**THE INTERNATIONAL CONFERENCE OF THE CARPATHIAN EURO-REGION SPECIALISTS IN INDUSTRIAL SYSTEMS**
**6th edition**

# PRODUCT DEVELOPMENT USING CAD-CAM-CAE SOFTWARE AND INTERNET FACILITIES

***Constantin ISPAS[1], Miron ZAPCIU[2], Cristina MOHORA[3], Dorel ANANIA[4],***
*[1,2,3]Professor Eng. PhD. [4]Assist. Eng.*
*University "POLITEHNICA" of Bucharest Machine and Production Systems Department,*
*Splaiul Independentei no.313, Bucharest, RO 060042 Romania*
*e-mail: ispas@leo.optimum.pub.ro, zapcium@sun.cfic.pub.ro,*
*cristinamohora@yahoo.com, doresana@yahoo.com,*

***Abstract**: The main goals to the product development are to obtain a short time of design process, a low price and best performances of the final product. According to these goals, the product design must use some modules of advanced CAD-CAM-CAE software and the internet on-line 3D catalogs for some parts (more or less standard). The advantage obtained by using some modules from different CAD-CAM-CAE software is to use the most performant parts of these software (specific to the engineering fields) at a low price (it isn't necessary all the software, only some specific modules). The internet 3D on-line catalogs offer the advantage to find very easy useful information about mechanical elements (prices, technical characteristics, 3D models, etc,).*

***Key words:** CAD-CAM-CAE software, internet on-line catalogues, on-line portal 3D catalogues, standard elements, integrated product design*

## 1.INTRODUCTION

Now, in the industry exists a high competition to produce new, better and cheaper products. The manufactures have to deal with the increasing demands of the customers. They have to improve continuously the conception methods of the products, to modernize the organization structure in order to create a fluent link, without limits, between studies, design, preparation, manufacturing, commercialization and working life of the products.

To become more competitive into a world with diversity of products, with continuous changes, the companies must modernize and increase the flexibility of the production systems.

The companies find out that the interactive design of a product is the most efficiently tool for analysis end evaluation. So the use of internet data base and CAD-CAM-CAE software creates visual data base and industrial geometry design. Process and product development using computers and internet environment allow a substantially costs and time economy.

On the market there is a lot of CAD-CAM-CAE software which offer specific tools for engineering design into a tri dimensional virtual space.

## 2.USING MULTIPLE CAD-CAM-CAE SOFTWARE PACKAGES

These kinds of software are representing a very useful tool in products development design process. By using them it can be created a 3D virtual product, simulate from many point of view [1], in order to improve its characteristics (technical or non technical).

Some of these software's have better performances for some engineering fields as aeronautics, automotives, mechanical etc. Today single CAD-CAM-CAE software cannot cover the entire industrial field for high performances. Another major disadvantage of that software's is very high prices for a full version. Usual the prices are starting from several thousands of EUR.

There are 3 advantages for the most CAD-CAM-CAE software's: 1 - the software's are structured in modules, even in the same area (for example: in CATIA in mechanical design are: part design; sheet metal design, mold design, wierframe and surfaces design etc); 2 - it can be bought only some specific package regarding computer aided design, computer aided manufacturing or computer aided engineering; 3 - all these software allow to save date in some commune file format (for example: dxf for 2D drawings, step for 3D solids; iges for 3D surfaces etc). These types of files can be opened by almost all CAD-CAM-CAE software in some specific condition

