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Contribution to the Monitoring of Diploma Project Activities

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Abstract: The paper tackles the organizational problems related with diploma project activities. The study starts with the presentation of the logical steps, followed by students, professors and administrative staff during the drawing up of diploma projects. A software was created in order to assist the monitoring of diploma project activities in the industrial engineering area. The coding methodology is presented first, and then the structure of the database.
Key-Words: diploma project, software, database, manufacturing science, methodology

1 Introduction

In the current condition characterized by knowledge explosion, globalization and global competition, increasing customer focus, compression of product lifecycles, universities aim to define and improve their functions more accurately.
Some of the main university functions are:

- Study of the labor market;
- Study of the secondary school graduate market
- Integration into the local and industrial community
- Integration into the academic community
- Improvement of human resources (academic staff)
- Improvement of material resources
- Improvement of financial resources
- Improvement of the quality of the educational process at graduate, master and PhD level.
- Improvement of the research activity
- Promotion of the university image and services offered, etc.

Students' educational process is completed with a diploma project which cumulates and underlines the students' knowledge and abilities acquired at that level.

This paper aims to develop a model of the diploma project activities, an efficient model that can be implemented only in connection with a specific software product. The coding methodology is drawn up in such a way that it will ensure information redundancy. This information forms the basis for the software structure that will be presented in the final part of the paper.

Such an approach is important for e-learning educational system.

2 Activity flow related to the diploma project in the manufacturing science area

In the following, we shall present diploma project activities and their logic connection using the pseudo code language.

START
The dean's office ESTABLISHES the distribution (number of topics) to each department
SCHEDULING of the diploma project (DP) activities
COLLECTING the possible topics from departments, companies and students
APPROVAL of the topics (by the diploma project commission - DPC)
Topics CODING depending on the project type
Topics PUBLISHING
IF the student fulfills the conditions and wants to defend the DP
    THEN the student chooses the topics and the thesis advisor
    ELSE the student is recorded into a database for the following sessions
ENDIF
WORK on diploma project
IF topics change
    THEN establish the new topic and begin work
    ELSE continue work
ENDIF
REALIZE regular meetings with the advisor

IF problems from other areas do appear
THEN contact the specific departments (professor); solve the problem
ELSE continue work
ENDIF
IF the student's work is good and x% of the project is ready
THEN validate the activity
ELSE send back for completion and reevaluation after z days
IF the completing is enough
THEN continue work
ELSE the student is recorded into a database for the following sessions
ENDIF
ENDIF
FINALIZE the diploma project by the student
EVALUATE of the DP by the professor
IF the paper is adequate
THEN the paper is delivered to DPC
ELSE Correct and/or complete the paper depending on the professor's suggestions
IF the paper is adequate
THEN the paper is delivered to DPC
ELSE is rejected
ENDIF
ENDIF
IF the paper is adequate from the point of view of the originality
THEN the paper is accepted by the DPC
ELSE the paper is refused and must be defended in another session
ENDIF
INTRODUCE the paper characteristics into the database (title, type, structure, results, abstract, images)
PARTICIPATE in the final examination
IF the student promotes
THEN introduce in the graduate's name, paper title and mark into the database
ELSE the student is recorded into a database for the following sessions
ENDIF

3 Database Codification

Of great importance is database internal codification, which must ensure a complete level of information, its redundancy and easy access to it.

In order to meet these necessities, the codifications will underline the most important areas of interest related to diploma projects.

According to diploma project type, there are

- R- research projects
- T – technological projects
- G – general projects
- M – managerial projects
- other.

In the manufacturing science area, some specific areas (representing subdivisions of the codification) are presented in the following. For their research project, students can study cutting tool devices, control devices, conventional technologies, unconventional technologies, CNC technologies, plastic deformation technologies, industrial equipment, product design with applicative software, quality, educational software for the areas presented above etc. Technological projects can focus on technological redesign (existing product), technological design of a new product, etc. General projects can focus on industrial equipment, agriculture equipment, extraction equipment, different products, educational software for the previous areas etc. Managerial projects can tackle the managerial problems of the company, manufacturing management, machine tool and cutting tool administration etc.

