6TH INTEGRATED PRODUCT DEVELOPMENT WORKSHOP
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INTEGRATED DYNAMIC PRODUCT DEVELOPMENT

A two-year International Master Education Program for Bachelors in Science to become Masters of Science (MSc) in Integrated Dynamic Product Development (IDPD) is offered for students who want to contribute to improved quality of life in a wide perspective. The education is at high academic level at the same time as it prepares the students for practical professional work.

1 Background of the Program

Individuals and companies in the western hemisphere have a long history in developing inventions and research findings to new products and transforming them into successful innovations – i.e. new products that have been sold and taken in use in huge numbers. During the last century many of these innovations have developed to be larger business units.

However, the last 10 – 20 years a strong trend has been to concentrate on few businesses or one business, making it difficult to take on new ideas and products outside these businesses. Another newer trend is that the production of an innovation, when it has reached a certain production duration, is pushed away more and more to countries where labour costs are lower, safety rules are less restrictive, and environmental laws are less developed, etc.

The two mentioned trends are problematic for western societies, which put strong demands on increased innovative activities in companies, countries and regions. This is the bearing principle of the new master program, which mixes as well traditional principles as Integrated Product Development (IPD) for incremental development going out from well defined customer needs and Dynamic Product Development (DPD) which is used when more radical steps must be taken based on wants and wishes. Of this reason the program is called Integrated Dynamic Product Development - IDPD.

2 Highlights of the Program

To be accepted for the Master Education Program, a Bachelor in Science or an equivalent grade is needed. Students with practical experience is accepted before students without such experiences.

The aim of the program is:

- to prepare students in a holistic and practical way to perform and to lead the development of new or the improvement of existing products,

- to prepare them to apply the new knowledge within all fields of Mechanical Engineering and many adjacent areas like e.g. Mechatronics and assistive products, and

– to prepare them to conduct innovation management, i.e. to start up new businesses on their own or within an existing company.

The education is given in English. Teachers are recognised international experts both from industry and university. An e-learning portal is used both for efficient learning and for the administration of the education.

To our knowledge, so far no similar program exists in Europe. The program is in accordance with the Bologna resolution. It is valued with 120 ECTS points.

3 The Bases of Success of a Company: Products and Innovations

Every product has a commercial product life cycle (PLC) that starts with the product being brought to the market (either as a completely new product or as an improvement of an existing one). It ends with the product being discontinued when sales have dropped and/or profit levels become too small or negative. PLC varies from less than a year for software products to decades for mechanical products.

However, PLCs are getting shorter and shorter. If a company doesn't have new or improved products ready for the take over when one product is to be discontinued, the company will loose the market for this product, which may lead to serious financial disadvantages. Therefore, the continuous development of new and /or improved products is the crucial factor for any company that wants to stay in business. Investigations also show that companies developing new product “in-house” are more profitable then companies that do not develop new products in-house but instead acquire companies with new product.

New products and innovations can emerge from new discoveries, new inventions, and/or new product ideas. Discoveries are often the result of research in physics, medicine, chemistry and biology. The development of products from discoveries is sometimes called "technology push" and the market activities are called “innovation push", as the pioneer customers have to be convinced to buy the products. Development based on customer needs is called "market pull".

From when the products have been sold and taken in use, re-engineering takes place to secure that the market need for the products are conserved as long as the products are not regarded to be old-fashioned by the market. Re-engineering or adaptation is in general easy to plan. Its return on investment can easily be calculated, which is opposite to the situation when innovative development is to be done. The most complete development method for this type of development is Integrated Product Development (IPD).

New product development has become increasingly complex as the development situation changes all the time in a way (e.g. by permanent changes of customers' requirements, the so-called "running targets") that is difficult or impossible to plan for. Often it is in advance not possible to give time and cost frames. In addition, chaotic situations tend to occur within shorter intervals in the society and the nature. For this type of development the principles of Dynamic Product Development (DPD) is used.

4 Outline of the International Master Education Program

The Master Education Program, which lasts for two academic years, will bring useful knowledge about innovation techniques, product development and how to establish new products on the market. Although technical development of the product will be in focus, production development, market development and business development will be thoroughly covered both in theory and in projects collected from industry.

The education consists of eight courses covering all necessary aspects of product development, accompanied by continuous project work (at least one project per semester) and a Master Thesis amounting in total 120 ECTS (points within the European Credit point Transfer System). The size of the program offers enough opportunities and space to learn the syllabus carefully and to deepen the acquired knowledge.

Project work, traditional lectures and seminars will be used during the presence phases at the university (about 40 % of the education time) that will be scheduled into students' holidays and two-day weekend courses. The remaining time, students will perform self-studies using the e-learning portal over which also information is given and communication is done.

The layout of the education is:

- Industrial economy: What the product developer needs to know about it in the daily business: Business Management, book keeping, law questions, patents & immaterial rights, innovation financing, advanced methods of cost-benefit-analyses (10 ECTS)

- Information & Communication Technologies Update: Systems and approaches for product modelling, information logistics, simulation & evaluation, Product Lifecycle Management (PLM), optimisation approaches and systems, web-based collaboration (11 ECTS)

- Knowledge Management: Knowledge acquisition, application & handling, storage & retrieval (5 ECTS)

- Integrated Project Management: Dynamic project navigation in order to manage development projects in international and turbulent environments that run in different locations (5 ECTS)

- Innovation Techniques: Human resources, entrepreneurial management, market prospecting, marketing & sales, resources, organisation, and distribution (11 ECTS)

- Dynamic Product Development: Scientific base and mind-setting, ethics & moral, tools & methods, Design for "X" (where "X" represents any other topic except development, e.g. manufacturing, assembly, service etc.), Design to Cost, packaging design, production process design, sequence-less design (26 ECTS)

- Industrial Design: Added value of Industrial Design, aesthetics and ergonomics, process and quality (5 ECTS)

- Research Methodology: Research perspectives, questionnaires and statistical treatment, Action Research, writing & evaluating scientific papers (11 ECTS)

As a preparation for the Master Thesis, an accompanying project work has to be accomplished during the teaching period (6 ECTS).

