The Role of Computer Aided Design (CAD) in the Manufacturing and Digital Control (CAM)

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Abstract

Inasmuch for speed to customers desires change and large completion that describe day world. To lead technology and operations technology to form general, to achieve competitive advantage and special form design technology is master key to determine nature and form product, and what tolerable quality levels that work fit product to uses, and all of features and preferences determine through design technology. For importance CAD/CAM subject, we introduce in this research that offer primary components to CAM system, and styles this system to achieve details work steps, and details design steps. From within completely program in (AutoCAD) system with details steps to how design transportation to manufacturing operations to series achieve to desired product. With offer conclusions that fitness between CAD and CAM to introduce direction communication between design and manufacturing lead to mistakes reduction to large ratio.

Keywords: CAD-CAM- DFMA-STEP-VRT-MASTER-CAM.

Introduction

We have characterized the last century electronic technology revolution, and it has been at the forefront of these technologies in addition to computer and various electronic control media which came in various walks of life. And talk in this search for design technology (the concept of integration of design and manufacturing computer) (CAD / CAM Integration), which depends mainly on the possibility of

computerized manufacturing systems benefit from data extracted generated from the database of computer design systems.

The drawing and design software represents the most prominent concerns of developers of computer systems, and was the development of several software that fall within the design concept computer (Computer Aided Design), which is referred to as short term CAD. It was this software with two, including directions what general, including what is a specialist in one of the engineering fields such as mechanical or electrical or electronic, construction and architecture, some of which is advanced in the adoption of the principle of geometric modeling:

In the same direction, there was an important development in the software means and which fall within the concept of manufacturing computer (Computer Aided Manufacturing), which is referred to by the term CAM for short. The concept of manufacturing computer includes all the activities involved in the planning and control of production in different factories, such as digital control computer (Computer Numerical Control: CNC) and the leadership of human industrial automation (Industrial Robotics) and planning of production processes (Process Planning) and the overall layout of the plant, including so planning tables productivity and material requirements planning, and production capacity

- Research Methodology: It includes:
First: the research problem: summed up thus:
1 - the difficulty of drawing any product or part of a product on board elaborately geometric and difficult to make the required modifications to that product or as part requires changing the entire graph paper and start again.
2 - Product specifications are always lower than the required level of quality and cause either an error in design or manufacturing process.
3 - The scarcity of specialized staffs are able to work on (CAD) and (CAM).
Second: the importance of research:
Search lies the importance of the importance of manufacturing and design theme for this vital subject of a very large impact on the future of the industry and the ability to adapt and survive as best competitor in the market.
Third: the objectives of the research: summarized thus:
1 - Explain the concepts of computer design and manufacturing.
2 - Drawing and design of a particular product (and chose (PLATE) in the program AUTOCAD and then save and share product data file format within the software and configure a database for this product which represents the coordinates of the points that make up the product and all the dimensions and specifications of its own.
3 - And then be sent to the program prepared in (CAD) to the machine (to manufacturing-CAM) by the Master CAM program by simulation which saves a lot of time and effort.
Theortical-Side:Includ:-
First:Design-Technolog
Defined (Heizer) tools provided by science informatics, which contribute to the

products are designed better, cheaper and faster. Adds (Russell) as tools have the ability to enter products many to the market and so quickly that affect drastically the competitive environment and the changing nature of manufacturing, and confirms that part of the motivation to dumping is to promote the new products available for the design of technology products, for example, developed a company (Sony) more than (160) of the model with the devices (Walkman) own into practice over the past years. And the two agree on a set of tools, namely:

1-1ComputerAidedDesign(CAD)

From the standpoint of (Krajewski), the computer-aided design an electronic system for the design of parts or products new already have, and allows the designer treatment precise geometric shapes and can of innovation fees and see it from all angles on the display and can calculator that simulates the reaction of one part against tests strength and stress. Through the use of design data stored in memory user can or beneficiary to obtain printed copies of the drawing and specifications relating to any part or product quickly. lowers the (CAD) of the cost of creating the product and reduces sharply from the time of marketing products new, and learn the (CAD) at the present time is an essential requirement for designers, since the number of its investors is growing fast and that the budgets allocated to it in many companies over Makin in 2000 three times, and go larger amounts of software calculators and through Pro-Engineer put the United States clear concept of the standard national and confirms (William) that the existence of a number of alternative designs provided by the database system enables a good study of the possibilities and determine what is best by Alhacbhovq standards designer.