Each of these project types can be tackled in different ways. For example research projects can focus on fundamental research, applicative research or combinative research. Technological projects can describe new operational alternatives performed with classical machine tools, CNC technologies or combinations of both of them. General projects can trade with designing processes, redesigning or comparative studies. The managerial projects can tackle planning processes, implementations, control and evaluation improvements of technologies or organizational aspects. There are also situations in which a project can tackle several types of research.

Of great interest is the shape of the products analyzed by students. These can be classified depending on:

- general external shape: cylindrical external, cylindrical internal, plane, etc.
- highest dimensions: <50mm, 100mm, 500mm etc.
- cylindrical manufactured surface: none/external/internal, dimensions etc.
- plane manufactured surfaces: none/open/ closed, dimensions etc.
- conical manufactured surfaces: none/external/internal, dimensions etc.
- profiled manufactured surface: none/external/internal, dimensions etc.
- thread manufactured surface: none/external/internal, dimensions etc.

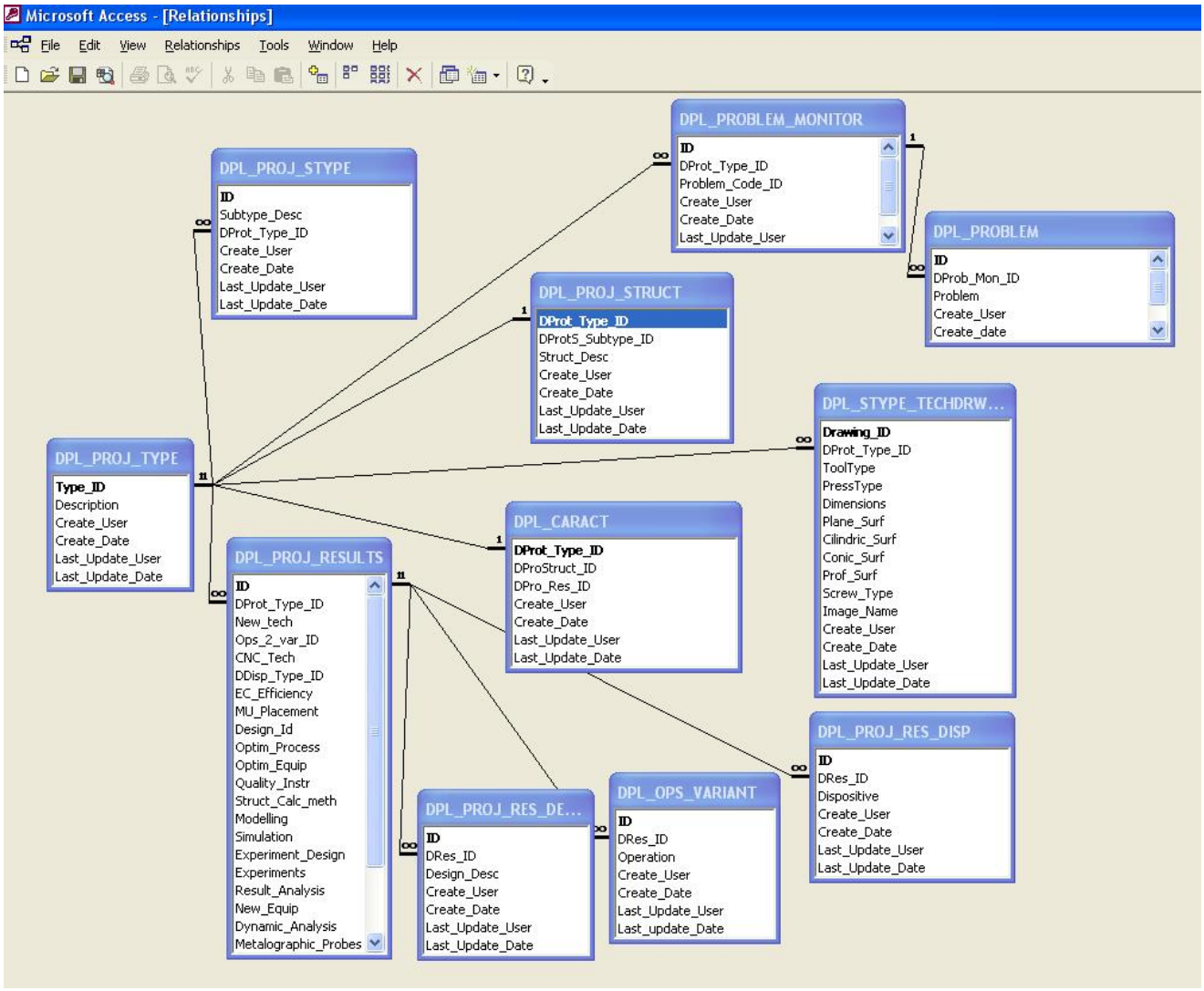

Fig.1 Databases content

Connected with this codification, it is important that the image of the studied piece exist in the database.

An important step in the work and estimation of students' activity is the monitoring, consulting and quantification of their work during the preparation of the diploma project. The student will send mails to the professor knowledgeable in the problem he is interested in. The professor must answer and notice the student activity, knowledge, involvement, scientific and managerial abilities. The possible areas have codes:

- Classic technology
- CNC technology
- Cutting tools
- Devices
- Plastic deformation
- Management
- Marketing
- Quality
- Databases
- other

Therefore, the project will contain information related to the type of students' activity and inherent problems and the way these were solved.

After the project is completed, a synthesis of the student work must be made. This information is important in the final evaluation of the project and in the creation of a database comprising students' diploma project activities over time.

For every project the necessary information is:

- Topic code
- Abstract
- Project structure
- Results

The results can be synthesized in the following way (each in one record):

- New technologies:
- Operations analyzed in two variants
- Designed devices
