

Digital Engineering Education by Amalgamation of a University and Enterprises

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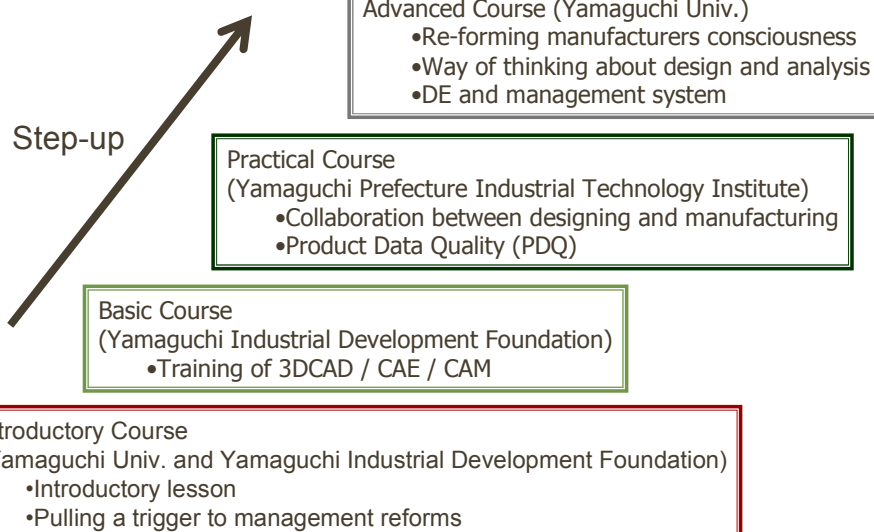
Background

- 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 and Management of Technology (MOT)
 - Digital engineering is an ongoing innovation in manufacturing and important subject in Management of Technology
- However, the new knowledge, 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

DE Education in Yamaguchi Univ.

- 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
 - Official name: "Technology-management Education by Amalgamation of a University and Enterprises"
- We started MEXT's "Promotion program for education corresponding working people's needs" in FY 2007 – 2009
 - Official name: Systematic Education for Cultivating Regional Human Resource and Realizing Advanced Manufacturing using "Analysis-led design (ALD)"

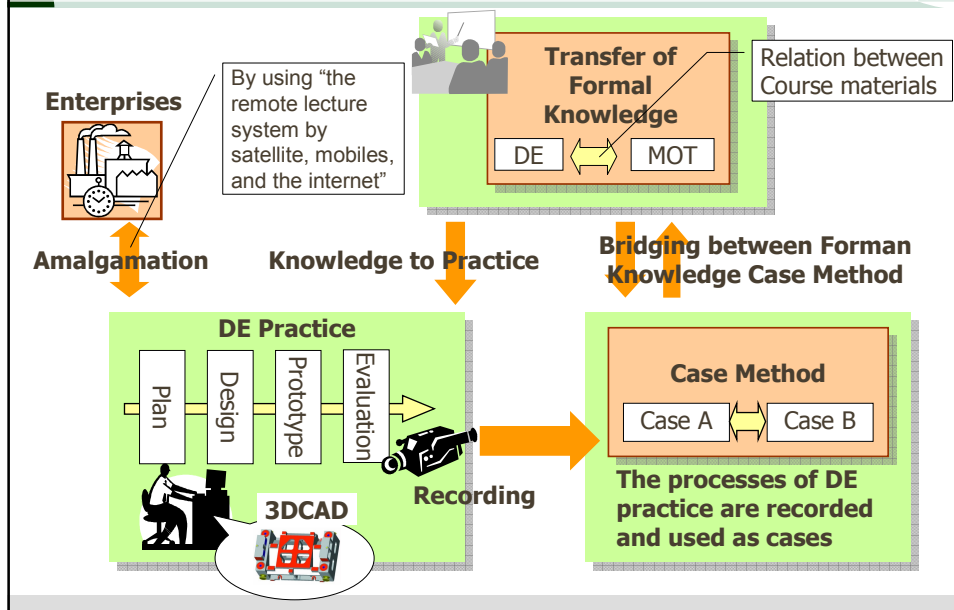
Collaboration with Regional Institutions