And put (Slack) a number of advantages (CAD) are:

1 - improving the quality of design and products manufactured from them.

2 - Systems (CAD) is strengthening communication and stimulate innovation in multi-functional design teams through the provision of interactive visual focus on the debate.

3 - Leads to improve every stage of stages of product design to shorten the time and cost.

4 - Contributing to the achievement of contact between the designer and supplier through electronic communication between them through the screens visible to a computer.

5 - Provides a database managed storage and retrieval of design data at any time and quickly.

6 - Treatment after the details of the design and promotion of design flexibility is largely due to changes can be made quickly on designs.

7 - Hurt in achieving all priorities competitiveness (quality, flexibility, speed, and cost).

1-2 Computer Aided Manufacturing (CAM)

From the standpoint of (Evans), the calculator-aided manufacturing includes calculators control over the manufacturing process, as in the calculation tool movements and cutting speeds, and possesses the (CAM) prefer advantages on traditional manufacturing concepts in many cases, especially when:

- Is produced by several different parts of the requirements of a changing or

periodically.
- Are permanent changes to the design?
- Be a complicated manufacturing process.
- Doubling mechanism processes are taking place on one part.
- Expert operator skills and control is required.

Each machine in the system (CAM) ability to choose and deal with a number of tools and according to the instructions programmed, and thus gives a high degree of flexibility in the implementation of manufacturing processes and control, for example, uses (Caterpillar) SYSTEM (CAM) in the manufacture of parts kits recycling engine Turakatr, as stands a group of machines on both sides of wagon-like vehicle railway and the length of no transmission comes and goes portions between workstations where they are implementing (30 to 40) from operations mechanism as keeps the operator is located at the entrance points, which obliges parts inflows and outflows to and from the transport mechanism and the rest of the process is managed by the calculator. Researchers at (Clothing Technology Corporation) to find the concept can be producers of clothing from innovation clothes manufactured specifically according to the customer's requirements, this includes the concept of a survey scanned the body of the customer by calculators and machine operated calculator to cut cloth is fitted body customer completely. Proved that the garment manufacturer in this way resist ways the fashion industry businesses. The systems (CAD / CAM) integrated design with the manufacturing process by turning the final specifications for the design to detailed instructions for the machine for the purpose of manufacture of any substance. and longer (CAD / CAM) is the fastest and least likely to commit errors of rights and avoid getting cloning between engineering and manufacturing.

The recent example of the ability of a company (Boeing) to design and build the structure of aircraft (777) big body without any action on the form at all, and was the first physical copy pilot of the aircraft has been tested by the pilots in 1994, as it used Engineers company's system software (Dassault) is named ((CATIA is an acronym for the phrase (analysis interactive three-dimensional help of calculators.) this is a French company one of the leading processed for groups of programs calculator. another example is the company (K2 Corporation) which is the largest American company producing skis the Alps that they must constantly be re-designMnojadtha in order to meet the changing needs of the customer, it produces about (20) and B model with (12) different length, and allows stations to work (CAD / CAM) own designers unlike numerical descriptions for the new format to any ski to fees and manufactured designs.

Another example is the experience of the company (Levi Strauss) using technology (CAD / CAM) in the manufacture of women's jeans, and wants its customers to pay a premium of 15 dollars due to manufacturing as per customer's request and quick delivery.

