EDUCATIONAL VIRTUAL COMPANY AT KVS

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We are trying to improve student's imagination about company functioning as a complex issue at the Department of Manufacturing systems on Technical university of Liberec. The goal is to create complex educational example where all company processes will be blended together. Students will be familiarized not only with each process but also with company process as whole. Following article shortly presents this idea which leads to creation of educational system for integrated project of production process including its production control.

Introduction

Today's requirements of competitive environment pose great demands not only on the production process but especially on those who are projecting, controlling and optimizing them. That is why we obey by this motto: Effective operation of the manufacturing systems can not be reach by "local" optimization. It is necessary to look on the manufacturing systems as on complex (global) system and search system "optimum". Therefore we reflect on requirements posed on absolvent of Technical universities, which requires implementation of new forms of education, where the priority is to teach them thing in context (vide [1], [3]).

First experience

Students serve tasks fit to wide context in "virtual company" on KVS already. They gain experiences for example, how can chosen technology (in view of CNC programmers) affect work of:

- foreman – e.g. capacity load of machines,
- buyer – e.g. change of material of purchased part
- project engineer – e.g. change of material flow
- planner – change of previous and follow up manufacturing process
- IT – actualization of database

They assume bindings between e.g. construction-technology, construction-logistic, technology- logistic, construction-quality, logistic quality and logistic-administration.

They try how to discuss and evaluate variety of solutions in view of different criteria and professions. They derive benefit of using different information technologies and methods of industrial engineering at the same time. So they have unique chance to learn how to confess in complex bindings of whole company process.

Students are standing before follow up problem at the beginning and they are solving it in the work teams.

Suddenly you have inherited machining company (education workshop and laboratory of KVS) from forgotten relative. You cannot sell the company and until 5 years you have to raise turnover on level of 1, 4 € million per year. You become valid 100% owner then and your account will increase to interest from inheritance. You have all places, machines, equipment and IT systems of KVS at the beginning. Main present work load is production of mechanisms.

Where and how they begin with solving this problem is on them. The goal of this project is to analyze and project the production plan (including calculations), project the production layout with all the logistic. Their work is also projection of documentation and system of planning.

Education process within one of the courses

The main pillar is course named Manufacturing systems II. at the present time. Education is organized in the form of management meetings, workshops of production teams and education training of employees supported by teacher.

Figure n.1 Education in “Virtual company” KVS

Students have dates gained from related courses. For example physical prototypes and dates required for its machining created in course “Programming of CNC machines”. They should (depending on task) also verify, search and complete lots of dates.

Project continues in courses “Simulation of manufacturing systems”, where they dynamically verify projected machining in simulation system Witness and “Project II.”, which program will be projection of work plan in system AROP (EPR-APS) and area of improvement of projected production process of given mechanism (e.g. VSM, MOST, 5S, SMED etc.)

It is preparing connection to other courses in our department to make outcomes from one course become incomes to other course.

Study areas in Virtual Company on KVS

3D digitizing and Rapid Prototyping I. and II. – Students are learning how to make digital prototype (measuring and digitizing of objects). They learn how to create physical fast prototype by production, which is not usual in common manufacturing (Rapid prototyping).

Programming of CNC machines – They transform model in program which is used in CNC machines. They are using CAM application or they making program exactly on machine (on EMCO by ISO code or on machining center MAZAC in the system Mazatrol) depending on difficulty of each parts.

Project I. – project of multi-spindle drilling chucking head, work-holding device, manipulating instruments with preparation tools and instruments of rapid holding for method SMED.

Manufacturing systems I. and II. – Solution of own manufacturing system.

Simulation of manufacturing systems – Dynamic verifying of projected system in simulation software Witness.

Project II. – They familiarize with heftiness of proceeding and accounting of documentation describing production state. They implement dates in ERP system AROP. They choose strategy of production control. They prepare documents for organization of machining, directions, recipes. They; compare accuracy and feasibility of planning to constrained and unconstrained capacities. They also use quality methods and continue improvement process.

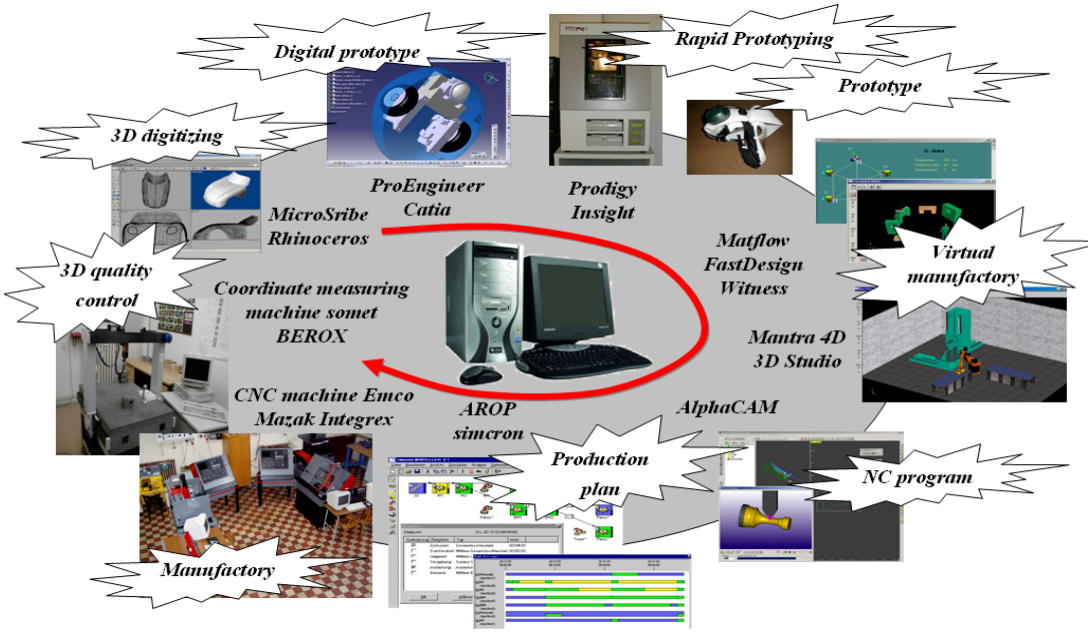

Figure n. 2. Educational Virtual Company on KVS

Resume

Although we have lot of work in front of extending our complex task in area of other courses supported by our department, we have good feedback from our student and also from industry.

Students gain knowledge and skills not only in the area of technical preparation of machining, but also in production control and its optimization. They could lead project teams and define requirements and priority for their college constructors, technologist, duality inspectors and economist.

Literature

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