

Computer aided design and computer aided manufacturing computer science essay

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While working with computing machine aided design, the first thing which strikes our head that how we implement our pencil and scale design in computing machine engineering. It ' s rather obvious that we do n't utilize pencil, graduated table, and rubber in a computing machine to pull designs. Well, losing any of these tools consequences to an uncomplete design, but non so in CAD.

CAD is an electronic tool that enables us to do a quick an accurate design with the usage of package in the computing machine. With the aid of this package we can easy do drawings merely by snapping the buttons of a keyboard. It has figure of advantages over simple hand-crafted designs, such as CAD drawings are orderly, clean and extremely presentable. Electronic drawings can be modified rather easy can be presented in a assortment of formats. To have a CAD plan was non every bit easy as it is now. A decennary ago CAD ' s monetary value was excessively high to be purchased by common applied scientist interior decorators. Merely a few professionals could afford it.

In recent old ages, nevertheless, computing machine monetary values have decreased significantly and more professionals are taking advantage of CAD. There are several types of CAD plans available in industries presents. Some are specially mend for general pulling work while others are dedicated on specific technology applications. There are plans that enable us to execute 2D drawings, 3D drawings, rendering, shadowing, technology computations, infinite planning, structural design, undertaking direction, etc. COMPUETR AIDED MANUFACTURING (CAM)CAD has now extended its division to yet

another technology subdivision called computing machine aided fabrication. CAM is a common method for fabricating used by big corporations. CAD and fabrication plan are frequently integrated into one system called CAD-CAM.

These systems import CAD drawings into CAM plans to automatize the fabrication procedure. It ' s like say an applied scientist draws a auto design utilizing CAD. The CAD drawing is brought into a computing machine aided technology plan for technology analysis. When the design is finalized, the drawing is brought into a CAD-CAM system that uses numerical informations from the CAD pulling for existent fabrication.

CAD HARDWARE AND SOFTWARE

There are two parts of a computing machine system, hardware and package and here CAD system is no exclusion. Computer hardware is the physical constituents of the computing machine such as cardinal processing unit, proctor and schemer.

Computer package is the plan that determines the application of a system. Here we will be more concern with the package thing instead than traveling into item survey of the hardware system which is beyond the demand of the subject.

Software

A CAD plan contains 1000s of plans that enable us to execute specific pulling undertakings. A undertaking may affect pulling an object, redacting an bing drawing, display a position of the drawing, printing or salvaging it, or commanding any other operations of the computing machine. The maps

contain a figure of bids that enable us to stipulate precisely what we want to make and how we want to make it. The maps as mentioned above are organized into faculties that provide an easy entree to all bids.

The plan is farther divided into faculties such as draw, edit, informations, end product, map control, informations storage and direction. A plan may besides hold a figure of specialised maps such as beds, database and 3D. Lashkar-e-Taiba ' s travel in item through the CAD faculties: DrawEditData end productSystem controlData storage and directionParticular characteristicsDrawThe pulling map faculty enables us to entree to all pulling map of CAD. Whenever we need to pull something, this faculty is used. The draw faculty enable us to pull circles, eclipsiss, text, lines, discharge, boundary lines, symbols, dimensions and many other pulling constituents.

Draw is CAD most often used faculty because all pulling work is accomplished utilizing it. EDITThe edit faculty lets us to alter bing pulling elements and pull strings them in a figure of ways. We can travel, transcript or erase pulling constituents. We can besides alter the dimensions of the drawing by merely enlarging or cut downing the size. We can alter the colour and line type of pulling constituents. We can besides alter the size and manner of text and dimensions, every bit good as edit a dimension to demo different units of measuring.

DATA OUTPUTThe information end product faculty enables us to expose drawings on the screen and so publish them on paper. There are two separate sets of maps that help carry through these: View show

mapPrint/plot mapsThe view-display maps allow us to expose different positions of a pulling on the screen. These maps are used rather frequently, whenever we need to redact or pull something, we need to concentrate on that part of the drawing. With the aid of position show maps, we can whizz in or out in a specific part of the drawing.

