

School of Mechanical Engineering

Course Code : BTME 3060

Course Name: Computer Aided Design

BTME 3060 Computer Aided Design Lecture 7

2nd Year

III Semester

Galgotias University

2020-21

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Name of the Faculty: Pramod Kumar

Program Name: B.Tech

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Unit I: Introduction to CAD

- Syllabus
 - Product Development Cycle
 - Introduction to CAD, Hardware and software requirement of CAD;
 - Graphics input devices- cursor control devices, Digitizers, Scanners, speech oriented devices and touch panels,
 - Graphics display devices- Refresh cathode ray tubes, Raster-scan displays, Random-scan displays, CRT Monitors;
 - Input devices- keyboard, joy-stick, mouse, scanner;
 - DVST, Flat- panel display, Hard copy devices - Printers and Plotters, dot matrix, inkjet, laser printers,
 - **Graphics Standards – Neutral File formats –IGES, STEP,**
 - Graphics software, Graphics functions,
 - output primitives- Bresenham's Algorithm and DDA.

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Objectives of the lecture

- Understanding of the Graphics Standards
- History and development of the Neutral File formats –IGES, STEP,



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Graphics Standards

- several have become de facto standards, and several more have come out of actual standards working groups and have either been designated as standards, or are being considered. For example, JPEG is an adopted standard (ISO WG 10, 1991) for encoding and compressing continuous tone raster still images.
- It was proposed by the Joint Photographic Expert Group, hence its name.
- Likewise, MPEG (ISO WG11, 1991) is a standard for encoding video and audio sequences, from the Moving Picture Experts Group.
- list of some other more popular formats:

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list of some other more popular formats:

| Format | Developer | Purpose |
|-----------------------------------|---------------------|---|
| BMP (BitMaP) | Microsoft | raster; color independence |
| CCITT | Fax CCITT | document transmission |
| DXF (Drawing eXchange File) | Autodesk, Inc. | interchange AutoCAD files |
| EPS (Encapsulated PostScript) | Adobe | describes a single picture that can be included in a PostScript file |
| GIF (Graphics Interchange Format) | Compuserve | uses LZW compression for transmission over telephone lines; has become a Web standard |
| JFIF | C-Cube Microsystems | Portable JPEG |
| PICT (PICTure data) | Apple | optimized for Apple QuickDraw |
| QuickTime | Apple | storage and retrieval of compressed time-based data |

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Neutral File Formats

- CAD file formats generally fall into two categories
 - Native or
 - Neutral(Standard) File format.
- Native file formats are Proprietary of a particular CAD software maker, to be used with their software.
- Neutral or Standards were specifically created to encourage interoperability, which helps exchange files between different software programs
- Neutral or Standard File format make it easier to exchange files with someone who uses different CAD software, the most successful Native Formats are supported by a variety of software. Let's have a look at some of the Neutral File Formats here:

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STEP

- STEP is the most widely used and most recommended of 3D file Formats.
- It is an ISO 10303-21 standard, so we know it is in the hands of a reputable standards-making body.
- Most of the software support STEP importing and exporting.

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IGES

- IGES stands for Initial Graphics Exchange Specification (pronounced eye-jess) is a vendor-neutral file format and is an older standard started by the US Air Force and taken over by ANSI.
- Using IGES, a CAD user can exchange product data models in the form of circuit diagrams, wireframe, freeform surface or solid modelling representations.
- Applications supported by IGES include traditional engineering drawings, models for analysis, and other manufacturing functions
- Since IGES was create at the beginning of Solid Model, there will be lots of feature missing in this file format, so we don't recommend you to use the format for sharing your designs.

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Parasolid

- Parasolid is a geometric modeling kernel originally developed by ShapeData, now owned by Siemens PLM Software (formerly UGS Corp.), that can be licensed by other companies for use in their 3D computer graphics software products.
- Since the license is a big catch, not all software support it.
- Parasolid combines the actual code kernel with a file format helps make sure everyone's use is compatible, which is a good thing.

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STL

- STL stands for STereoLithography (also has backronyms such as “Standard Triangle Language” and “Standard Tessellation Language”) is the universal format for pure 3D information created by 3D Systems.
- It is much-loved by 3D printers and somewhat loved by CAM.
- The biggest problem with STL is that it describes only the surface geometry of a three-dimensional object without any representation of color, texture or other common CAD model attributes.
- The STL format specifies both ASCII and binary representations.
- Binary files are more common, since they are more compact
- STL is fine for 3D printing where a slicer doesn't need to manipulate the CAD data much, but it is often not the best thing for CAD where you load a file that turns into a monolithic lump that is hard to edit much.

