

Yamaguchi University's Activities toward Advanced Human Resources Cultivation

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Background (1)

- The cabinet decided the “**Basic Policies for Economic and Fiscal Management and Structural Reform 2006**” on July 7th, 2006.
- These policies were presented by the “**Council on Economic and Fiscal Policy**”.
- The “**Basic Policies**” pointed out a variety of issues confronting Japan, e.g.,
 - intensification of international competition,
 - fiscal deficits,
 - acceleration of demographic aging, and
 - varying levels of domestic inequalities (i.e., (1) the regional imbalances, (2) inequality in education levels, and (3) inequality in job opportunities)

Background (2)

- Among the many approaches to these issues, the followings are related to management of technology (MOT):
 - Enhancement of international competitiveness
 - Improvement in productivity by introducing information and communication technology (ICT) and/or shifting to service industry
 - Vitalization of small and medium-sized enterprises (SME) in each region
 - Establishment of education system to realize the society that offers chances to try again

Motive of this workshop

- In order to enhance the international competitiveness of Japan, various types of innovations, including the improvement in productivity by ICT, are necessary.
- However, innovations should be realized by the regional communities not the state according to the principle of **“From the state to the regions”**.
- The regional innovations will be driven by cultivating human resources capable of managing technologies, i.e., assessing the potential of technologies and developing them into businesses.

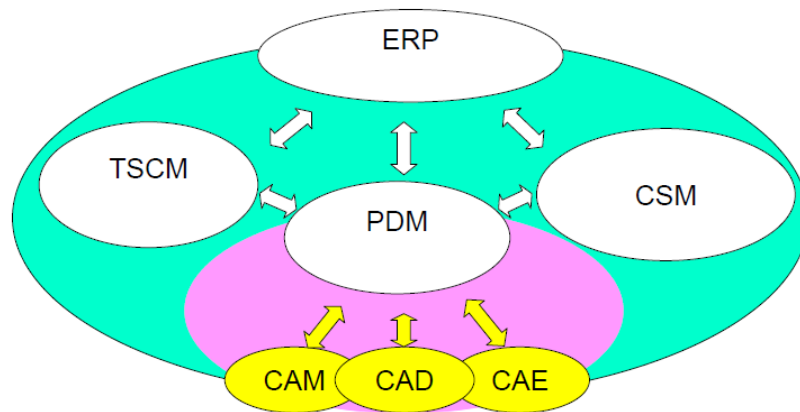
Speakers of this workshop will present

- advanced cases and ideas regarding the cultivation of human resources toward regional innovation.
 - Professor Xie will present the perspective about MOT education on the based of Chinese cases.
 - Professor Duysters will show the advanced ideas on the innovation strategy.
 - Dr. Sandhu will indicate the importance of ICT on enterprises.
- The participants in this workshop may learn the cases and ideas and put them to good use.

Yamaguchi University's Activities

- Graduate School of Innovation and Technology Management, Yamaguchi University (YUMOT) was established in 2005.
- It becomes a base of the MOT education in western Japan and is challenging to cultivate regional human resources.
- The followings are YUMOT's ongoing projects for human resource cultivation:
 - Technology-management Education by Amalgamation of a University and Enterprises
 - Selected as the "Promotion program for education in the professional graduate schools" of Ministry of Education, Culture, Sports, Science and Technology (MEXT) in FY 2006 and 2007
 - Systematic Education for Cultivating Regional Human Resource and Realizing Advanced Manufacturing using "Analysis-led design (ALD)"
 - Selected as MEXT's "Promotion program for education corresponding working people's needs" in FY 2007 – 2009

