2005 PACE Program Highlights:

- Defined the PACE program for creative design institutions with digital focus
- Announced five new institutions globally, including first:
  - U.S. Hispanic Institution
  - U.S. Creative Design Institution (exclusively)
  - Brazil Institution
  - South Korea Institution
- Engineering courses utilizing NX increased 37% over 2004
- 2,676 students utilized Teamcenter Engineering software in its pilot year with PACE
- 49% increase in design and engineering projects utilizing CAD/CAM/CAE
- Six collaborative industry projects completed in 2005
- PACE grants continue to support curriculum development and diversity initiatives
- 16 institutions received PACE grants
- First PACE Global Digital Manufacturing Forum held at Technische Universität Darmstadt, Germany
- PACE Annual Forum held in Mexico – first-time global location
NEW PACE INSTITUTIONS

The PACE Program continues to announce institutions that have been selected to join the program — institutions from a variety of countries, each with unique qualifications.

Celebration events were held at each of these universities to formally announce them as PACE Institutions.

This brings the total number of PACE Institutions which were formally announced to 34.

College for Creative Studies – USA
Hongik University – South Korea
Lehigh University – USA
University of Sao Paulo – Brazil
University of Texas at El Paso – USA

PACE GLOBAL DIGITAL MANUFACTURING FORUM

First international forum on Digital Manufacturing took place December 2005 at Technische Universität Darmstadt, Germany (TUD)

More than 80 attendees from Europe, USA, South America, and Asia participated

Speakers and topics featured:
- Hulas King, UGS, “Product Lifecycle Management: A Unique Perspective on Innovation, Productivity & Digital Manufacturing”
- Dr. H-G Lehnhoff, CIO, GME, Keynote Speaker, “Global Engineering for Digital Manufacturing”
- Dr. J. Uthoff, IS&S GME, Russelsheim, “Virtual Factory as Part of GM Global Engineering”

Global work sharing, simulation, visualization, flexible manufacturing, and collaboration experiences were shared among global manufacturing companies and academic institutions

Academia presented an insight into both fundamental and application oriented research explaining new approaches for optimization of production processes based on digital and numerical methods

Clear message conveyed – the digital manufacturing world is evolving – enabling integrated analysis, simulation and optimization of product definition, and production processes
In addition to the educational contributions made by the PACE Partners, other companies, called “PACE Contributors,” embrace the PACE mission, and contribute valuable products and services to PACE Institutions.

**PACE CONTRIBUTORS AND PRODUCTS**

**NEW!**

Alias is the development source for the following products that are used in GM’s design and product development process:

- Maya Unlimited (part of the Maya family of software products)
- Alias AutoStudio (part of the StudioTools family of software products)
- Alias PortfolioWall
- UG Direct Connect

Engineous Software provides its critical Process Integration and Design Optimization (PIDO) software, called iSIGHT. This software enables the rapid integration of CAE tools and technologies, and automates their execution to accelerate the evaluation of many design alternatives.

**SAE CAD PROFESSIONAL CERTIFICATION**

In 2005, SAE, UGS, and CAD Potential announced a new certification entitled SAE CAD Professional Certification, which is slated for use by engineers and engineering students. This certification program was formulated with input and guidance from GM and other automotive partners. It is anticipated that students will be able to achieve some of the levels of this certification prior to being hired into GM and other companies. Not only will this certify CAD capability for students, thus making them more marketable, but because it aligns with certification programs in the industry, it is expected to save time and money in redundant training for incoming interns and new hires.

This certification is in pilot stage with PACE Institutions and is expected to be more broadly available by the end of 2006.
The 2005 PACE Global Annual Forum was held in Mexico City, Mexico, the first ever to take place outside of the United States. A record number of more than 160 people attended, including global industry leaders and faculty from 34 PACE Institutions around the world. The forum featured:

- Training on Alias AutoStudio and Maya for design faculty, and on MSC.Nastran, MSC.Adams, and Altair HyperWorks for engineering faculty
- Faculty and student presentations on PACE activities, research, and curriculum integration of PACE tools and technologies
- Panel discussion on collaboration and visualization
- Press conference
- Poster session for faculty and vendor presentations
- Presentation on SAE Automotive CAD Professional Certification
- Tour of GM de Mexico facilities
Currently, PACE Competitions are conducted within a class that utilizes the PACE tools and technologies and includes a project as part of the syllabus. There were 11 competitions conducted in 2005 from the institutions shown below:

**PACE Competitions:**

- Generate student enthusiasm for PLM applications
- Give students an opportunity to apply what they learn
- Provide students with an opportunity to collaborate with other students from within their institution and from other institutions
- Help students learn to collaborate across time zones, language barriers, and cultures
- Provide networking opportunities with industry experts and executives
- Provide a recruiting opportunity for PACE companies to identify students who can successfully execute projects in teams using PACE tools

**INCREASED PACE COMPETITIONS DEMONSTRATE STRONG INTEGRATION OF PACE TOOLS INTO THE CURRICULUM**

[Graph showing the increase in PACE Competitions from 2003 to 2005]
PACE ACTIVITIES INCREASED DIVERSITY AMONG STUDENTS SELECTING DESIGN, ENGINEERING AND MANUFACTURING

Eleven PACE Institutions attributed increases in student diversity to PACE activities – for example:

- ITESM-Toluca created International Institute for Women in Engineering in Mexico
- Lehigh University introduced a new Design Arts program – 50% female enrollees
- Michigan Technological University boasted a record number of females registered for the Biomedical Engineering FEA course
- University of British Columbia reported increase in females majoring in Engineering
- University of Missouri-Rolla credited the high visibility of PACE programs for attracting a diverse group of students interested in CAD/CAM software

PACE PROJECTS
GAIN MOMENTUM

PACE Projects offer real industry experiences to students and give PACE companies an opportunity to identify students who can successfully apply their skills and learnings. They provide an opportunity for collaboration – even across institutions, time zones, and cultures. Examples of 2005 projects were:

- **Interior Storage Options** – Purdue University
- **Side Window Defogger Grill Placement (Part 1)** – Michigan Tech University
- **NVH CAE Modeling for the S Car** – ITESM-Estado de Mexico
- **Analysis of the Feasibility to Develop a Composite Muffler for the S Car** – ITESM-Monterrey

UPWARD TREND OF STUDENT PROJECTS USING PACE SOFTWARE

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of Projects</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003</td>
<td>1027</td>
</tr>
<tr>
<td>2004</td>
<td>1192</td>
</tr>
<tr>
<td>2005</td>
<td>1924</td>
</tr>
</tbody>
</table>

PACE INSTITUTION STUDENTS USING NX VS. OTHER CAD SOFTWARE INCREASES 41%

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of Students Using NX</th>
<th>Percentage Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004</td>
<td>8254</td>
<td>65%</td>
</tr>
<tr>
<td>2005</td>
<td>14,036</td>
<td>79%</td>
</tr>
</tbody>
</table>

INCREASE IN PACE INSTITUTIONS INTRODUCING NX TO STUDENTS IN THEIR FIRST YEAR OF UNDERGRADUATE CURRICULUM

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of PACE Institutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004</td>
<td>13</td>
</tr>
<tr>
<td>2005</td>
<td>17</td>
</tr>
</tbody>
</table>
PACE PROGRAM METRICS

**PACE INSTITUTIONS WITH AN AUTOMOTIVE ENGINEERING CURRICULUM**

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of Institutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>1</td>
</tr>
<tr>
<td>2002</td>
<td>5</td>
</tr>
<tr>
<td>2003</td>
<td>6</td>
</tr>
<tr>
<td>2004</td>
<td>8</td>
</tr>
<tr>
<td>2005</td>
<td>9</td>
</tr>
</tbody>
</table>

**PACE INSTITUTION FACULTY, TEACHING ASSISTANTS AND ADMINISTRATORS PARTICIPATING IN PACE SPONSORED TRAINING**

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>1</td>
</tr>
<tr>
<td>2002</td>
<td>70</td>
</tr>
<tr>
<td>2003</td>
<td>94</td>
</tr>
<tr>
<td>2004</td>
<td>168</td>
</tr>
<tr>
<td>2005</td>
<td>282</td>
</tr>
</tbody>
</table>

**INCREASING CAD/CAM/CAE-RELATED COURSES ILLUSTRATE ACADEMIA'S POSITIVE RESPONSE TO THE DIGITAL WORLD**

- **6,580** - number of students, globally, who completed 264 CAE-related courses
- **441** - number of students enrolled in courses that utilized Alias tools
- **89** - percentage of PACE Institutions with an established PACE Laboratory
- **42** - percentage of engineering institutions using NX exclusively for CAD
- **38** - number of creative design-related courses utilizing Alias AutoStudio and/or Maya
- **28** - number of students who achieved certification: 5 CAD Certification; 2 SAE CAD Professional Certification; 21 UGS Certification
- **12** - number of robust Sun Microsystems servers deployed to support PACE related curricula
- **1** - number of PACE Design Institutions teaching Alias tools in the first year of study

**PACE INSTITUTIONS REPORT UPWARD TRENDS IN RESTRUCTURING CAD/CAM/CAE-RELATED COURSES, MAKING THEM MORE COMPLIANT WITH PACE GOALS**

- **NUMBER OF COURSES**
  - 2001: 2
  - 2002: 6
  - 2003: 9
  - 2004: 12
  - 2005: 15

- **NUMBER OF COURSES RESTRUCTURED**
  - 2001: 0
  - 2002: 3
  - 2003: 6
  - 2004: 9
  - 2005: 12
PACE CONTRIBUTORS – 2005

PACE SUPPORTER – 2005

PACE INSTITUTIONS – 2005

AUSTRALIA
Monash University

BRAZIL
University of Sao Paulo*

CANADA
Dalhousie University
Queen’s University
University of British Columbia
University of Toronto
University of Waterloo

CHINA
Shanghai Jiao Tong University

GERMANY
Technische Universität Darmstadt

MEXICO
Instituto Politecnico Nacional
ITAM
ITESM-Estado de Mexico
ITESM-Monterrey
ITESM-Toluca
Universidad Iberoamericana

SOUTH KOREA
Hongik University*

SWEDEN
University of Trollhättan/Uddevalla

UNITED STATES
Brigham Young University
College for Creative Studies*
Georgia Institute of Technology
Howard University
Kettering University
Lehigh University*
Michigan State University
Michigan Technological University
MIT
Northwestern University
Prairie View A&M University
Purdue University
Tuskegee University
University of Michigan – Ann Arbor
University of Missouri – Rolla
University of Texas at El Paso*
Virginia Tech

* Institutions formally announced in 2005

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