

Project Oriented Learning Environment

An Interdisciplinary Learning Platform for Students of Partner Universities Using Modern Information and Collaboration Technologies

# Project Sun&Shade

Participation for Students in

Industrial and Product Design Electrical Engineering Mechanical Engineering Computer Science Plastics Technology and Material Science Process Management

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Schenker

Blinds

Assignment Spring/Summer Term 2008 University of Applied Sciences Northwestern Switzerland

## **Organisation POLE**



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## POLE - A Platform for Learning and Teaching

University students are nowadays increasingly challenged within their specific core disciplines; in addition however, they are also supposed to develop skills in order to apply this particular knowledge in practice. This ideally goes hand in hand with a sense of maturity of the individuals' characters vis-à-vis the social, cultural, and economical environment. The practical application of theoretical knowledge can thus only be implemented successfully if these three basic elements are taken into account.

In addition to university students' disciplinary knowledge, the ability to work efficiently within multicultural environments has become increasingly important. Universities are therefore looking to expand and deepen this particular aspect in order to provide the necessary expertise in this field. This realisation has led to universities becoming more proactive with regards to networking and offering joint courses, which is where POLE (Project Oriented Learning Environment) is actively involved in. In the course of this new collaboration, it has become apparent that the complementary aspect has gained in importance. An example for this is the liaising between strongly research-oriented and more practically oriented universities with the common goal of being able to implement the according results as soon as possible. Apart from contributing to more comprehensive and efficient process work, the POLE courses lay particular emphasis on improved cultural know-how.

In order to do this, students are encouraged to contribute their experiences within international teams, regardless of geographical and language barriers.

POLE sees itself as a learning system cooperating with other European or international universities. It does so within a reflexive context, taking into account the various cultures involved in order to create new methods of resolution regarding teaching and learning methods. The students are at the core of this concept, and are given the option to develop process-oriented expert knowledge through interdisciplinary teamwork. Simultaneously, they learn to work independently and to deal with current problem cases through the use of modern information and communication tools.

Processes within POLE are largely organised within the individual teams themselves. The according goals are set and committed to within the teams; in case of resulting conflicts, weight is given to iterative processes in order to find solutions. A further characteristic of POLE is an increasing tendency for the overlapping, or even amalgamation, of various lines of work in order to give way to new, holistic, and interdisciplinary perspectives. POLE is a comprehensive platform which gives students the opportunity to contribute their full potential. Each individual's attitudes, characteristics, and abilities are taken into account as a whole in order to allow as much space as possible for independent development of students' responsibilities and skills. A contribution to the concept of 'Campus in Mind' is made by POLE in providing the multi-disciplinary teams with learning facilities that are based on experimental and interactive technologies.

The teamwork in the POLE courses allows the students to further expand their specific professional skills, on the other hand; it also gives them the opportunity to develop more generic competences, which nowadays is one of the key qualifications in order to be able to adapt to a continuously changing environment. The course also enables students to evaluate their ability to function in a team and to analyse their styles of communication. Through practical examples, students are given the opportunity to explore how well they are able to work in a team, and to what degree they are flexible to accept members' concerns from other disciplines, i.e. how they can integrate these into their own work and patterns of thinking.

Experts and mentors which do not form part of the university, but are active members of businesses and the industry in general, are an essential part of POLE courses. Their participation contributes a high degree of practical knowledge to the projects, pointing out the actual 'state of the art'. In this manner, POLE manages to link academic education and professional practice. The intensive interaction between these two elements guarantees a rapid transfer of technology, while at the same time ensuring that the students involved are motivated to a high degree.

POLE is not only about to significantly remould the landscape of teaching and learning at universities, but it also intends to wield substantial influence concerning decisionmaking and the creation of practical work processes. In association with university teaching staff, the mentors are instrumental in contributing expert knowledge and regular feedbacks to the teams, while they are also actively involved concerning the evaluation of processes and related products. The latter will be of increasing importance in the future, as scientific research has been initiated in connection with reflections of certain POLE processes. It is the intention of this kind of research to support students with regards to the awareness of their personal learning styles. The findings will then be made accessible for future work in a broader context.

Further POLE research issues include for example the creation of knowledge databases, which will serve as a tool for more rapid evaluation of solutions and decision making processes in the future. These efforts are based on the knowledge that a large part of creational, construction, and design processes are substantially shaped by re-design. The initial POLE courses had been launched as a result of the ever increasing demands in the current building trade, which is of a highly complex, segmented, and competitive nature. Experts from the fields of architecture, civil engineering, and construction management are clearly demanding a broader education, along with more diversified core skills for engineering students. The POLE learning environment and its associated methodology is not limited to this initial context, but allows students from practically any discipline to apply their theoretical knowledge in practical cases. Through collaboration in interdisciplinary teams guided by process management students, students from fields such as architecture, urban planning, civil engineering, interior design, plastics engineering, mechanical engineering and economics were given the opportunity to cooperate in POLE projects and thus better understand the individual processes involved and acknowledge their relation to the social, economical, and political dimensions.