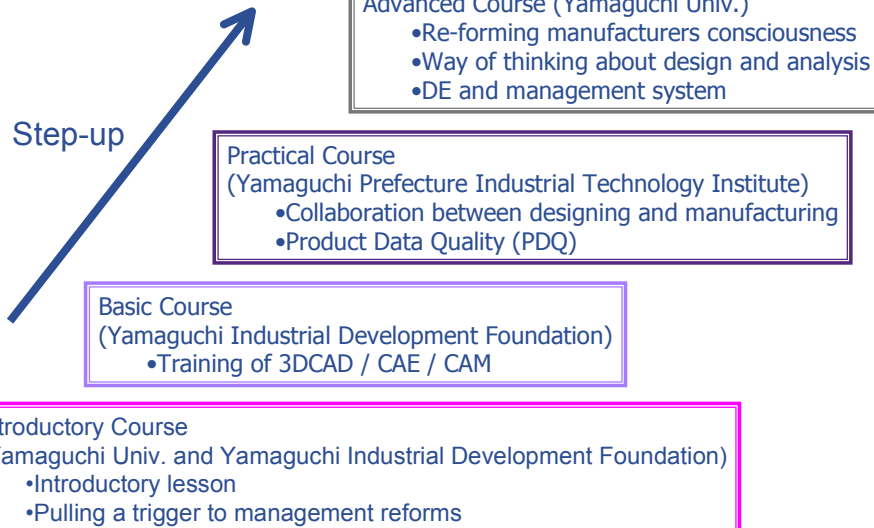
Scheme of Digital Engineering



Importance of Digital Engineering

- **Digital Engineering for Manufacturers**
 - Digital engineering (DE) technology is now spreading globally for manufacturing high-quality, low-cost, and quick-delivery products
 - Introducing DE and constructing management system using DE is an urgent and crucial concern to survive against international competition
- **Digital Engineering for Management of Technology (MOT)**
 - Digital engineering is an ongoing innovation in manufacturing and important subject in Management of Technology

Collaboration with Regional Institutions

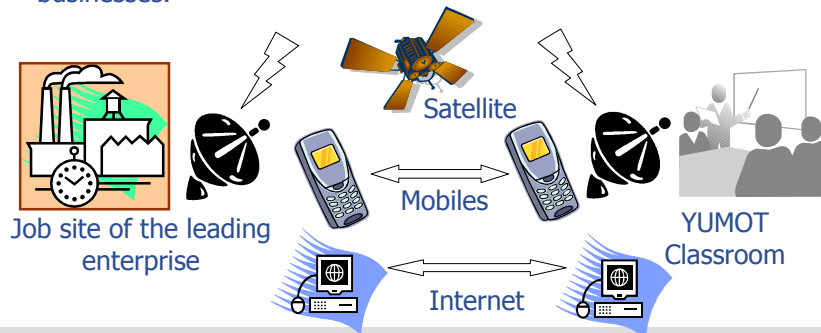


Digital Engineering Education

- DE doesn't lead to management reforms if manufacturers don't understand the underlying philosophy as well as formal knowledge and technological skills
 - New education system, in which manufacturers learn the underlying thought of DE from the job sites, is necessary
- Using **"the remote lecture system by satellite, mobiles, and the internet"** is one of the solutions

The remote lecture system

- By using the remote lecture system, classrooms in YUMOT can connect with the job sites of leading companies.
- Managers, technicians, and engineers of manufactures participating in DE education in YUMOT can discuss with the staff of the leading companies, extract tacit knowledge from "Living Education Material", and learn the way of thinking to full use of DE and improve their businesses.



Practical example of DE education

- **Time and date:**
 - 10:00 – 15:00, March 17th, 2007
- **Intended students**
 - Manufacturers with a deep interest in DE in Yamaguchi prefecture
- **Contents**
 - Transfer of the formal knowledge regarding DE and Motivation for introducing DE
 - 10:00 – 12:00
 - Mr. Keiji TOYODA (Amada)
 - He gave a presentation about introduction of DE in the sheet metal processing and innovation of management by DE
 - DE Practice: "DE seminar"
 - 13:00 – 15:00
 - The Graduate school of innovation and technology management , Yamaguchi University (Ube city) and Amada's solution center (Isehara city) were connected by satellite
 - Amada showed Virtual Prototyping Simulation System (VPSS), i.e. a virtual factory
 - Students learned the essence of DE by seeing VPSS and discussion about it

Scenes of DE Seminar by Satellite



Yamaguchi Univ.
(Ube city)



Amada's solution
center (Isehara city)