The Master Thesis shall be based most preferably on a task from the student's company. It will be carried out as an Insider Action Research project securing both a scientific level and usability for the company. Expected duration time is six months. Two members of the teaching personnel and one member of the company (30 ECTS) will supervise the thesis work.

The Master examinations are carried out under the supervision of the university, which also issues the Master of Science grade.

5 Quality Assurance

A supervisory board with representatives from industry and research assures the quality of the Master Program. This is done from the following viewpoints:

- Contents quality and actuality: Requests from participants; experiences from numerous and various projects with industry; research results; experiences from graduate study courses in Magdeburg (Vajna) and Linköping (Ottosson); results of the international IPD workshops (www.ipd-workshop.de)

- Teaching quality: Teachers are recognised experts in their areas of knowledge; provision of strict teaching rules; teachers' evaluation by participants; monitoring by the supervising institution; parallel provision of contents in e-learning portals

- Examination quality: Study orders and examination orders are similar to University orders; reproducible written examinations (actually 7); strict rules and conditions for oral examinations (actually 5); the acceptance of the Master Thesis is decided also by the enterprise where the thesis was performed

In parallel to these measures, the Master Program will be either accredited by an international agency or will undergo a peer-to-peer evaluation.

6 The Home Institution

The International Master Education Program was created and is executed by the Chair of Information Technologies in Mechanical Engineering at the Otto-von-Guericke University in Magdeburg (http://lmi.uni-magdeburg.de).

Research topics of the chair include Integrated Product Development (IPD), Autogenetic Design, Dynamic Process Navigation, Product Lifecycle Management (PLM), 3D-CAD product modelling, product optimisation, calculation methods of the economic viability of new technologies. In 2000, the chair created a graduate study course in IPD and has run it responsibly since then. Further lectures are given in Product Modelling, CAx, PDM, Interfaces and Archiving, Knowledge Management, and Project Management.

Head of the chair and co-chair of the Master Education Program is Professor Dr-Ing. Sándor Vajna. He has 25 years of experience within industry (head of product development and

information management of automotive and electric products) and research on the above-mentioned topics. He has written more than 250 articles and conference contributions as well as books within his specialities. Prof. Vajna is an internationally well-known expert in Integrated Product Development of mechanical products and in Information Technologies in Mechanical Engineering. He is on conference committees of international conferences (e.g. ICED conference series) and is member of the editorial boards of the journals "CAD-CAM Report" and "eDM Report".

The other co-chair is Prof. Dr.-Ing. habil Stig Ottosson, who, coming from Linköping University in Sweden, was enrolled 2004 to deepen the activities of general product development and innovation management. His expertise is both in Dynamic Product Development and in Innovation Management. Professor Ottosson has 20 years of industrial experience as head of product development and innovation management activities. He is an internationally well-known researcher in Product Development and Innovation Management and has written a large number of articles and conference contributions as well as books within his specialities. Prof. Ottosson is on the conference committees of international conferences and is member of the editorial boards of e.g. "Technovation" and "Journal of Engineering Design".

Prof. Dr.-Ing. Prof. h.c. Sándor Vajna

Born 1952 in Budapest, Hungary
Full professor, head of chair since August 1994

Prof. Dr.-Ing. h. Stig Ottosson

Born 1947 in Åmål, Sweden
DAAD guest professor since October 2004

7 Who shall attend?

The International Master Education Program in Integrated Dynamic Product Development is intended for people with a grade of Bachelor of Science (at least), having several years of practical experience. Due to its holistic approach, it is open for those working in product development or in adjacent areas, like e.g. marketing, styling, production process planning, manufacturing, etc. In this context "product" doesn't necessarily mean a physical product only. On the contrary, it has been successfully shown in a lot of different industrial projects, that the approaches of IDPD are applicable to any kind of products, like e.g. services, consultancy, or teaching elements. Furthermore it has been shown that applying the approaches of IDPD, significant improvements in product and process performance can be achieved.

The two chairmen of the IDPD Master Education Program will be pleased to give you more detailed information on performance gains upon request.

8 Applications

To be admitted to the International Master Education Program an applicant must have a BSc degree, preferably in Engineering or in adjacent areas. After the applicant has sent in her/his application, an admittance board will evaluate the application and will decide whether the applicant will be invited for an interview. If the applicant passed the interview, he will be accepted to the education. Applications can be sent in at any time.

New classes usually start once a year with the beginning of the winter semester (October 1st, however, for more information, please see the exact dates given on the home page).

If an institution desires to send a reasonable amount of students, other starting dates can be agreed upon request for this group.

More information
Prof. S. Vajna, vajna@mb.uni-magdeburg.de, phone +49 391 67 18794
Prof. Stig Ottosson at stig.ottosson@tervix.com, phone +46 708 905 714