1-3 Design for Manufacturing and Assembly (DFMA)

Confirms (Heizer) on the program that allows the designer given to the effects of design to manufacture the product and the first extension of (CAD) is (DFMA) it allows the designer preview integration designs the product before manufacturing the

product, for example, allows ((DFMA to automotive designers preview how to put transmission movement in the car on the production line, even in the event that all of the transmission and the car Aizalan in the design phase. sprawl second (CAD) is the modeling of objects three-dimensional 3-D, according to this technology in the development of small models, the modeling of objects three-dimensional, finding form fast and processed materials with very light layers for the purpose of evaluation of this technology are accelerating the development of the manufacturing process by avoiding long and very formal.

1-4 Standards for the Exchange of product Data (STEP)

Based Technology (CAD) information product design electronic as digital this digital information is very important to determine a standard for the exchange, which is called standard data exchange of the product which allows producers to obtain information on three-dimensional product format standard or a standard so that it can be shared globally and to allow sites scattered geographically for companies to achieve integration in the design, production and support. using (STEP) the Engineers Ford Motor Company unification designs on three continents, and the engineers in England to send an electronic fee detailed three-dimensional to designers in Dear burn and Michigan and thus leading to Turin in Italy, since there are programmed computerized milling machine able to convert models within hours, if (STEP) supports cooperation indirect using talent wherever it exists around the world, and at the same time reduce the cost of development and the total cost of the design.

One of the advantages (STEP)

1 - Provide a copy allows three-dimensional electronic posting of the data.

2 - Speed in achieving communication between several sites.

3 - Low cost.

1-5 Virtual Reality Technology (VRT)

A formula invisible to connect to replace the images replace reality (real things) and ideally allow the user to respond interactively. That the roots of technology of virtual reality in operations lies in computer-aided design, and as soon as the design information in the system (CAD) become so exist in digital format electronic for other uses. for example, the company General Motors configured version of the car default using models sham to see the holograms on the floor of a small room and empty. after laying glasses effectively managed both designers and customers to see a model three-dimensional what appears to be a new design from the inside. uses the fact the default is also in the development of schemes three-dimensional starting restaurants and ending with the parks recreational and be changes on the car and the restaurant is much less expensive than at the design stage than would be it later. and used by many companies this technology in the design in order to accelerate development and reduce costs and improve products.

From the standpoint of (Heizer), the advantages of (VRT)

1- was able to see the final assembly of the product figurehead by real assembled thereby achieving all priorities competitiveness (quality, speed, cost, flexibility).

2-The possibility of the rapid development of the products.

And will be focus this research on the concept of design and manufacturing by

computer.

It can be defined as computer manufacturing as the use of computer systems for planning, management and control of manufacturing processes by interacting directly or indirectly to a computer with production sites in the factory and as is clear from the definition of manufacturing computer applications can be limited in two groups:

1. Computer control and monitoring: This includes direct applications in which they are directly connecting the computer manufacturing operations in order to control and process control.

2. Process support applications: These applications include indirect where the computer is used to support production processes at the plant but there is no direct link between a computer and manufacturing-processes.

The distinction between the two groups is necessary and essential for the understanding of the principle of computer manufacturing. The computer control and monitoring can be divided into surveillance applications and control applications include process control computer direct contact with the manufacturing process in order to note the process and related equipment and extract data from them. Here does not use a computer to control the process directly, but operations are controlled operator factor, however, which follows the information you provide him with the computer.

Second:Create-a-database-of-manufacture:

Playing system design computer major role in increasing productivity in the manufacturing section and the main reasons for the use of the system design computer because it allows a great opportunity to create a database is very necessary to manufacture the product in the Department of Manufacturing and used for many years in the industry and are prepared engineering drawings by designer is then used by manufacturing engineers to develop a plan to operate.

The events that fall under the framework of the product design process separate from those that fall under the planning process, and in general is essential to use a two-step course, this leads to the consumption of time and repeated efforts by the designer and manufacturer.

While in the system CAM / CAD Integrated there direct link to be established between the design and manufacturing does not stop the goal to automate certain stages of the design and manufacturing but also to automate the transmission of data, these systems have been developed on the basis that they are creating all the necessary data for the planning and management of the product and include (Data engineering - parts lists - material properties).