Satellite Relaying System

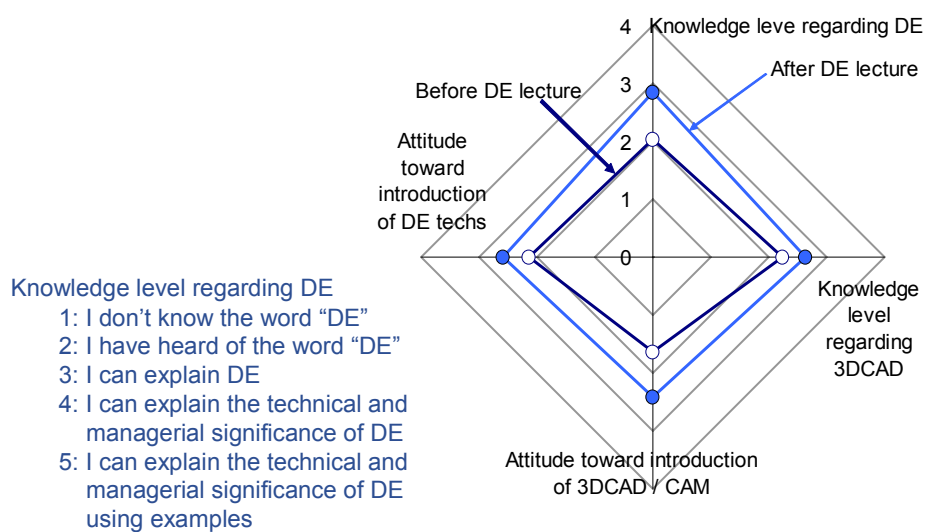


Video

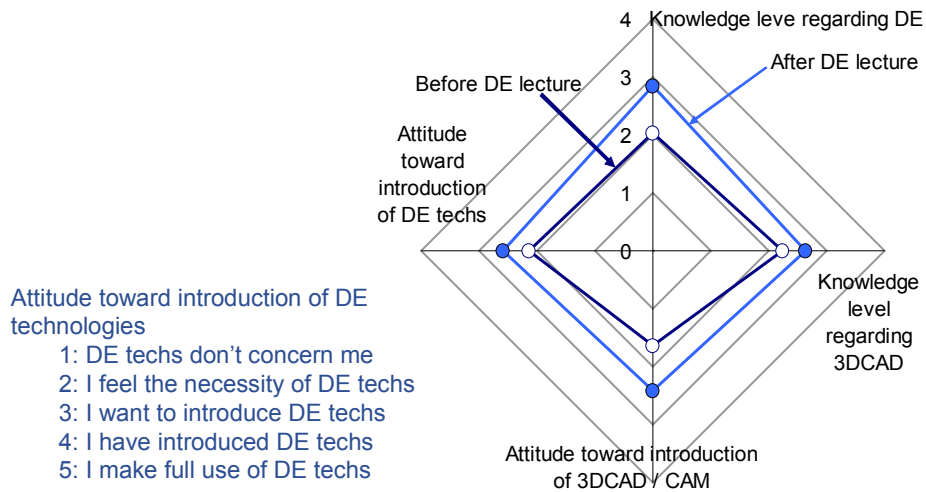
Educational Evaluation

- Method
 - Students declare states of the knowledge and awareness regarding DE before and after the DE seminar
- Evaluation items
 - Knowledge level regarding DE
 - Knowledge level regarding 3DCAD
 - Attitude toward introduction of 3DCAD / CAM
 - Attitude toward introduction of DE technologies

Results of Educational Evaluation



Results of Educational Evaluation



Depth of knowledge

- Option 1: Graded Words, Same Target
 - **BE AWARE** that atoms are made of electrons, protons, and neutrons.
 - **KNOW** that atoms are made of electrons, protons, and neutrons.
 - **UNDERSTAND** that atoms are made of electrons, protons, and neutrons.
- Option 2: Same word, Graded Targets
 - KNOW that **atoms have parts.**
 - KNOW that **atoms are made of electrons, protons, and neutrons.**
 - KNOW that **atoms have a nucleus of neutrons and positive protons, surrounded by a cloud of negative electrons.**

AAAS, Project 2061, *Benchmarks for Science Literacy*, 1993

Conclusion / Future Prospects

- The necessity of human resource cultivation and innovation in regions was explained according to the policies of the Japanese government.
- The DE education projects were shown as examples of Yamaguchi University's activities toward the advanced human resources cultivation.
- To make manufacturers learn the underlying thought of DE from the leading job sites, YUMOT used the remote lecture system.
- Results of evaluation showed that this system was effective for manufacturers.
- The achievement of the project will be reflected to the successive DE education projects.