An Academic Approach to Educate PLM

Experiences Gained by Using UGS Software Products in CAD-Training Classes

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Technische Universität Darmstadt

Statistics:
• 13 Faculties
  • 50% Engineering
  • 35% Natural Sciences
  • 15% Humanities
• 270 Professors
• 18000 Students
• 22% Students from foreign countries

Highlights:
• First autonomous university in Germany (since 2005)
• First PACE university in Germany (since 2003)
• One of the leading universities fulfilling Bologna Declaration in Germany
• More than 70 partnerships throughout the world
Department of Computer Integrated Design

Statistics:
- Belongs to the Faculty of Mechanical Engineering
- Head: Prof. Dr.-Ing. R. Anderl
- 17 scientific assistants
- 5 administrative employees/trainees

Methods:
- CAx Modeling an Analyzing
- Collaborative Engineering
- Software Architectures
- Knowledge Management
- Product Data and Process Modeling

Technologies:
- CAx
- Visualization / Digital Mock-Up
- Product Data Management
- Product Lifecycle Management
Introduction

• **Increasing competition forces enterprises to:**
  • Introduce their products faster to the market
  • Develop in less time
  • Reduce costs
  • Improve product quality
  • Increase their ability to innovate

Enterprises push

• Distributed product development
• Collaboration with suppliers and service providers
Universities form the Engineers of the future!

Engineering graduates need:

- To have all necessary technical expertise
- To have the ability to effectively communicate
- To be able to interact in multidisciplinary teams
- To be able to work in intercultural environments
- To be able to think in process chains
Current situation:

• Often graduate level classes
• Sometimes 2D CAD only
• Often tool-teaching only
• No methodology
• Not enough process knowledge
• No collaboration in teams
TUD’s Faculty of ME Philosophy

TUD’s approach:

• 3D-CAD with PDM Interface

• Mandatory classes at undergraduate level for all ME programs

• Students are trained to think along process chains

• Collaboration in teams over PDM system

• 3D-CAD as modeling technique

• Following classes are set on top of the basic CAD training and extend the knowledge step by step

• Design is taught in separate classes following CAD training
CAD Education at TU Darmstadt

- Lecture „Basic CAD-Training“ (undergraduate level)
- Advanced Design Project „Collaborative Engineering“ (graduate level)
- Formula Student Team „TU Darmstadt Racing Team (TUDART)“
Software Tools

Computer Aided Design (CAD):
- NX5 with latest Maintenance Pack
- UG Manager

Product Data Management (PDM):
- Teamcenter Engineering 2007
- Two Tier Deployment
- Portal Rich Client

Courseware:
- Learn2L Learn Data Management
- Deployment over WWW
- Browser as Client
Components of the Basic CAD-Training

- Lecture 2hrs./week
- Tutorial 3hrs./week
- Self-Practice 4hrs./week
- Different sections / content
- On-site training / self-practice
- Related examination
Organization of the Basic CAD-Training

- About 850 students
  - Team 1: 6 students
  - Team 2: 6 students
  - Team 3: 6 students
  - Team 4: 6 students
  - Team 5: 6 students
  - Team 6: 6 students

- About 50 tutors
  - Tutor
  - Tutor

- 2 research / scientific assistants

- CAD-Supervisor

- Students work together in teams
- Mentoring students as tutors (graduate level)
- Supervising research assistants (responsible for the organization)
Topics of the Basic CAD-Training

Using NX 5 and TCE 2007

- Hand sketching
- Part Modeling
- Assembly Modeling
- Documentation
Team Examination

- Parametric modeling
- Packaging
- Documentation
- Visualization
- Project management
- Teamcenter Engineering
- Product structure
- Cockpit
- Engine
- Main rotor
- Back rotor
How to Manage the Course

Examination and learning success:
• Tool for automatic generation of models
• Checker for supporting the correction
• Using Knowledge Fusion

TCE Configuration:
• Complete class structure is implemented
• Using persons, user, groups and roles
• Manage privileges

Workflows:
• Different workflows
• Team communication and organization
• Review tasks for examinations
Advanced Design Project „Collaborative Engineering“

Global project:
- 5 Universities
- Automotive design tasks
- Global teams

Project consists of two main elements:

Seminar series
- Six weekly lectures
- Alternating from different locations
- Submitted via videoconference

Design training
- At least 80 hrs. of practical work

Challenges:
- Different time zones
- Cultural and linguistic differences
- Asynchronous work

Solutions:
- Concurrent Engineering
- Scheduled meetings
- English as working language
Teamcenter tools support:
- "Virtual" teams
- Central database
- Quality gates / workflows
Formula Student Team Darmstadt

Formula Student Competition:
- International design competition
- 250 Universities
- Design of a race car in a virtual company

TUDART Team:
- 40 students
- Design in NX
- Using Teamcenter Engineering
- 2nd best newcomer at Hockenheimring 2006
Conclusiones

- PLM is a framework of strategies, abilities and tools and therefore has special challenges for education

- 3D-CAD with PDM Interface at undergraduate level classes is challenging but not impossible

- The introduction of PDM technology leads to a more structured class

- Properly set up PDM technology can help with medium/large class administration

- Teamwork in CAD classes trains both social competences and skills in using groupware technology
Thank you

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