Third:The-advantages-of-CAD/CAM-integrated:

There are many benefits to computer design system, little of which can be measured. Some of these benefits are intangible, reflected on the improvement of the quality of work, and there are tangible benefits, but it does not seem obvious in the design stages, but can be observed in the production-stages.

We can mention some of these benefits are as follows:

1. Increase the productivity of the designer and this is achieved by the computer helps the designer introduced product, sub Mjmath and also reduce the time required in the installation and analysis.

2. Improve the quality of the design: The computerized design system allows the designer to a deep and accurate analysis of the design as well as provides a large number of alternative designs that can be tested, and the design errors less because of the high precision provided by the system.

3. Improve the exchange of ideas: engineering drawing international language transcends barriers translator and that the use of the system leads to charges having standard specifications and reduce-errors.

4. Provide the data base for manufacturing: When the fee for a product (the development dimensions of the product and its parts and determine the lists of materials and specifications), it is available data can be used in many manufacturing processes.

And computerized design system benefits especially in terms of the manufacturing process using a database CAD / CAM for production planning and control. These benefits can play a role in the following areas:

1. Fixings and design tools required for the purpose of manufacturing.

2. Programmable digital control machines.

3. Planning for computer-aided production.

4. User complexes (formed by a computerized design system) for the purpose of production.

5. Planning robots (robots).

6. Less time to manufacture and through the development of good schedules.

7. Computer-examination (Computer Aided Inspection).

fourth: numerical control (NC) and computer numerical control (CNC): The concept of digital control began in the forties of the twentieth century in response to the need in advanced manufacturing techniques to run complex aircraft clips. Digital control technology is simply the application of digital methods to control the machines. Programmable digital control are not engaged in the manufacture parts, but the machine controls how and when and where to move to make the parts.

Programmable digital control is a mental and physical activity is an actual partnership between the design and documentation of the program which will be used to manufacture the part. Numerical control programming is often defined programming parts manually (Manual Part Programming) because it is done without the computer.

Numerical control machines performing the same tasks of cutting and forming tools used for decades in the industry. The main difference and the main benefit of digital control equipment is controlled increase in the number of pieces, and increased control this allowed manufactures parts was difficult or impossible to run in traditional ways.

The machine controller digital control machine mind. Function much like the human mind at the function where they read, interpret and input unexplained shift (perceived input) to the appropriate movements. The control also various accessories such as coolant, change tools and fees. The machine controller (called sometimes uncontrolled Controller) are converting encrypted program information to the voltage

or current values and pulses of different frequencies are used to control operations of the machine.

Most of the machines NC / CNC program capable of storing in the memory. These machines are stored in the program memory when you read it for the first time. Then you can call these programs frequently from memory without the need to read it again. This leads to faster operations when required production numbers of identical parts.

Machines that do not contain memory must be read in the program step by step and implement step before moving on to the next step, but it cannot store the program the machines that do not contain memory must re-read the program in each time you produce a new part. This leads to delay-the-process.

The Practical Side: -

First: the basic components of a digital control system:

Digital control system consists of the following three basic components:

1-program:

The program is a set of commands and directives that guide the machine to what must be done. The program is encrypted in the form of numbers or symbols on the introduction of certain media where they can be interpreted by the control unit. Input modes may be in the form of perforated tape (Punched Tape) or magnetic tape or in the form of photographic films. It is worth mentioning that there are other ways to enter, the first is the manual input of directives to the control unit. This method is called manual data entry (Manual Data Input) and is referred to as the Acronym letters MDI is suitable only for simple acts of where the command is repeated. The second way to enter is done by connecting directly with a computer. Digital control defines direct (Direct Numerical Control) or what is referred to as the Acronym (DNC).

The program is set up by a competent person who knows parts (Part Programmer) function programmed processing detailed set of steps by which accomplish the desired function. And operations, the operating steps also include the relative movements between the cutting tool and the-product.