- Designed cutting tools
- Designed control devices
- Design of new equipment
- Economical efficiency study
- Machine emplacement
- Processes optimization
- Equipment optimization
- Quality analysis
- FEM analysis
- Mathematical models
- Process simulation
- Experiments
- Result analysis
- Dynamic analysis
- Metalographic samples
- etc.

Each field must be completed.

Finally, after the student's diploma exam has been completed, the obtained mark will be recorded into the database.

3 Database model

The software application will be based on a classic relational database model.

The prototype database contains the minimum requirement of tables and relations in order to be able to manage information regarding diploma projects. It enables the possibility to create, modify, and delete database records as well as the creation of reports and statistics.

Any other request can be implemented by an appropriate extension of this model.

A brief description of the tables follows:

DPL_PROJ_TYPE – generates the project identifications and its type.

DPL_PROJ_STYPE – contains the description of the project (research, technology, general etc.). Each type contains several records corresponding to the subdivisions, which characterize the project (Example - For the research type the records are: cutting tool, devices, control devices, conventional technologies, unconventional technologies, etc.).

DPL_PROJ_MONITOR

DPL_PROBLEM - the tables contain details connected with the problems pointed out in every project. Every problem is associated with a code.

DPL_PROJ STRUCT – contains information related with the project structure based on its type;

DPL_STYPE_TECHDRW - contains information related to product identification and the product image;

DPL_CARACT–contains project characteristics.

The following tables contain information about the project results;

DPL_PROJ_RESULTS – results generalities;

DPL_PROJ_RES_DESIGN – design type;

DPL_PROJ_RES_VARIANT – operations analyzed in two variants;

DPL_PROJ_RES_DISP - design devices.

An ER (entity-relationship) diagram of the prototype is presented in figure 1.

4 Conclusions

The paper presents a methodology of monitoring diploma projects in the manufacturing science area. The software created with this aim improves the quality of this organizational process, the precision of work quantification. Moreover, over years, it will offer large amounts of information to students and professors, which will continuously improve the educational process and will maintain the expected originality level of the students' work.

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