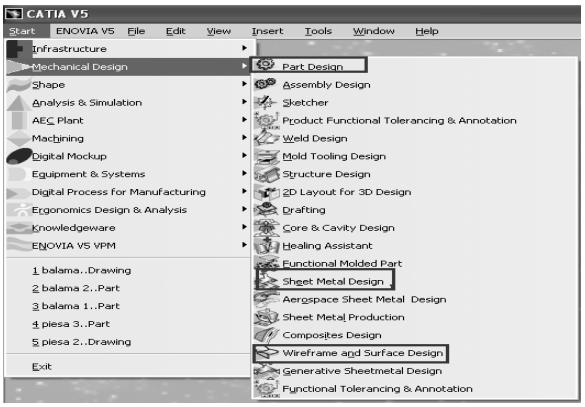



**Fig**.1 Specific modules in the same domains

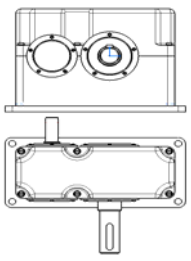


**Fig**.2.Gear - dxf format

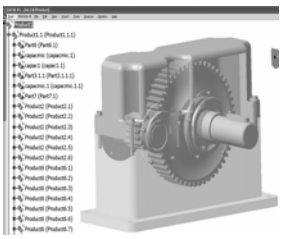


**Fig.**3 Gear- Catia format

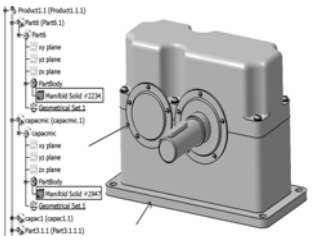


**Fig**.4.Gear - step format

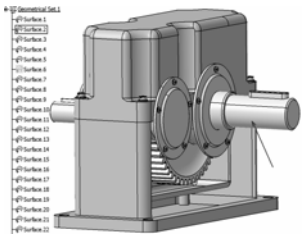


**Fig**.5. Gear - iges format

For a complex product (ex. in automotive industry) which need complex surfaces for modeling a single CAD-CAM-CAE software isn't sufficient. In this case the solution is to use some high performant specific modules from different CAD-CAM-CAE software.

## 3. USING INTERNET FACILITIES IN PRODUCT DEVELOPMENT.

The growth of the Internet today offers the newest wave of communication through electronic mail, file transfer, telnet access, transaction applications, and much, much more.

The most popular part of the Internet is the World Wide Web, where anyone can access hypertext pages with the click of a button. The popularity of the Internet has launched many social and ethical issues. Recently, the Internet has been criticized for its uncensored information, but has been praised for its educational value.

In engineering field the internet is used for information dissemination and company advertising. Today all the big company offers many information about their products directly on the internet. In the mechanical engineering fields the most companies offer free catalogs about products (free documentation about technical characteristics, free 2D drawings and 3D models), prices, calculus technical software (ex: bearings SKF) etc.

On the internet exists dedicated sites for all level of product development. Starting from standard catalogs for elementary parts fig.6 (screws, bearings, pulleys, belts, gears etc) and finished with complex products (like industrial robots – fig.7) the internet is a useful tool in design process for all kind of products.

The disadvantage of the internet is the increasing diversity of information and the way of dissemination. The big problem is how to find utile information in this virtual space on internet.

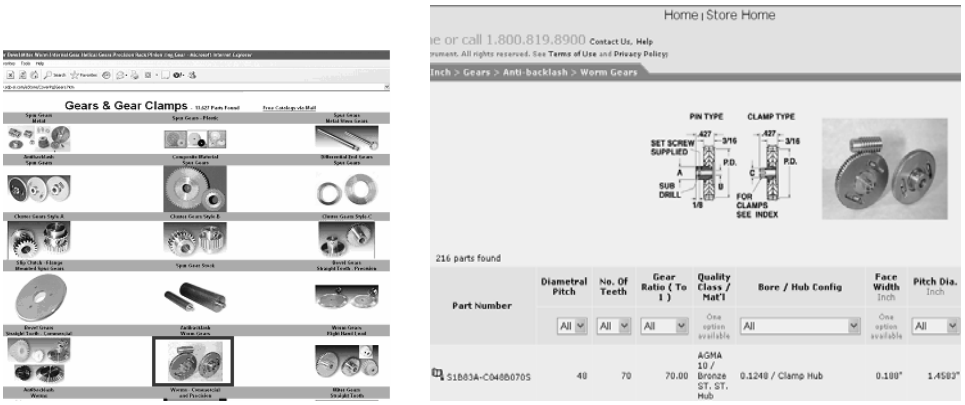



**Fig.6** Free 3D gears catalog on internet

### 3.1 Finding useful 3D catalogs on internet

Today on internet the information is structured into web pages. Almost all the companies in the world have web pages in order to offer more information about their products.

There are 3 ways to search: 1 - to find a company into some specific engineering fields. If the name of company is known usually the site is www.<company names>.com (ex: SKF has www.skf.com). If is not, an easy way is to use a searching site as google (www.google.com ) and as keywords the company name; 2 - to find some companies witch have similar products it is recommended to use searching site as google and keywords technical words witch describe the product. For example to find bearing companies it can be use: keywords like “bearings”; “ball bearings” etc.; 3 - to find some specific products (standard or not) for a specific engineering field it is recommended to use dedicated portals. A portal is a site which contains information and links to specific sites for a domain. (ex. http://www.foreigntradeexchange.com/suppliers/bearings.html).

On internet in the engineering fields the companies presents their products structured in catalogs. There are two types of catalogs on web.

One is in well-known format PDF (portable document format). To find catalog of this type it is recommended for searching to use, after specific keywords, the acronym “PDF”. The advantage using a pdf catalogs is that all the needed information about a product is presented into single file, which can be printed.