2- Control-unit:

The control unit is the second basic components of a digital control system. Include electronic and physical entity who is reading and interpretation of the program and convert it to an act of the machine mechanic. The control unit includes a tape reader (Tape Reader), and the data area (Data Buffer) and channel output signals to the machine and channels feedback from the machine and sequence controllers that controlled the entire chain of operations of all the previous elements. It is worth mentioning that all modern digital control systems today are equipped with a computer works as a control unit. Therefore know this type of digital control systems with digital control systems computer (Computer Numerical Control) and is referred to as a shortcut (CNC). Stripe Reader is an electromechanical device the roll and read the perforated tape which contains guidance program. The function of this storage device inputs in the form of logical blocks of information. Mass of information is usually representing one full step in a series of operating elements. For example, the data may be necessary to move the machine to the table a specific location and

operation of a hole in that location is a mass of information and one. Channel output signals related to the engine, which controls the movement mechanisms (Servo Motor) and the rest of the controllers in the machine. The guidance is sent to the control unit Machine through these channels. To ensure that these guidelines have been implemented correctly from the machine, the feedback data is sent from the machine to the control unit via feedback channels. The important function of the feedback circuit to make sure that the location of the machine table and the work piece relative to the true cutting tools. Units to control the sequence of operations coordinate events for the rest of the elements of the console. Running stripe reader to read the data in the selected area (buffer), and the signals are sent to and from the machine, and so on. These types of transactions should be synchronized and this is the function modules to control the sequence.

Contains the control panel buttons are set through the system. Although the digital control system, automatic However, the need for humans still exist to start and stop the machine. And changing the tools (there are digital control systems are changing the tools automatically), and the loading and unloading of the machine, and the completion of various tasks.

3- Machine-or-process-to-be-controlled:

The third element of the components of the digital control system is a machine or process that is intended to control. It is the part that the completion of useful work. A common example of a digital control system designed to accomplish the operation of the machine consists of a table and spindle drives and control units are necessary to drive components. The machine also includes a number of pieces and stabilizers and other auxiliary equipment necessary for the operation.

Second:The-digital-control-system-procedures:

To use the digital control system in manufacturing must complete the following steps:

1.And technical course newspaper is a list of sequential processes that must be completed on the work piece. The newspaper contains technical course on the list of machines that must pass through the work piece to perform a series of operations, usually technical course contains some of the processes that must be accomplished on machines with digital control is accomplished the rest of the operations on machines running classic.

2. Programming process: the person programmed planning process for that part of the work that will be done by digital control. This person must possess knowledgeable enough about the operations and be well-trained, which is responsible for planning the sequence of operating steps and are intended to be completed on numerical control machines and documenting these steps for a particular model, and there are two ways to programmable digital control machines: manual-programming. Computer-programming.

Processed orders in the operating manual programming in the form of a list of the relative movements between the product and tools that must be followed to play the part. In the computer-aided programming is to get rid of a lot of boring work that we encounter in programming where computer-based hand these tasks. This is especially

important when running pieces filled with complex geometric shapes, where work includes multiple operating steps, the use of the computer in such machines lead to significant savings for the effort and time.

3. Prepare the tape: The programmed to prepare the tape perforated after reviewing the operating plan, in the programming manual is prepared tape drill directly from the program through a special device has potential perforation tape, and programming computer-aided the computer interpretation of commands and perform calculations necessary to convert them into a series of orders movements control of the machine and then punching device for the preparation of the tape of the machine.

4. Check the authenticity of the tape: After the preparation of the tape be sure of the accuracy of the tape through the process of achieving (Verification). Sometimes be checked ribbon through it runs through a computer program based drawing movements of several different pieces of paper, and in this way be detected for most of the errors that may be contained on the tape, and are tested tape also by his experience on the machine using the plastic or the like to run segment. The usual programming errors and sometimes it requires three attempts to get to the final version.