The print and secret plan maps allows us to publish drawings utilizing the pressman or a schemer. We can command many facets of printing and plotting. We can publish the same drawing in different sizes by using the appropriate graduated table factor. We can plot the drawings with specific colour, pen thickness, and line types. Degree centigrades:

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Beginning TO DRAW

THE COORDINATE SYSTEM (2D system)

The co-ordinate system is another method to turn up the exact reference of the point in infinite (pulling) and it besides enables to turn up points by stipulating distances from a fixed mention point. You can turn up a point by giving its distances in the x-axis and y-axis way, mensurating along an angle. The co-ordinate system is available when a map requires informations input in the signifier of point locations. We may utilize it while pulling, redacting or any clip we need to turn up a point.

The most common co-ordinate systems are as follows: Cartesian co-ordinates
Polar co-ordinates
CARTESIAN COORDINATES
Cartesian co-ordinates, besides known as rectangular system of measuring which merely means that whenever we locate a point in the system it form a rectangle while following it, with perpendicular and horizontal constituent taking into history. The horizontal values, X- co-ordinates, are measured along X-axis. The perpendicular values, called Y-coordinates.

The meeting point of x-axis and y-axis is called the beginning (0, 0). The positive X values are measured to the right and the positive Y values are measured above the beginning point. The negative X and Y values are measured to the left and below severally. POLAR COORDINATES
Polar co-ordinates allows us to specify a point by stipulating the distance and the way from given point. This manner of measuring is rather helpful ; in working with the angles. To pull a line at an angle, we need to stipulate how long a line we want to pull and stipulate the angle.

Drawing Tool
Line types
Multiple analogue lines
Flexible curves
Arcs and circles
Ellipses and egg-shaped discharge
Text
Dimensions
Hatch forms
Polygons
Arrows
THE EDIT FUNCTION
The edit faculty gives a great flexibility in altering CAD drawings. If we were to pull utilizing merely pulling maps of CAD, it would likely take same sum of clip as it would on a pulling board. But CAD ' s redacting maps made CAD dynamic tool that consequences in important clip nest eggs. The followers are the basic capabilities of the edit faculty: Erasing pulling objects
Traveling pulling objects
Copying pulling objects
Changing the visual aspect of the drawing

objects
SELECTING OBJECTS TO EDIT
In order to use any of the edit maps, we need to first choose the drawing objects that need to be edited. Following are the basic methods for choosing pulling objects for redacting. Choosing objects one by one
Choosing objects by enveloping them in a window
Choosing objects utilizing choice filters
Making groups of selected objects
ERASING Drawing OBJECTS
CAD provides a fast, accurate and convenient agencies of wipe outing drawings. Once we have entered the erase bid, you are in the erase manner ; any objects we select now will be immediately erased.

We can utilize any method described above to choose the object. MOVING
Drawing OBJECTS
CAD allows us to travel pulling objects within a drawing in a convenient mode. We can merely rearrange the bing drawing objects, as we like. The first measure is to choose the pulling which we have to travel by merely foregrounding it. The 2nd measure is to bespeak a base point. Then we indicate the finish point where we want to put the drawing. Copying
Drawing OBJECTS
The package besides allows us to do speedy transcripts of an bing copying. First we merely select the object to be copied so we use the transcript map and topographic point the object as indicated earlier.

3D DRAWINGS

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jpgIntroduction
The 3D capablenesss allow us to pull pictural positions such as isometrics, oblique positions and positions. The positions drawn with CAD provide absolute rightness and are lot flexible in footings of redacting and

show. We can revolve a theoretical account on screen merely like an existent theoretical account, and expose positions from different angles. Engineers frequently use this method which is more flexible to see the design in an easier manner to make up one's mind whether it will work or non.

PICTORIAL VIEW CONCEPT It is rather hard to stand for a 3D drawing in a 2D manner such as computing machine screen of a pulling paper. This is merely possible through optical semblance. The positions that we draw on 2D media are 2D representation of 3D images. We use same the construct of pulling 3D as we draw in paper utilizing coordinate system in 2D. **OBLIQUE VIEWS** Oblique positions are the simplest signifier of the pictural positions that can be drawn by utilizing parallel projection lines from an lift. There are criterions established to pull oblique positions at specific angles. A common criterion used is to pull an oblique position by projecting lines at 45. To mensurate deepness along a 45 angle, we need to scale it down by $\frac{1}{\sqrt{2}}$ or $\frac{1}{2}$ of the existent distance.

