Engineering the System with ANSYS

Fluid Dynamics  Structural Mechanics  Electromagnetics  Systems and Multiphysics
Every Product is a Promise

A promise that it will perform properly, not fail unexpectedly, and even exceed the expectations of its designers and users. ANSYS helps power these promises with the most robust, accurate and flexible simulation platform available.

“ANSYS simulation software is incredibly reliable and accurate. Simulation enables us to drastically reduce lead times and get solutions to the circuit much quicker, so we are more competitive race to race.”

Steve Nevey
Business Development Manager
Red Bull Technology
Our Advantages

- Industry Solutions
- Value-Added Services
- Global Support

- Unequaled Depth
- Unparalleled Breadth
- Comprehensive Multiphysics
- Engineered Scalability
- Adaptive Architecture

- Vision
- Company Strength
- Independence

Fit

Products/Technology

Foundation
Increasing Investment in R&D

- **Investment In Acquired R&D**
- **Internal Investment In R&D**

Over 500 Developers in 2010

- **Year**
- **Fluent**
- **Ansoft**

- **1994**
- **1995**
- **1996**
- **1997**
- **1998**
- **1999**
- **2000**
- **2001**
- **2002**
- **2003**
- **2004**
- **2005**
- **2006**
- **2007**
- **2008**
- **2009**
- **2010**

- **Millions**
- **ICEM**
- **CFD**
- **CFX**
- **CDI**
Leading Provider of Power Simulation Solutions

Markets

Power-efficient Electronics
- Mobile
- Data centers
- Consumer & computing
- Automotive

Users: IC/system designers

Customers

All 20 of the top 20 semi companies (a)
- Intel
- Samsung
- Toshiba
- TI
- Renesas
- Hynix
- ST
- Micron
- Qualcomm
- Elpida
- Broadcom
- AMD
- Infineon
- Sony
- Panasonic
- Freescale
- NXP
- Marvell
- MediaTek
- nVidia

Performance

- Consistent growth
- CF positive, profitable

(a) According to iSuppli 2010.
Our Balance

Consolidated Company Geographic Revenue

<table>
<thead>
<tr>
<th>Region</th>
<th>Percent of Net Sales</th>
</tr>
</thead>
<tbody>
<tr>
<td>Europe</td>
<td>34%</td>
</tr>
<tr>
<td>Americas</td>
<td>34%</td>
</tr>
<tr>
<td>Asia</td>
<td>32%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Industry</th>
<th>Percent of Net Sales</th>
</tr>
</thead>
<tbody>
<tr>
<td>Academic</td>
<td>8%</td>
</tr>
<tr>
<td>Aerospace &amp; Defense</td>
<td>17%</td>
</tr>
<tr>
<td>Automotive</td>
<td>15%</td>
</tr>
<tr>
<td>Construction</td>
<td>2%</td>
</tr>
<tr>
<td>BioMedical</td>
<td>2%</td>
</tr>
<tr>
<td>Consumer Products</td>
<td>2%</td>
</tr>
<tr>
<td>Energy and CleanTech</td>
<td>10%</td>
</tr>
<tr>
<td>Industrial Equipment</td>
<td>13%</td>
</tr>
<tr>
<td>Materials &amp; Chemical Processing</td>
<td>12%</td>
</tr>
</tbody>
</table>

Percent of Net Sales
Revenue by Industry
Customer Pressures

Energy Availability
Time to Market
Product Lifecycle
Skilled Labor

Uncertainty

Margin for Error

Complexity

Competition
Cost Constraints
Lawsuits/Warranty
Product Innovation
Customer Expectations
Top Business Pressures Driving Product Design Improvement

- Lower Cost Products
- Compressed Schedules
- Improving Quality
- Need to Innovate
- Additional New Features

Biggest Hurdles for Product Design

- Late-Design Problems
- Making Design Tradeoffs
- Frequent Design Changes
- Understanding Variation
- Skilled Technical Experts

Source: Aberdeen Group, April 2011
Smart Products/Smart Processes

- Interconnected systems
- Adapt to environment
- Adapt to user
- Lack test experience

"Today’s increased complexities require a system-level approach in designing wind turbines and evaluating performance based on real-world conditions."

