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The Teaching of the CAD in the Curriculum of Graduation in Technology

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Abstract: This work aims to study How to teach the CAD (computer- aided drawing) in higher education for masters training level, then to propose, to assess the pedagogical devices established to facilitate the learning of the CAD, And also to approach learning of the CAD via the 3D software. The proposals of the new method will also be analyzed with higher education, and its need to integrate in masters degree program. In the industrial sector, the training is largely irrelevant with reality, And students master level is low for all XAO. The work aims to examine how to teach the CAD in master level in Algeria. IMSI of Oran (Industrial Maintenance and Safety Institute) is a national institute, and therefore making this study, as if we did for the whole of Algeria. The study was carried out on the curriculum of the five years of teaching with a balance sheet, from the proposals will be put forward.

Keywords: Innovation, Computer, Design, CAD, CAM, CADM, Automatic, Manufacturing, Robotics, Teaching, Graduation

Introduction and General Organization of Educations for the Electromechanical Engineering

Given that the constant evolution of science, With the multiple varieties of situations and contexts, the mutations of societies, the socio-economic systems and technological developments in order to ensure specific training, practical and integrated which promotes personal development and a skilled academic training . These programs have been developed to be aimed for Master students of the IMSI of Oran.

For the content of this program of the 1st year licence in both 1st & 2nd semester, in electromechanical engineering, we find that " Design and Standards 1 and 2 " module With about 5% of the program, And contains 84% on generalities about drawing, And only 16 % of initiation into the computer-aided design. The content of lessons of 3th year, 4th year and 5th year have been developed by teachers of the IMSI. 3rd year program for electromechanical sector of study includes the module of mechanical construction with 14% of the program.

Teaching of this subject matter is summarized as follows:

- Knowledge Contribution of technology components.
- The Functional Analysis of simple mechanisms
- Mapping and graphical construction using the rules of the design school.
- The facility of drawing definition and overall.

A mechanical manufacturing module with 11% of the program, Through this material the student has to know the basic operations for turning, milling, drilling, tapping, etc .it will be the study of the various accessories and cutting tools ,The Visualization, the identification of the movements

Of the different machines, the choice of cutting conditions, realization of the surfaces on different machines and adjustment operations .the student has to develop a logical thinking of forecast ranges of machining on the basis

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of design of definition and technological data of manufacture, it will be able to write a range of production taking into account the constraints and specifications related to the drawing.

M1 Master program for the electromechanical industry contains the Engineering Office (research department) module with only 15 % of the program.

Teaching of this subject matter is summarized as follows:

Knowledge Contribution of technology components.

- Functional Analysis on a topic representing a real mechanism.
- graphical construction or applying the rules of establishment of drawings.
- Calculation and Sizing of the mechanism.
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The whole constitutes a technical construction file.

Methods office module with 11% of the program. The student must be able to work out on the basis of the documents of methods office and technological data, a manufacturing file including : The range of manufacture, the crude calculation, the analysis of phase, The calculation of the time and also provides the means of fixtures for machining.

Manufacturing module project with 11% of the program. The goal of this topic is to introduce the student to the process engineering in the context of a problem situation in construction of mechanical manufacturing technology, and Therefore to highlight the knowledge gained by the implementation of a manufacturing project.

M2 Master program for the electromechanical industry contains the CADM (computer- aided design and manufacturing) module with 11% of the program.

The teaching of this subject matter is summarized as follows: Definition of the CADM, CAD (computer-aided manufacturing), CAM, Systems manufactures, their definitions and classifications, the Cellular workshops, flexible workshops, And the Robotics elements " CNC robots, the conveyor systems, and the self-guided vehicles".

A module of automation of the means of production with 5% of the program, its objective can be supported by the realization of mini projects related to themes of automation of machine tools mechanical manufacturing.

A module of machining in digital control with 11% of the program, the objective of this material is to know the different types of command, the programming language, the study of the different functions, and the achievement of the surfaces on the different machines.

Content of the teaching of the CAD

1st Year: design and Standards 1 and 2 (11% of the program), with a small portion on the CAD.

3rd year: Mechanical engineering (14 % of the program) and mechanical Manufacture (11 % of the program).

1st year Master (4th year) : office of research and methods .

2nd year Master (5th year): CADM.