The present POLE course offered during the spring/summer semester 2008 will bring together the disciplines of industrial and product design, mechanical engineering, electrical engineering, computer science, plastics technology as well as material science and process management with students and faculty from University of Applied Sciences Northwestern Switzerland, Swiss Federal Institute of Technology ETH Zürich, Zürich University of Applied Sciences, Helsinki University of Technology HUT (Finland), Aalborg University (Denmark), Olin College Boston and Stanford University (USA).

## **Responsibilities of POLE and its Partner Universities**

POLE considers itself as a learning platform which enables and facilitates interdisciplinary processes. It has also proven to offer an excellent test bed for research in the field of modern teaching and learning as well as in the field of evaluation of novel learning spaces. At the same time it is important to put on record that the responsibility for the disciplinary supervision of the students remains with the sending home universities. This relates also to the grading of the students' contribution. POLE on the other hand will provide a qualification on the team processes and on their interaction patterns. (It is suggested that students who successfully participate in POLE projects receive academic credits based on the ECTS.) The experience during the previous POLE courses has revealed that this double responsibility of the student towards his/her POLE team and towards the home university and professors, respectively, may also bear conflicts. POLE demands that team decisions be respected what the approach and the agreed objectives is concerned; POLE leaders are convinced that within this frame work there is still ample tether to adhere to high academic standards in the disciplinary work.

Saying this makes it obvious that a close accompaniment and monitoring of the project by the faculty of the partner universities is essential and highly welcomed by POLE. The involved faculty will receive full access to all documents of the POLE project. Their participation during the kick-off events, the reviews and the final presentations will add to the interdisciplinary depth and thus to the quality of the project and to further developments of POLE.

#### Assessment

POLE has the ambition to continuously improve its learning and teaching platform. One step to do so is by integrating an external assessor into the process, who will participate in as many of the POLE design activities. POLE has cooperated in this field of evaluation and assessment with the Department of Education of the University of Applied Sciences Northwestern Switzerland and with Stanford University since the very beginning in the year 2000. The participatory assessment will focus on the effectiveness of the design processes and the adequate use of collaborative communication technologies.



## Sun&Shade Project Task

Theme: Innovative Concepts for Novel Sun Protection Systems

Sunlight is essential for life on earth. But, besides its life-supporting quality, sunlight also bears imperilling characteristics due to the ultraviolet part of its spectrum: This latter radiation can harm the skin and even cause cancer. But it's not only these acute dangers that have motivated men to invent means of sun protection: The purpose of the innovation was to optimize their living and working conditions in the shade with lower temperatures and/or reduced illuminance values.

Schenker Blinds Inc. has been the market leader in sun protection systems in Switzerland and beyond for may years and decades. Its palette of products ranges from parasols, high tech shutters to indoor products and full scale automated sun protection concepts for buildings. As an innovative company, Schenker Blinds is also involved in field-related research.

In the context of this year's POLE project Sun&Shade novel concepts of sun protection will be developed in cooperation with Schenker. The project task will take a special focus on the use of sustainable materials and low energy consumption for the production of the product (as well as the pre-processing of the materials used) and in particular for the motorized versions of the systems. The proposed solutions will also have to take into consideration means of self-controlled mechanisms to prevent damage due to wind or climatic influences. In addition modular systems are sought for which allow for flexible and aesthetically appealing arrangements.

Starting out from existing Schenker systems which often don't fulfil adequate ergonomic criteria, the Sun&Shade project envisions new concepts which extend the functionality as well as improve the comfort of handling.The analysis of the usability and the reflection on improvements of conventional devices are key parts of this POLE Sun&Shade project.

The design task is quite open for innovative contributions. It invites and anticipates solutions for indoor as well as outdoor façade applications. In addition to the design aspects it is also expected that the marketability of a new product and price issues are kept in mind.



The task will be discussed in more details with professionals and experts from Schenker Blinds Inc. during the kick-off week when visits to the company's headquartes (in Schönenwerd, Switzerland) and production sites (in Thanvillé, France) are planned. A comprehensive list of requirements shall be disclosed by Schenker Blinds Inc. at its research and production facilities during the kick-off week.

The structural design of the system will challenge mechanical engineers' thinking as well as make use of knowledge of material science and plastics technology. The integration of new electro- or hydraulically active systems (incl. sensors) must be investigated. The complexity of the design task definitely requires multidisciplinary teams consisting of students from technical as well as artistic disciplines. Especially today's architects' requirements of systems which are invisible, slender and never the less do their job as windstabile and efficient sun protectors form a challenging task for the entire team.

## **Process Design**

POLE as a platform for learning and teaching not only focuses on the product but puts strong emphasis on the structuring of the design process. The following list of deliverables shall facilitate the work process for the teams as a back bone.