For illustration, if the existent deepness of the object is 10 " , we measure 9 " or 6 " . The $\frac{1}{\sqrt{2}}$ graduated table factor creates an consequence as if the object is viewed from a somewhat higher angle than the $\frac{1}{2}$ graduated table factor. **ISOMETRIC VIEWS** Isometric positions are more realistic than oblique positions. The object appears to be tilted at a 30° angle on both sides. An isometric is defined by three planes called isoplanes: top isoplane, right isoplane and left isoplane.

On a pulling board, we use 30° trigon to pull the three planes of an isometric. The same rule is applied in CAD with the aid of assorted maps. The right isoplane is drawn with the 30° and 90° angles, the left isoplane with 150° and 90° and the top plane with 30° and 150° angles. All distances are measured utilizing 1: 1 scale i. e. existent size, to demonstrate deepness, breadth and tallness.

Polar co-ordinates are peculiarly helpful to mensurate distances along an angle.

THE 3D COORDINATES SYSTEM

3D co-ordinates system contains three dimensions, which is shown with the aid of three axes: X, Y and Z. The axes meet at the point in the form of a tripod. This point is called the beginning point, which is the (0, 0, 0) location of all co-ordinates. The three axes besides form fanciful planes: XY plane, XZ plane and YZ plane.

All these planes are perpendicular to each other. This generates a perfect infinite where we can see a pulling 3D infinite by traveling it up and down and sidewise in any angle which we like to. The 3D co-ordinates can be entered utilizing the undermentioned formats: Cartesian co-ordinates, Spherical co-ordinates, Cylindrical co-ordinates, Degree centigrades: UsersSAGARDesktopLOVELY SCHOOL OF ENGINEERING AND TECHNOLOGY 26-7-10erm papermec 101ca. jpg

DISPLAYING Positions

We can revolve a 3D theoretical account on the screen and expose different positions by stipulating an exact point of view. The point of view merely means the place of the camera from which the position is to be taken. There are two chief protocols used to expose positions: View coordinate geometry Object co-ordinate geometry We are now traveling into more item about the point ' s mentioned above.

VIEW COORDINATE GEOMETRY In this instance it is assumed that the camera (point of view) remains stationary and the 3D theoretical account is rotated to expose a coveted position. The theoretical account can be rotated around the X, Y or Z axis. We need to stipulate around which axis the rotary motion will take topographic point and by how much grade. **OBJECT COORDINATE GEOMETRY** This point of view is merely the antonym of “ position co-ordinate geometry ” i. e.

the theoretical account remains stationary and the camera (point of view) is moved to a show a coveted position. We can utilize any of the co-ordinate methods to stipulate an exact point of view. **DISPLAYING ISOMETRIC**

VIEW To expose an isometric position we need to stipulate the way from which the position is to be taken. The most convenient manner is to bespeak the way with the aid of spherical co-ordinates. We need to stipulate two angles: an angle in XY plane (longitude) and an angle from the XY plane (latitude) . The longitude determines the orientation in the XY plane and the latitude determines the tallness of the point of view.

3D DRAWING AID FUNCTIONS

The common 3D pulling -aid maps are as follows: 3D ready-made forms Linear bulge Radial bulge Shadowing and rendering 3D Ready-made SHAPESCAD allows us to pull assorted types of ready-made forms in a few simple stairss.

For illustration, to pull a regular hexahedron, we do n't truly necessitate to pull the regular hexahedron by pulling all the lines or 3D faces of each of the sides. We can merely immediately draw a regular hexahedron by stipulating its dimensions. Similarly we can pull figure of normally used geometrical forms merely by stipulating their form and size. EXTRUDING OBJECTS IN THE LINEAR DIRECTION Cad allows carving or taking out the desire 2D geometrical figure from 3D forms. For illustration, we can squeeze out a rectangle from a cuboids or a trigon from a prism. When we use the additive bulge map, we are prompted to choose the objects to be extruded and stipulate the way of the bulge (axis of the bulge) . Shading AND Rendition There is a figure of shadowing and rendering plans available that can be used to do 3D drawings really realistic.

These plans allow us to make colourss, sunglasses and shadows precisely as they would look in a image. These plans are rather big and complex and necessitate powerful computing machine hardware. With the aid of rendering plans, you can stipulate a figure of shadowing and rendering parametric quantities and make a 3D scene.

we can delegate colours and textures to different surfaces of a theoretical account.