General Criticisms

At the level of the IMSI, teaching the CAD is so little integrated in the training in technical drawing. It is necessary to introduce this training in the schedules of the drawing, without too amputation of the latter. With the use of a limited hardware, we would have to combine this training in the traditional teaching of the drawing on the five years.

The student of the IMSI must be able to speak and understand the graphical means used in mechanics , master basic skills related to manufacturing processes Know the methods and working tools used in designing , size mechanical components of bases in traditional deign representing a more significant , even indispensable .

It should also be noted that, all art request of the time and effort even for the CAD. The latter is designed to familiarize the student with the tool of computer aided drafting, to understand the advantages and limitations, It needs exercise sessions to allow him to focus on the work of the screen management techniques of drawing mechanical construction projects . As well, the CAD. allows you to design and produce on the computer screen drawings of all kinds. It will easily and quickly make changes. It may at any time view his work steps and then print the final result.

In any case, this apprenticeship repetition over the five years is essential.

Proposals

The objective of this work is to propose and assess the pedagogical devices set up to facilitate the learning of Computer Assisted Drafting, in these crucial representation of a design methodology phases , we report an experiment conducted as part of the training of students at the IMSI of Oran .

General Purpose

The use at the beginning of the training in partial autonomy of simple CAD software.

Public

A class of first year students in electromechanical.

First grade class students have no knowledge in drawing. After a year of basic training in "drawing and standards 1" module and over the first semester, we start this training at the beginning of the second half of the same year.

This class at 1h 30 of TD and 1h 30 of drawing courses per week for a single class group. The group will be drawing on classic work for a week. Once the group has completed its work sequence, it will resume the same work of drawing course on the CAD using computers.

Material

- The computer lab, in electromechanical engineering Department of the IMSI of Oran.
- The software.

Note: Only one student per workstation.

Sequence 1: Presentation of the Hardware and Software

With the whole group and after the distribution of a brief documentation on the hardware configuration of a CAD workstation, we present the different parts of a workstation and work positions, with manipulations of the DVD and launch the software, we have seen quickly the possibilities of drawing software.

Sequence 2: Basic Features of the Software

With the help of a course with various basic commands, the student will form the functionality of the software:

- Launch of the software.
- Moving the mouse.
- Selections of commands by menus, which must include a selection of graphics tablet orders to work in full screen for drawing.

At the end of the sequence the student must be able to start the equipment and run the software.

- Learn about the screen and drop-down menus.
- Draw, delete basic objects.
- Zooms make.

- Save and load his work.
- Define the limits of drawing.

Students will be highly motivated, which will present other opportunities of the software as more complex orders.

The seizure of the coordinates of the points is carried out in a dynamic way visually on the screen. At the end of the sequence the student must be able in partial autonomy, to the net and draw a room.

Sequence 3: Basic Controls of Windows

With the whole class at the computer laboratory, using the CAD by introducing the windows basic commands:

- System concepts
- Copies of files
- Deleting a file

Sequence 4: Draw a Component Part

Based on this preparatory study, the students realize & perform drawings a component part from a tutorial. Each group of students took over these works, of hard disk to copy on a flash drive, students for this must be placed in the right directory. Notions and commands of change directory and sub-directory will be introduced during this sequence.

Sequence 5: Make the Assembly of Parts

Each group of students will have to draw parts and will have to make their assembly by using a tutorial.

Sequence 6: Make the drawing for each piece and the drawing of all the parts to be drawn

The student must make the implementation plan of the items designed and the implementation plan of the overall drawing.

This sequence will introduce the concept of "implementation plan of work"

The student will have to complete, erase, drawing new lines in order to achieve the requested views.

End of the first year of training in the CAD.

Repeat sequences of 4 to 5 for the third year and the last year with a more advanced level, with more difficult parts and complicated assemblies.

By following this method the student will be able to acquire the concepts of the CAD and we will be able to respond to the requirement of the industrial sector by forming good students in the field of computer - aided drawing.

Conclusion

This training at the CAD with the "3 dimension" software easy access, will permit students to have a first approach to the use of the computing in their field. This initiation (60% of the schedule of the drawing module) will be supplemented by colleagues of other modules and practical workshop works which use CAM and CNC software. This computer assisted drafting program will be able to respond to a growing demand of designers called to prepare projects in the sectors of the industry.

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