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VRML

- VRML (Virtual Reality Modeling Language, pronounced vermal) is a standard file format for representing 3-dimensional (3D) interactive vector graphics.
- It carries somewhat more information than STL, but is read by fewer software packages. VRML has been superseded by X3D

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X3D

- X3D is a royalty-free ISO standard XML-based file format for representing 3D computer graphics.
- It is successor to the VRML. X3D features extensions to VRML (e.g. CAD, Geospatial, Humanoid animation, NURBS etc.),
- the ability to encode the scene using an XML syntax as well as the Open Inventor-like syntax of VRML97, or binary formatting, and enhanced application programming interfaces (APIs).

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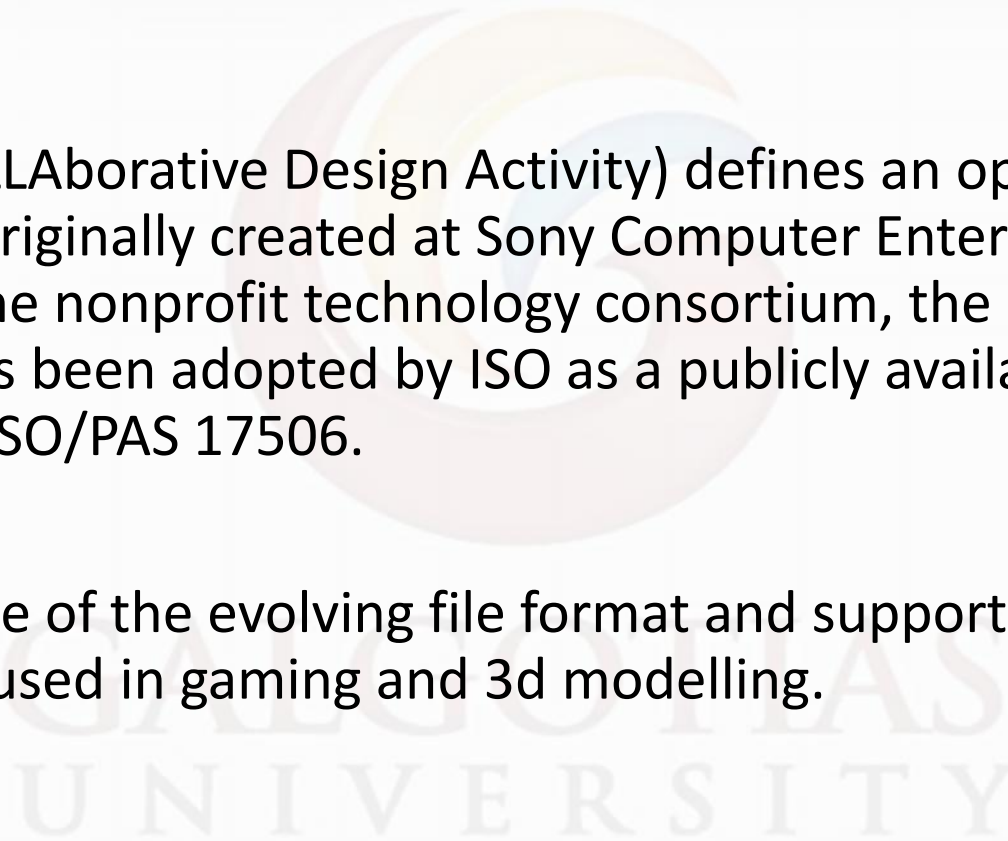
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COLLADA

- COLLADA (COLLABorative Design Activity) defines an open standard XML schema originally created at Sony Computer Entertainment managed by the nonprofit technology consortium, the Khronos Group, and has been adopted by ISO as a publicly available specification, ISO/PAS 17506.
- COLLADA is one of the evolving file format and supported by popular software, it is used in gaming and 3d modelling.



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DXF

- DXF which stands for Drawing Interchange Format, or Drawing Exchange Format is a pure 2D format and technically should be viewed as a Native format.
- It is Autocad's native 2D format.
- But Autocad is so ubiquitous and so many CAD programs support it that DXF has come to be a pretty universal interchange format for 2D information.

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Summery

- There are many standards used and some of them are discussed
- The file formats those of being used popularly are
 - STEP
 - IGES
 - PARASOLID
 - STL
 - VRML
 - X3D
 - COLLADA
 - DXF

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Questions

- Why the standards of the file are being used?
- What are the types of the neutral file formats



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Text Books

- Improving the Performance of Neutral File Data Transfers by Raymond J. Goult, Peter A. Sherar – 2012
- Specification of a CAD * I Neutral File for CAD Geometry by E.G. Schlechtendahl - 2012

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- Thank you



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