The other is interactive on-line catalogs which have some advantages like: 1- to find all information for a product (including in pdf format), 2- on-line calculus software, 3 -the product can be directly implemented into CAD-CAM-CAE software. To find such types of catalogs it is recommended to use keywords as “3D catalogs on-line” in combination with technical keyword. For example to find a gears catalog 3D on line it can be use for searching the next string: “gears 3D catalogs on-line”

### 3.2 Using 3D component catalogs

In figure 9 is presented a screen capture for the results of 3D gears catalog search. With red arrow is marked possible internet address for 3D catalogs. In red rectangle is marked the address for interactive catalog presented in figure 10. In figure 10 is presented a portal for technical products which offers free 3D and 2D catalogs. As example it is presented a catalog wheal used in design of gear presented in figure 5. For selecting a wheal in this catalog it has

to specify all the necessary parameter: 1.Diametral Pitch; 2.No. Of Teeth; 3.Material; 4.Hub Style; 5.Quality Class; 6.Pressure Angle Degree; 7.Bore Size; 8.Face Width; 9.Pitch Dia; 10.Hub Dia. ( N/a= Hubless).


**Fig.9** Finding interactive on-line catalog

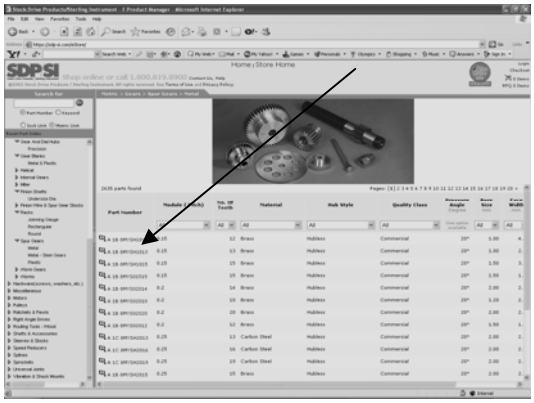
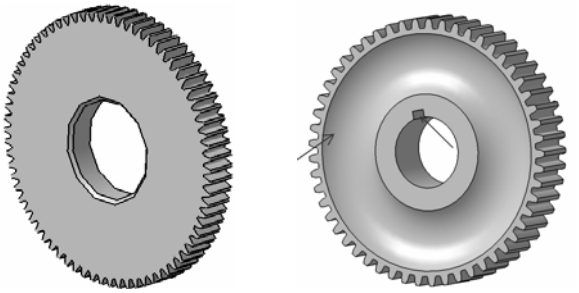


**Fig.10**. Interactive on-line catalog for gears

In figure 11 is presented all the characteristics available in this catalog (https://sdp-si.com) for selected wheal as technical characteristics; prices; available file formats for direct implementation into CAD-CAM-CAE systems.


**Fig.11** Wheal characteristics

For 3D model it was selected a step format (used for solid component). After implementation into CAD software a few minor modifications were made on the solid wheal according with the gears design requirements. It was made a key pocket and a circular pocket (for constructive reason). For a speed reducer only a few parts were designed as shells and spindles. In figure 14 with A are marked catalogs elements (wheals, screws, bearings, keys) With B are marked elements designed in Catia V5.



a. b.

**Fig.13** The wheal : a. initial catalog wheal; b. modified wheal

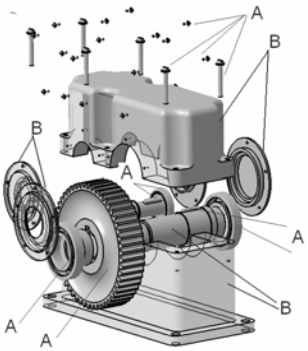



Fig.14. speed reducer

**CONCLUSION**

By using different modules from different CAD-CAM-CAE systems, based on software performances, the process design can be optimized from technical point of view without extra costs. Into a single CAD-CAM-CAE system some modules are better others no and the software price is high.

By using online interactive catalogs the design process will be much simple. For all the elements used there are all the information technical and non-technical, so it can be easy made an estimative product cost (from point of view of elements).

The major advantage of product development using CAD-CAM-CAE software and Internet facilities is the short time dedicated to design process. This is improved with approximately 70-80%.

**REFERENCES:**

[1] Constantin Ispas, Miron Zapciu, Cristina Mohora, Dorel Anania, *Researches regarding the integrated conception of the mechanical systems*, The 1st International Conference on Computing and Solutions in Manufacturing Engineering CoSME ’04, Brasov, 2004

[2] Ghionea, I., Anania, D. – „*The management of the computer aided design using virtual prototype”*, Proceedings of the International Conference on Manufacturing Systems ICMaS, , Editura Academiei Române, Bucharest 2002