COMPUTER AIDED MANUFACTURING (CAM)

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jpgDegree centigrades: UsersSAGARDesktopLOVELY SCHOOL OF

ENGINEERING AND TECHNOLOGY 26-7-10erm papermec

1012005_Lamborghini. jpgDEFINITION: A Computer-Aided Manufacturing

(CAM) is the usage of computing machine package and hardware in the interlingual rendition of computer-aided design theoretical accounts into fabrication instructions for numerical controlled machine tools. A

APPLICATIONS OF COMPUTER-AIDED Fabrication

The field of computing machine aided designA has steadily advanced over the past four decennaries to the phase at which conceptual designs for new merchandises can be made wholly within the model of CAD package. From the development of the basic design to the Bill of Materials necessary to fabricate the merchandise there is no demand at any phase of the procedure to construct physical prototypes. AComputer-Aided Manufacturing takes this one measure farther by bridging the spread between the conceptual design and the fabrication of the finished merchandise. Whereas in the past it would be necessary for design developed utilizing CAD package to be manually converted into a drafted paper pulling detailing instructions for its industry, Computer-Aided Manufacturing package allows informations from CAD package to be converted straight into a set of fabrication instructions.

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ACAM package converts 3D theoretical accounts generated in CAD into a set of basic running instructions written in G-Code. G-code is a programming linguistic communication that can be understood by numerical controlled machine tools – basically industrial automatons – and the G-code can teach the machine tool to fabricate a big figure of points with perfect preciseness and religion to the CAD design. A Modern numerical controlled machine tools can be linked into a ' cell ' , a aggregation of tools that each performs a specified undertaking in the industry of a merchandise. The merchandise is passed along the cell in the mode of a production line, with each machine tool (i.

e. welding and milling machines, drills, lathes etc.) executing a individual measure of the process.

A For the interest of convenience, a individual computing machine ' controller ' can drive all of the tools in a individual cell. G-code instructions can be fed to this accountant and so left to run the cell with minimum input from human supervisors. A Cam

BENEFITS OF COMPUTER-AIDED Fabrication

While unwanted for mill workers, the ideal province of personal businesss for makers is an wholly machine-controlled fabrication procedure.

In concurrence with computer-aided design, computer-aided fabrication enables makers to cut down the costs of bring forthing goods by minimising the engagement of human operators. An add-on to take down running costs there are several extra benefits to utilizing CAM package. By taking the

demand to interpret CAD theoretical accounts into fabrication instructions through paper bill of exchanges it enables industries to do speedy changes to the merchandise design, feeding updated instructions to the machine tools and seeing instant results. An add-on, many CAM package bundles have the ability to pull off simple undertakings such as the re-ordering of parts, further minimising human engagement. Though all numerical controlled machine tools have the ability to feel mistakes and automatically close down, many can really direct a message to their human operators via nomadic phones or electronic mail, informing them of the job and expecting further instructions. All in all, CAM package represents a continuance of the tendency to do fabrication wholly automated.

While CAD removed the demand to retain a squad of drafters to plan new merchandises, CAM removes the demand for skilled and unskilled mill workers. All of these developments result in lower operational costs, lower terminal merchandise monetary values and increased net incomes for manufacturers. A

Problem WITH COMPUTER AIDED MANUFACTURING

Unfortunately, there are several restrictions of computer-aided fabrication. Obviously, putting up the substructure to get down with can be highly expensive. Computer-aided fabrication requires non merely the numerical controlled machine tools themselves but besides an extended suite of CAD/CAM package and hardware to develop the design theoretical accounts

and change over them into fabricating instructions - every bit good as trained secret agents to run them.

Additionally, the field of computer-aided direction is fraught with incompatibility. While all numerical controlled machine tools operate utilizing G-code, there is no universally used criterion for the codification itself. Since there is such a broad assortment of machine tools that use the codification it tends to be the instance that makers create their own bespoke codifications to run their machinery.

While this deficiency of standardisation may not be a job in itself, it can go a job when the time comes to change over 3D CAD designs into G-code. CAD systems tend to hide away information in their own proprietary format (in the same manner that word processor applications do) , so it can frequently be a challenge to reassign information from CAD to CAM package and so into whatever signifier of G-code the maker employs. A

Decision