Ahmad Haidari
Global Industry Director
Energy and Power
ANSYS
“Companies often focus on time to market, but the advantages of fast product introduction may be quickly overshadowed by the huge cost of poor quality, resulting in product recalls, rework, warranty payments and lost business from negative brand image.”

Andreas Vlahinos
President
Advanced Engineering Solutions
“Most high-technology companies now realize the potential benefits of simulating the performance of their products. They also clearly know that performing analysis early in the design cycle has the potential to identify and solve design problems much more efficiently and cost effectively compared to handling them later.”

Fereydoon Dadkhah
Senior Engineer
Delphi Electronics & Safety Systems
Our Vision: Simulation Driven Product Development

Concept & Design

Simulation-Driven Product Development

Physical Prototype

Production

Concept → Design → Physical Prototype → Testing → Analysis

CAD → CAE → CAM
System “V” Development Process

- Requirements & Specifications
- System Topology & Layout
- Sub-System Options & Design
- Component Optimization
- Component Integration & Verification
- Sub-System Integration & Verification
- System Acceptance
Comprehensive Capabilities Today

Example: Hybrid Electric Vehicle System

- Thermal CFD
- Temperature profile
- Mechanical FEA
- EMC/EMI
- Magnetic FEA
- Current profile

Battery: Circuit, Electrochemistry, Thermal

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Dimensions of System Simulation
### Systems Roadmap - Physics

Strategic Intent: Accurate analysis of all the physical phenomenon acting on and within the system.

<table>
<thead>
<tr>
<th>Development Focus</th>
<th>R14</th>
<th>R15</th>
<th>R16</th>
<th>R17</th>
</tr>
</thead>
<tbody>
<tr>
<td>Convergence of Fluent and CFX Solvers</td>
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<tr>
<td>Expand Two-way Multiphysics Solutions</td>
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<tr>
<td>Advancements of HPC Performance</td>
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<tr>
<td>Core Solver Capabilities and Robustness</td>
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</tbody>
</table>
Systems Roadmap - Users

Strategic Intent: Enable multiple users to collaboratively define and solve complex system designs.

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<thead>
<tr>
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<th>R16</th>
<th>R17</th>
</tr>
</thead>
<tbody>
<tr>
<td>EKM Model Libraries</td>
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<tr>
<td>EKM Collaborative Multiphysics</td>
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<tr>
<td>Intuitive User Environments</td>
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</table>
Strategic Intent: Provide appropriate simulation focus and resolution based on application objective.

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<th>R17</th>
</tr>
</thead>
<tbody>
<tr>
<td>Robust Design Solutions</td>
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<tr>
<td>Expand Reduced Order Model Creation by 3D Solvers</td>
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<tr>
<td>Modelica and VHDL-AMS Library Support</td>
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</tbody>
</table>
Strategic Intent: Solve models of different fidelity and size automatically in a unified environment.

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<th>R17</th>
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</thead>
<tbody>
<tr>
<td>Expand Co-simulation between 3D and 0D Solvers</td>
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<tr>
<td>System File Management by EKM</td>
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<tr>
<td>Material Modeling</td>
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Announcing ANSYS 14.0

- Available in Q4, 2011
- Update presentations during technical tracks
- Material will be available on the customer portal following the release
Thank You Customers!
Engineering the System with ANSYS
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Thank You for Coming!
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Appendix
The following slides should be used to customize the presentation to particular industries and partner sponsors for each event.
System Process “V”

- Requirements & Specifications
- System Topology & Layout
- Sub-System Options & Design
- Component Optimization
- Sub-System Integration & Verification
- Component Integration & Verification
- System Acceptance
System “V” Development Process

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- **Moldex3D**
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Requirements & Specifications → System Topology & Layout → Sub-System Options & Design → Component Optimization → Component Integration & Verification → Sub-System Integration & Verification → System Acceptance
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