5. Production: the final step in the procedure is to use digital control strip in production. This request includes a raw piece and determine the necessary tools and stabilizers and processing of digital control machine. Function is load factor work piece on the machine and determine the starting position for the cutting tools relative to the work piece. The digital control system after the implementation of the commands on the ribbon at the end of the run part of that group removed from the machine and download the following piece and so on.

Third:action-steps:

Stages of the work is composed in part be implemented using a computer design program and then transfer the design to the second part, which is using the driver or computer manufacturer.

-Program-Master-CAM:

It is my design and operational program from among the programs in the field of advanced manufacturing, and has been used to illustrate the manufacturing side in this article, and Figure 1 shows the program window. At the top of the screen shows the address line program that displays the name of the file currently working on it. And then to the bottom of it toolbar to a large-group-of-buttons.

There are also lists on the far left of the screen, the main menu to the top of the list to the bottom, where secondary unclear where the value of Z, color, etc.. The main menu includes commands groups to accomplish the task design, operation, modification, etc.

And generally includes interaction within Master CAM options menus and dialogue within the area of dialogue bottom of the screen and the establishment of the items and choose totals in the drawing window. Is movement between the sub-menus to reach the required commands, and the information required is determined by sub-menus or dialog boxes, and then execute the desired command. There is the possibility to undo by the command (Undo) to correct the error. Can show and hide the dialogue by pressing (Alt + P). Where to hide the dialogue

leads to an increase workspace. When data entry is required, the editing area show directly in the bottom of the screen allow entering the required data.
Figure 1: Window program Master CAM.
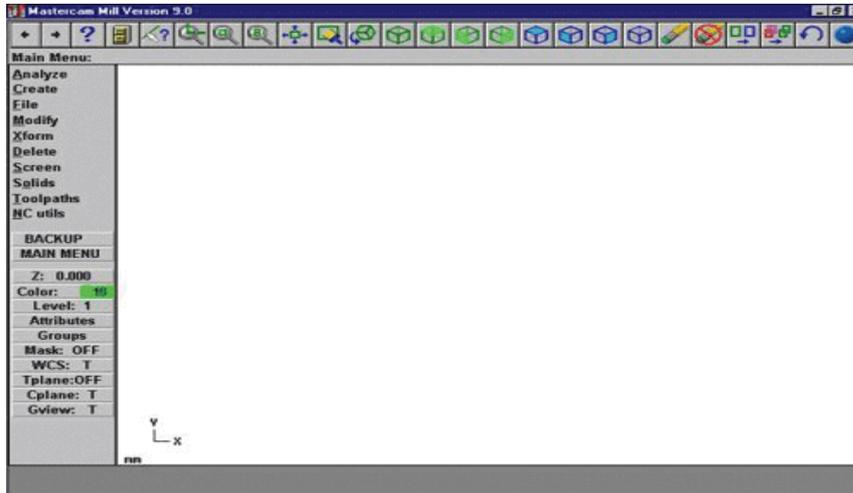
Fourth: design steps using a computerized design system:
AutoCAD software can be used to implement the design part of the work, and to clarify the review action steps of the model shown in Figure 6, it can be a statement steps to accomplish this form are as follows:
1. The use of multi-line (Polyline) for the outer limits of the fee model in one piece.
2. Use the circle to draw holes in the design.
3. Extrude the figure with thickness equal (10mm) in 3D .
4. We empty the holes using subtraction (Subtract).
Full program: -
Command: _pline
Specify start point:
Current line-width is 0.0000
Specify next point or [Arc / Halfwidth / Length / Undo / Width]: * Cancel *
Command: z
ZOOM
Specify corner of window, enter a scale factor (nX or nXP), or
[All / Center / Dynamic / Extents / Previous / Scale / Window / Object] <real time>:
a
Regenerating model.
Command: _pline
Specify start point: 10,10
Current line-width is 0.0000
Specify next point or [Arc / Halfwidth / Length / Undo / Width]: @ 30 <90
 Specify next point or [Arc / Close / Halfwidth / Length / Undo / Width]: @ 50 <-30
Specify next point or [Arc / Close / Halfwidth / Length / Undo / Width]: @ 50 <30
Specify next point or [Arc / Close / Halfwidth / Length / Undo / Width]: c

