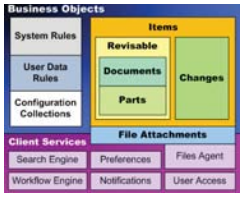
DE Desktop Engineering®

Technology for Design Engineering

PRODUCT SHOWCASE

> To appear in the next Product Showcase, contact Jeanne DuVal at jduval@deskeng.com

PDXpert PLM: Easy Product Data Management



PDXpert software offers a simple, flexible and affordable way to manage your design, production and support data. PDXpert PLM features item numbering & revision control; bill of material (BOM) management; file storage with text search; engineering change management (ECN) and workflow for change approvals. PDXpert – perfect solution for growing companies. Call us or visit our website to download a FREE TRIAL now..

PDXpert PLM

> **Active Sensing, Inc.**

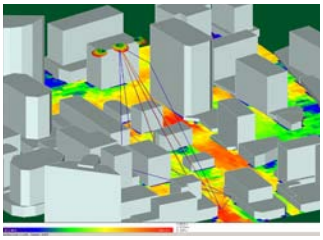
(800) 9-BUY-PLM • BuyPLM.com/DE

Unique OEM Electronics!

Remarkable test equipment, software, and components with specs or prices you won't find ANYWHERE else: premium quality, economical LCD oscilloscopes, spectrum analyzers, USB and Logic analyzers, engineering software, pure RF sources, DMMs, wireless and wired data loggers, test equipment, touch-sense ICs, Ethernet hard-wired TCP/IP ICs and modules, USB I/O ICs, high-reliability PCs, wireless and I/O control, Ethernet-serial/USB-serial/RS232-485, software, etc. FREE Elektor magazine.

> **Saelig** • 1.888.7SAELIG • info@saelig.com

Wireless InSite® for Wireless EM Propagation

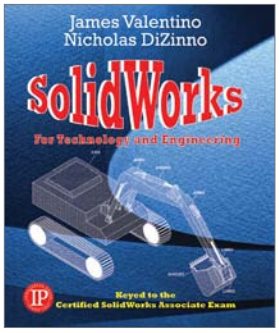


Remcom's Wireless InSite® is site-specific radio propagation software for the analysis and design of wireless communication systems. It provides efficient and accurate predictions of propagation and communication channel characteristics in complex urban, indoor, rural and mixed path environments. Applications range from military defense to commercial communications, including wireless links, antenna coverage optimization, and jammer effectiveness. Visit www.remcom.com/wireless-insite for more information.

REMCOM

> **Remcom** • 814.861.1299

Just published . . . SolidWorks for Technology and Engineering!



This unique text presents a thorough introduction to the subject for students with little or no prior experience. It can be used in virtually any educational setting and will also serve as a reliable reference for on-the-job use or as a self-study manual. It also contains exercises and materials that are key to preparing students for the Certified SolidWorks Associate (CSWA) exam. To order go to www.industrialpress.com.

> **Industrial Press, Inc.**

212.889.6330 • Fax: 212.545.8327

• industrialpress.com

ENERGY

What Your Manufacturing Needs!

For 2010, WESTEC enters a new dimension. Whatever industries you serve WESTEC can keep your manufacturing competitive with daily keynote speakers, industry panel discussions and technical sessions focused on the areas of renewable energy, defense/aerospace, and the economy that will help you gain the competitive edge. If you want to be part of new supply chains, WESTEC should be your first stop!

The direction is changing. Want to make sure your company not only grows but evolves? Make sure you get to WESTEC 2010! Register for FREE at **www.westeconline.com**.

2010

March 23-25

Los Angeles Convention Center | Los Angeles, CA

westec

SME Society of Manufacturing Engineers

AMTDA American Machine Tool Distributors' Association

AMT The Association For Manufacturing Technology

Over 100 Years of Building Global Productivity

WESTEC is produced by SME

PRODUCT SHOWCASE

> To appear in the next Product Showcase, contact Jeanne DuVal at jduval@deskeng.com

CADRE Pro 6 For Windows/XP/2000

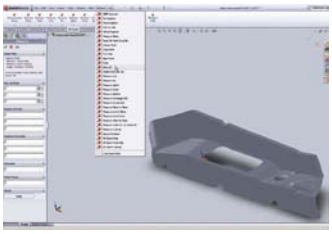
CADRE Pro 6 For Windows Vista/XP/2000 (32 & 64 Bit) with advanced modeling tools including CAD importing. A practical and affordable tool for engineers. CADRE Pro solves mechanical and architectural structures for internal loads, beam section or plate stresses, displacements, vibration modes, and natural frequencies. Advanced features for stability, buckling, shock and seismic loads. Eleven element types including specialized beams and plates.