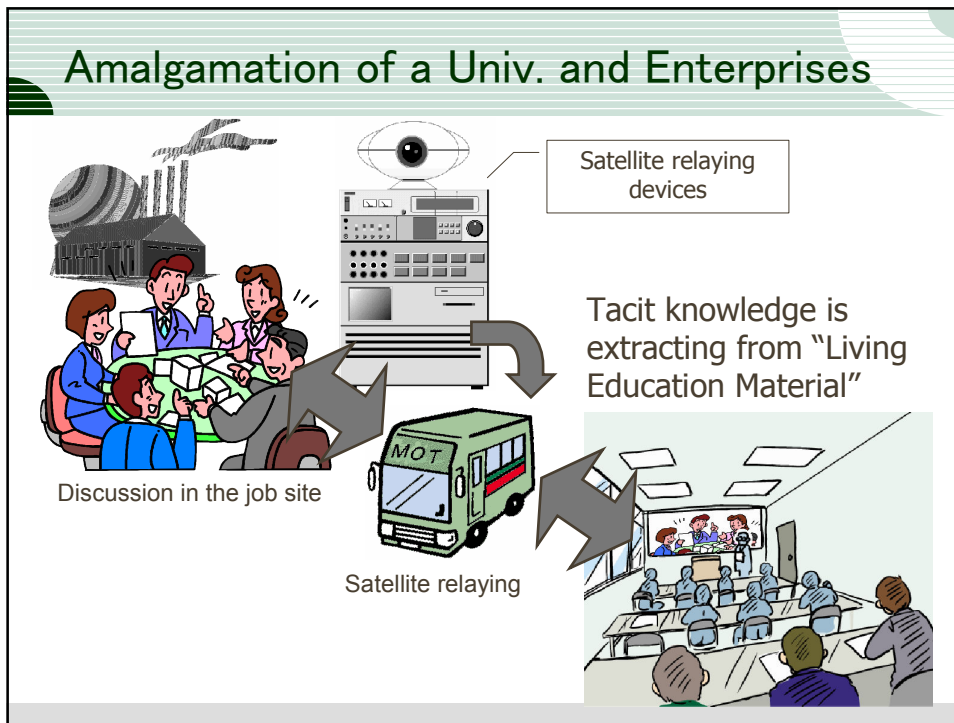
Brief explanation of the project

- Intended Students
 - Engineers who want to
 - Introducing DE and
 - Constructing new management systems using DE fully
- By using “the remote lecture system by satellite, mobiles, and the internet” developed in FY 2005, the following educations are carried out:
 - Transfer of formal knowledge regarding DE and MOT by class room lectures
 - DE practice in which students, lecturers, and enterprises participate and discuss
 - Case method using the recorded process of the DE practices as cases