Command: _circle Specify center point for circle or [3P/2P/Ttr (tan tan radius)]: 80,80
Specify radius of circle or [Diameter]: 40
Command: _circle Specify center point for circle or [3P/2P/Ttr (tan tan radius)]: 50,50
Specify radius of circle or [Diameter] <20.2303>:
Command: _extrude
Current wire frame density: ISOLINES = 4
Select objects to extrude: Specify opposite corner: 3 found
Select objects to extrude:
Specify height of extrusion or [Direction / Path / Taper angle]: 10 (thickness or fish = 10)
Current wire frame density: ISOLINES = 4
Select objects to extrude: Specify opposite corner: 3 found
5. After the completion of the design phase we store the file name, but not the (plate). Are run Master CAM then program call the form's file and after reaching the desired file by browsing the folders and select the correct location for the file button is pressed to open the files. Where the file transfer process is completed to the program Master CAM.
6. Manufacturing processes:
Operation is performed for the model to be manufactured by the following sequence:
1. Determine the product and the material is through the selection of appropriate material from the library of the program shown in Figure 2.
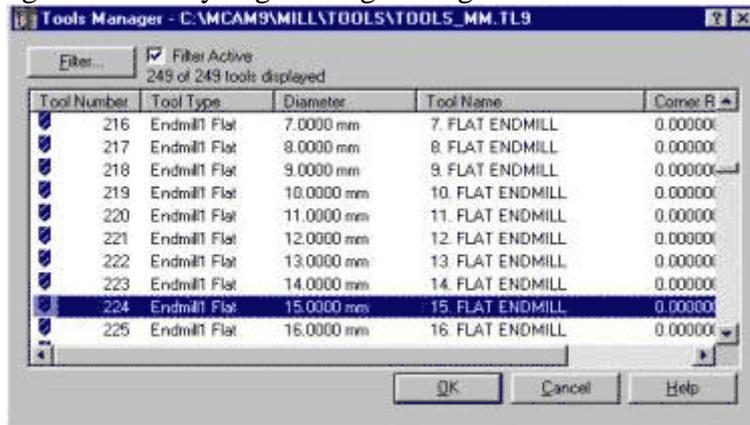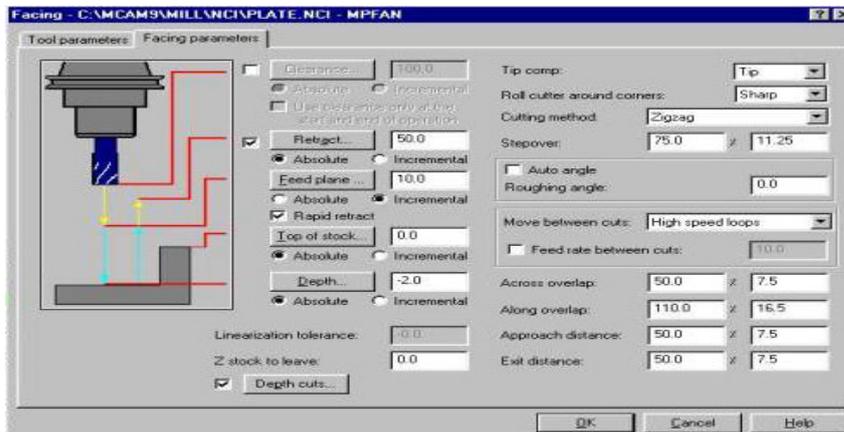
Figure 2: Library materials.
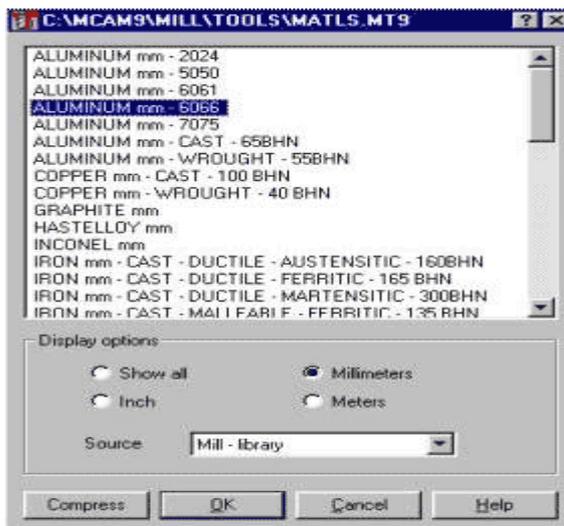
To determine the size of the raw material and to identify several pieces and the type of operation is done from the menu Tool Paths where is determined by the type of

