

UNIT-I

Introduction

Coordinate Systems:

Three types of coordinate systems generally used in CAD/CAM operations

- **Model Coordinate System (MCS)**
- **Working Coordinate System (WCS)**
- **Screen Coordinate System (SCS)**

Model Coordinate System:

It is the reference space of the model with respect to which all the model geometrical data is stored. It is a Cartesian system with its X, Y, Z aligned with the characteristics dimension of the model under consideration. The choice of origin is arbitrary.

Work Coordinate System:

This is basically an auxiliary coordinate system used in place of MCS. For convenience while we develop the geometry by data input this kind of coordinate system is useful. It is very useful when a plane (face) in MCS is not aligned along any orthogonal planes. It is a user defined system that facilitates the geometrical construction. While user inputs data in WCS the software transforms it to MCS.

Screen Coordinate System:

In contrast to MCS and WCS, Screen Coordinate System is a two-dimensional device-independent system whose origin is usually located at the lower left corner of the display screen. The SCS is important for display, screen input and digitizing tasks. A digital image or image on the screen is represented using pixels. The size of representation depends on the size of the image, the horizontal and the vertical resolution of the screen which are usually indicated as so many pixels per unit length. E.g. dots per inch, pixels per inch etc.

Graphic Displays

1. Cathode ray tube

The cathode ray tube (CRT) is a vacuum tube that contains one or more electron guns and a phosphorescent screen, and is used to display images.[1] It modulates, accelerates, and deflects electron beam(s) onto the screen to create the images.

2. Light-emitting diode (LED): It is a p-n junction diode which glows when a suitable voltage is applied between p & n junction. When a suitable **current** is applied

electrons are able to recombine with **electron holes** within the device, releasing energy in the form of **photons**

3. Liquid – crystal display (LCDs): Liquid-crystal display (LCD) is a flat-panel display or other electronically modulated optical device that uses the light-modulating properties of liquid crystals

Lookup table

A **lookup table** is an array that replaces runtime computation with a simpler array indexing operation. The savings in terms of processing time can signify faster computations for input/output operation.

Pixel Values

Each of the pixels that represents an image stored inside a computer has a *pixel value* which describes how bright that pixel is, and/or what color it should be. In the simplest case of binary images, the pixel value is a 1-bit number indicating either foreground or background.

For a grayscale images, the pixel value is a single number that represents the brightness of the pixel.

To represent color images, separate red, green and blue components must be specified for each pixel.

Graphics memory

It's memory used for processing graphics. If you have a discrete GPU, this memory is located somewhere on your graphics card, and is used for the GPU and nothing else. It is specialized memory that's engineered with graphics and similar calculations in mind. If you have an integrated GPU, it's a small block in your system RAM that is used by the processor in much the same way, but it is no different than your other system RAM.