> CADRE Analytic

425.392.4309

ReSpect™

***ReSpect*™, the Inspection Software Plug-in from ReverseEngineering.com Integrates PCMM Hardware into SolidWorks**



Current and future owners of inspection hardware devices (PCMMs) have long been asking if they can inspect and measure direct in their SolidWorks software.

ReSpect, a robust inspection plug-in from ReverseEngineering.com does just that. Save hours and days while performing traditional inspection and measurement tasks. Easy to use and native in SolidWorks.

> ReverseEngineering.com

Reference Drives Value in Organization's PLM Strategy

Chris Forbes
Knovel

Given today's economy and the close tie between PLM and productivity improvements, it is no wonder that the PLM segment has grown to more than $10 billion a year. Businesses strive to stay competitive via process enhancements, organizational design, and technologies such as digital design and digital product data management solutions.

While PLM relies heavily upon accessibility, management, and flow of engineering data, external reference information—found in handbooks, materials property databases, online standards, libraries of math, and best practices—remains essential to the engineering process. To make sure accessing that information does not become a bottleneck, it is imperative engineers have a trusted conduit as part of the engineering workflow. This is vital to maximizing the potential of PLM because engineers can solve complex problems more efficiently.

> People form foundation for innovation, but information sparks creativity.

Investments in PLM minimize product-knowledge losses as engineering staff retire or move on. With product-development speed and innovation driving profitability and growth, it is of critical importance to minimize those losses. One way businesses can do this is by ensuring their engineers have easy access to technical information.

With trusted reference information playing a significant role in an organization's overall PLM strategy, there are countless benefits to be had. According to findings from a recent survey of the American Society of Mechanical Engineers (ASME), more than 75 percent of engineers said electronic access to reference information improved their efficiency by 10 percent or more, and 34 percent indicated it

improved their productivity by 20 percent or more.

The ASME e-Library, powered by Knovel, has become an invaluable productivity tool for its members. ASME members use it to quickly locate and compare critical information from published works; interact with data in customizable graphs, charts, and tables; and inject them into their own work. Many organizations find that supplying such trusted information provides engineers with higher degrees of confidence, improves decision-making and reduces risks. Furthermore, it is vital as more organizations look to invest in technologies that reduce costs, get products to market faster, and fuel innovation.

To truly drive value for their PLM strategy, organizations must view electronic access to engineering content as an investment in their engineers.

Like other PLM enablers, common access to electronic reference data across the enterprise can help standardize engineering processes and promote reuse. Access to targeted engineering reference content, on demand, helps newer engineers gain the knowledge and tools to contribute at levels well beyond their years of experience.

With this information at their fingertips, the next generation of engineers will be able to easily harness these resources, successfully taking over projects already in progress and ensuring that time-to-completion, and in the end, customer satisfaction, remain on the right track.

To truly drive value for their PLM strategy, organizations must view electronic access to engineering content as an investment in their engineers. Well-crafted PLM implementations consider the role, satisfaction, and morale of the engineers who will see that management values them highly enough to provide them with the best tools to do their jobs as effectively as possible.

While people form the foundation for innovation and problem solving, it is information that sparks their creativity. Organizations clearly cannot afford to have engineers depend upon unreliable content because they were unwilling to make wise investments. In today's competitive global marketplace, every competitive advantage is essential. ■

Chris Forbes *is President of Knovel (knovel.com), a web-based application providing technical information to engineers. Send e-mail about this commentary to DE-Editors@deskeng.com.*

COMSOL MULTIPHYSICS

Capture the Concept™

80% of product ideas never make it to market. Let multiphysics simulation bring your designs to life.

With COMSOL Multiphysics® you are empowered to build the simulations that accurately replicate the important characteristics of your designs. The key is the ability to include all physical effects that exist in the real world. This multiphysics approach delivers results — tangible results that save precious development time and spark innovation.

Get a free Proceedings CD containing over 350 published simulation projects at:
comsol.com/conference/cd

COMSOL

MAKE YOUR IDEAS REAL

dimension 3D Printers

3D Printers

Create a more productive design process with Dimension 3D printers.

Dear Boss,

Project Delta would get to market sooner using one of these Dimension 3D printers!

- We'd see & test more iterations and decide on the final design faster.
- Functional models are in tough ABS.
- Leasing starts at $275/mo*
- Check out: www.dimensionprinting.com/de

Thanks!
– Larry

Here's the test print of our new strut.

Cool!

*Price for US leasing. Additional options, shipping, applicable taxes/duties not included. ©2010 Stratasys, Inc.

STRATASYS