## Deliverables

#### At the end of the kick-off week (February 23, 2008):

- Written statement of the team's objective(s)
- Concept of the information management (using ICT) by each team
- Description of the anticipated contributions of each student as a member of her/his team
- Commitment of each team member on a (preliminary) milestone structure

#### At the first review (March 26, 2008):

(duration of presentations 30 minutes/team)

- Product definition and list of requirements (incl. user needs)
- Market analysis (competitors' products)
- Verification of team's collaboration strategy (List and structure of teams' documents)
- Clarification of contributions of each team member (written document); reflection about changes or confirmation of one's own role within the team
- Intermediary results, presented on the intranet (1 day prior to the review)
- Refined sketches of envisioned product

At the second review (April 30, 2008):

(duration 30 minutes/team):

- Intermediary results, presented on the intranet (1 day prior to the review)
- Verification of roles within the team
- Selection of validated concept
- 1st versions of all deliverables due at the final presentation
- Clear concept of final prototype
- Definition of remaining milestones (segmentation; who does what?)

#### Final presentation (June 10 2007):

Presentation of all relevant results on POLE's Sun&Shade Project intranet portal. (by June 8, midnight) Note: Inputs will be blocked thereafter!

- Oral presentation (duration: 45 minutes/team) for colleagues, faculty and jury –including: Comprehensive documentation of product, production method(s), usability.
- Fulfilment of targeted specifications
- Potential for future research and development of Sun&Shade follow-ups
- Detailed evaluation of individual learning and insights

- Comments on success factors and/or pitfalls of interdisciplinary design teams
- Suggestions for future POLE projects
- Oral presentation of a management summary for a delegation of Schenker's directorate (duration 10 minutes/ team)

## Deliverables (hard copy)

#### At the end of the kick-off week:

- Written statement of the objective(s)
- Concept of the information management (using ICT) by each team

#### At the first review:

- List of documents and document structure
- Refined sketches of envisioned product

#### At the second review:

- Refined process plan (milestones) for final phase of the project
- List of target specifications

## Final presentation:

- Visualisation of proposed design by 3D renderings.
- Prototype or mock-up of final product
- Comprehensive documentation through physical documents (e.g. scaled technical drawings according to production standards) of

   product
  - production method(s)
- usability
- Video simulation of operational procedures
- Documentation of development process

# Information and Collaboration Technologies ICT

With its interactive 'i-room' POLE is offering a modern infrastructure with respect to information and communication technologies (ICT). POLE encourages the partner universities to support their students with respect to ICT as much as possible, in particular granting them access to their own information technologies.

The following list of ICT tools characterizes the necessary standards:

• 24 hours per day access to work stations, so students can work on their tasks and are able to communicate at all times

- Access to telephones with international access for conference calls
- Video conferencing facilities (available at least 2 hours per week and team)
- Suitable IT support (firewalls, basic support)
- Broad band internet access
- MS-Office including PowerPoint, Acrobat Reader, ZIP and FTP programmes

During the kick-off sessions POLE will provide instruction in the use of data transfer tools for the sharing of the use of video conferencing as well as in disciplinary applications. Restriction: It must be noted that for synchronous communication there is only support provided by POLE for operating systems Windows 2000 (and higher). The POLE ICT experts will also assist the teams in terms of security of internet interactions in the confidentiality context.

# **Team Composition**

The POLE Sun&Shade course is based on the partnership of University of Applied Sciences Northwestern Switzerland (with its faculties of industrial design, plastics engineering, electrical and mechanical engineering and computer science, process management), Aalborg University (department of production and institute for architecture & design), Zürich University of Applied Sciences (departement of mechanical engineering), ETH Zürich (institute for mechanical systems), Helsinki University of Technology (departement of engineering management), Olin College Boston (department of design and mechanical engineering) and Stanford University (CDR center for design research).

Approx. 30 students in five interdisciplinary teams will work on the design and development of a novel sun protection system for Schenker Blinds Inc. under the guidance and supervision of 10 faculty members.

# **Evaluation Criteria**

The evaluation of the project results will be in the duty of a jury. It will consist of one member of each discipline and two members of the POLE directorate. Each team will receive a report with an acknowledgement of the contributions according to the following criteria: (1) fulfilment of Schenker's requirements (a list of specifications will be handed out during the kick-off week by the patron), (2) usability, (3) innovative potential of solutions, (4) suggested production methods, (5) presentation of product, (6) general impressions.



## **Confidentiality Agreement**

Due to the high potential of such a novel product Schenker Blinds Inc. and POLE have agreed to respect a confidentiality agreement which in turn has to be signed by all partners involved in the project.

Individual copies for each participant will be ready for signature at the kick-off event.

## **Budget for production costs**

Each team is granted a budget of max. CHF 1'500 for material and production expenses. Payments can only be made by POLE against bills or (signed) receipts.

## Cost of living and accommodation

Thanks to the financial support of sponsors and the industry partner Schenker Blinds Inc., POLE is able to partially subsidize the cost of living and those for the documentations and hand-outs for the participating students. Nevertheless, a contribution total of 200 Euro for the kick-off week and the final presentation events will be charged to each student. The participants are also responsible for insurance matters.

#### Program Spring/Summer Semester 2008





www.pole-project.ch

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