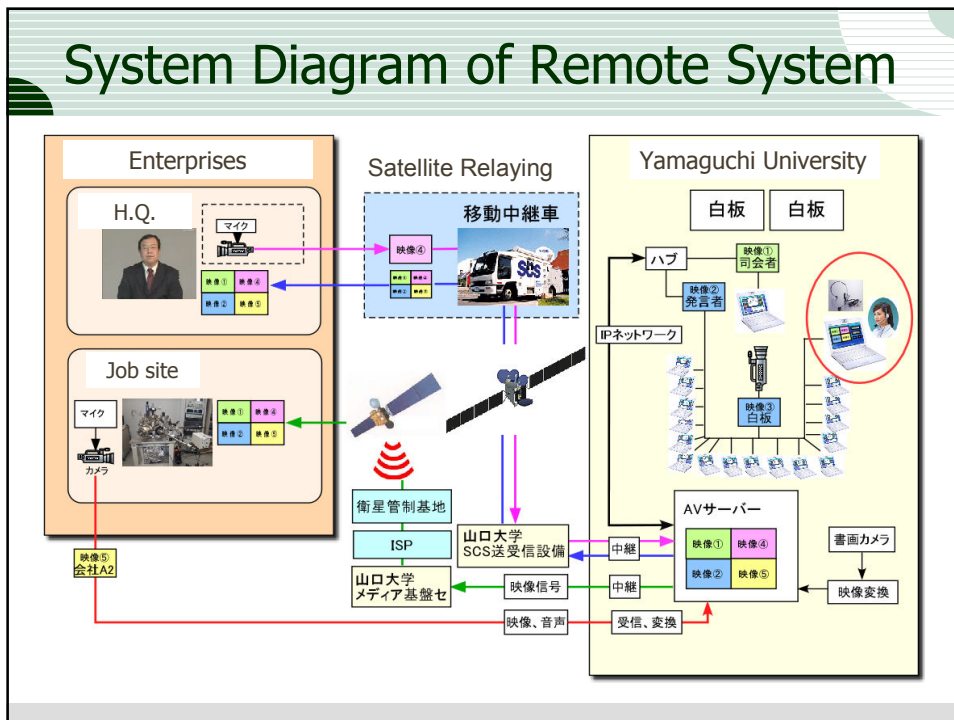
Overview of the project



Amalgamation of a Univ. and Enterprises



System Diagram of Remote System



Screenshot



Practical examples of DE education

- “Computerized manufacturing technology” (May 19th – June 16th, 2006)
 - Classroom lectures regarding CAE
 - Design practice by using 3DCAD software SolidWorks
 - Manufacturing practice by Rapid Prototyping (RP)
- Collaborating Seminar (1) (March 17th, 2007)
 - Collaboration of a machine-tools manufacturer, Amada and Yamaguchi Univ.
 - Transfer of the formal knowledge regarding
 - Remote lecture and discussion by satellite
- Collaborating Seminar (2) (Sep. 21st, 2007)
 - Collaboration of a sheet metal processing company, Axis, Amada, and Yamaguchi Univ.
 - Remote lecture and discussion by satellite

Collaborating Seminar (1)

- 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)



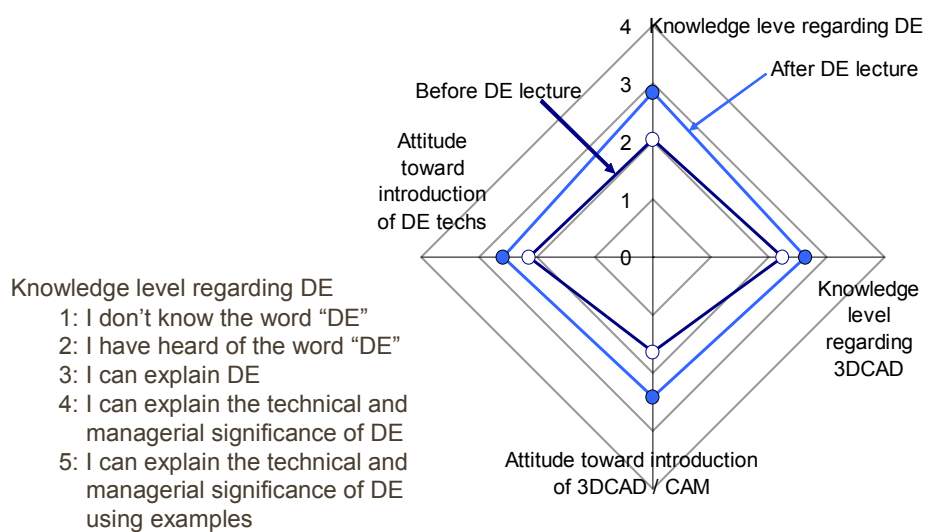
Satellite Relaying System



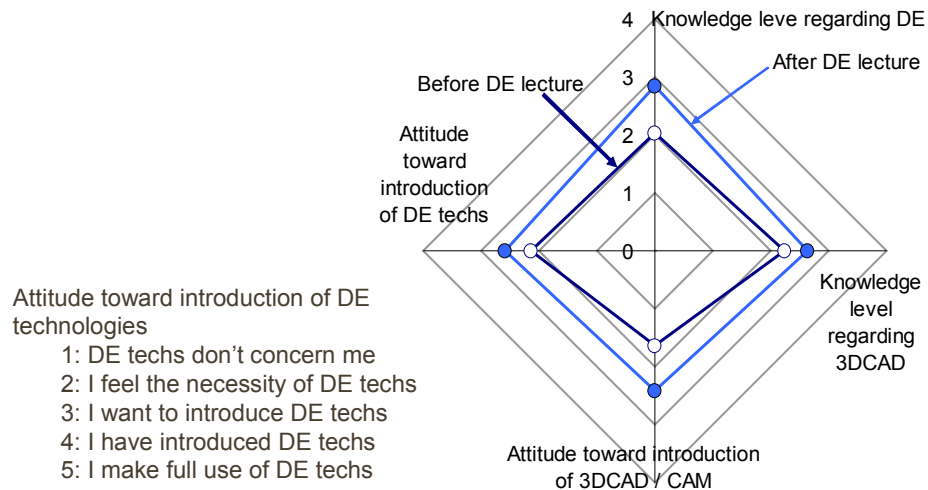
Educational Evaluation

- 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



Conclusion / Future Prospects

- New education system, in which manufacturers learn the underlying thought of DE from the job sites, is necessary
- Our DE education system by amalgamation of a university and enterprises realize it
- Results of evaluation shows that this system is effective
- The achievement of the our education system will be reflected to the successive project "Systematic Education for ... Realizing Advanced Manufacturing using ALD"
 - To apply instructional design (ID) techniques
 - To redesign educational contents by feed backing the results of DE education