operation (hole, Tfraz, expansion, etc.). The program has a library of cutting tools as shown in Figure 3.

Figure 3: Library engineering cutting tools.

Then variables is determined by the cutting process of cutting depth, nutrition and cutting speed through the Facing Parameters dialog box shown in Figure (4).
(Figure 4): cutting tools variables on the surface of the work piece.

- Send steps to program the machine:
After the completion of choosing the number of pieces and tested is going to address the design stage and convert it into machine language show in figure 5.

Figure 5: Library materials.
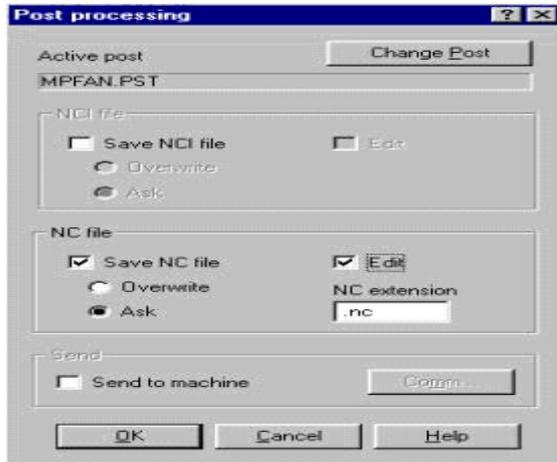
This can be tested from within the code program Master CAM without the need to run on the machine and through simulation (simulation) leads to saving a lot of time and effort.

Conclusions:

1 - we can deduce from the foregoing that the design technology is not easy application process, but at the same time the need to reach the organization through the use of effective tools to the location in the market by offering products with high quality and design and low costs.

2 - The construction of a CAD / CAM integrated provides a direct connection between the design and manufacturing processes; the goal of the system CAD / CAM not only automate certain phases of design and manufacturing, but also automate the transition from design to manufacturing.

3 - The use of CAD / CAM integrated lead and highly to reduce errors that occurred during the programming parts on CNC machines as desired program is obtained automatically through the computer, which was to provide him with the necessary data for manufacturing. It could be argued that the future carries with it a lot of hope in the access to the system CAD / CAM with super specifications and through the development of communication sciences and microprocessors and software. As the evolution of science communication will lead to the exchange of information greatly between people and machines and computers.

4 - The second factor that will lead to improving the role of CAD / CAM is the evolution of microcomputers and microprocessors, which leads to innovation more sophisticated machines. In general, can be summed up many benefits to system CAD / CAM and CNC machines.

Recommendations:

Given the importance of these programs in the industry and used in many fields, as well as a lack of industry in our country to manufacture parts and products are complex shape, as well as the technical staff in this area, we recommend the following:

1. Seriously considered for technology in general and particular design technology as an access key to lasting customer loyalty.
2. Business studies take into account the operating economics in Iraq .
3. Interest-based CAD / CAM and focus it into the curriculum.
4. Provide digital control machines and do the establishment of specialized workshops in this field.
5. Lifting of the level of national cadres in this field (in Iraq) establishing training courses at various levels both internally and externally, if possible.

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