Lecture 7
CAD Connections

Introduction to ANSYS DesignModeler
What will you learn from this presentation:

• Geometry Import Properties
• CAD Connections
• Uni/Bi-Directional Connectivity
• Named Selection Manager
Preprocessing Workflow

Geometry Creation OR Geometry Import
- Sketches and Planes
- 3D Operations
  - Extrude, Revolve, Sweep, etc
- Geometry Import Options
  - Direct CAD/Bi-Directional CAD

Geometry Operations
- 3D Operations
  - Boolean, Body Operations, Split, etc
- Geometry Cleanup and Repair
  - Automatic Cleanup
  - Merge, Connect, Projection, Flow Volume Extraction, etc

Meshing
- Meshing Methods
  - Hybrid Mesh: Tet, Prisms, Pyramids
  - Hexa Dominant, Sweep meshing
  - Assembly Meshing
- Global Mesh Settings
- Local Mesh Settings
  - Sizing, Body/Sphere of Influence, Match Control, etc

Solver
- Fluid Flow
  - Fluid Flow (CFX)
  - Geometry
  - Mesh
  - Setup
  - Solution
  - Results

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Geometry Properties (1)

- Geometry Properties are import and data transfer related properties which will be applicable for imports.
- Right click on Geometry cell on Project Schematics and select Properties.
- Most of the settings for import can be done through “Basic Geometry Options” and “Advanced Geometry Options”.
- Several things can be setup as default such as:
  - Default analysis type (3d/2d)
  - Import/export options
    - Parameters
    - Named Selections, etc.
Basic Properties:

- Select ‘Parameters’ option for importing parameters defined in CAD package
- ‘Parameter Key’ filters the parameters from CAD that enter Workbench
- If ‘Parameter Key’ is not specified, all parameters from CAD enter Workbench
- Similarly, Named Selections key controls the selections from CAD entering WB
Geometry Properties (3)

Advanced Properties:
- Select ‘Use Associativity’ to establish association between CAD and WorkBench
- Import Coordinate Systems, Work Points, etc. defined in CAD
- Smart CAD Update:
  - If selected, changes made in other options get updated in the model
CAD Connections

- Transfer CAD geometry to DesignModeler/Meshing
- Two approaches
  - Approach I (Import)
    - Import neutral/native CAD files directly into DesignModeler
    - Uni-directional connectivity
  - Approach II (Direct Connection)
    - Use Plug-In (Associative Interface)
    - Bi-directional CAD Connectivity
    - ANSYS Direct CAD Interface
CAD Connections: Supported Readers & Plug-Ins/Interfaces

### Reader
- ACIS (*.sat, *.sab)
- ANSYS BladeGen (.bgd)
- Catia V4 (*.model, *.exp, *.session, *.dlv) 4.2.4
- Catia V5 (*.CATPart, *.CATProduct)
- Catia V5 CADNexus CAPRI CAE V5-6R 2012
- Catia V5 CADNexus CAPRI CAE V5R 20, R21
- Creo Parametric (*.prt, *.asm) 1.0
- Gambit (*.dbs) 2.4
- IGES (*.igs, *.iges) 4.0, 5.2, 5.3
- Autodesk Inventor (*.ipt, *.iam) 2012
- JT Open (*.jt) 8.0, 8.1
- Monte Carlo N-Particle (*.mcnp)
- NX (*.prt) 8.0
- Parasolid (*.x_t/b, *.xmt_txt/bin) 24.1
- SolidWorks (*.sldprt, *.sldasm) 2012
- Step (*.stp, *.step) AP203, AP214

### Version
- 22
- 12
- 4.2.4
- V5-6R 2012
- V5R 20, R21
- 1.0
- 2.4
- 4.0, 5.2, 5.3
- 2012
- 8.0, 8.1
- 8.0
- 24.1
- 2012
- AP203, AP214

### Reader/Plug-In/Interface Version
- Creo P (Pro/Engineer) (*.prt, *.asm) Creo Parametric 1.0, 2.0
- Autodesk Inventor (*.ipt, *.iam) Wildfire 5.0
- NX (*.prt) 2012, 2013
- ST3, ST4
- TeamCenter (Plug-In) Unified 8.1 with NX 7.5
- Unified 8.3 with NX 7.5.2
- Engineering 9.1 with NX 8.0
- SpaceClaim (SCDM) (*.scdoc) 2012 SP1

For Full Platform/OS Specific Support Consult Documentation (CAD Integration)
Three ways to import file in WB

• Import option on Workbench project page (File → Import)
• Geometry cell on project page
  – Right click for Context Menu
• Import in existing DM session
  – Appends the geometry file to existing geometry in DM
  – Multiple imports possible
CAD Connections: Approach II

Launch Workbench from CAD system

- Bi-Directional CAD Connectivity
  - Export parameters from CAD to Workbench
  - Parameter change in CAD reflects in Workbench and vice versa

- Bidirectional import from DM session
  - Attach to Active CAD Geometry
  - Imports active CAD geometry in DM
  - Can attach only saved CAD sessions

- Parameter Key
  - Prefix key for importing parameters
  - Default filter set to DS. Remove to import all parameters
CAD Connections: Bi-Directional CAD

Parameterized Hole Dia and No of Holes

Parameters from CAD to Workbench

Parameters from Workbench to CAD

Pro/ENGINEER

DesignModeler
CAD Connections: Named Selection Manager

Named Selections
- Define in CAD & transfer to WB
- Define directly under WB
- Named Selection filter under WB
  - By default the filter is set to NS
  - Available if the “Import Named Selections” option is set to Yes
  - Default filter set to NS. Remove to import all parameters

Workbench Geometry Import Options
CAD Connections: Named Selection Manager

Named Selection defined in UG NX

Named Selection imported in WB
Pre-requisites for CAD Connections

• For all CAD packages
  – CAD correctly installed and licensed
  – Correct ANSYS Inc. license

• For CATIA
  – Compatible version of CATIA V5 CAD program (R17, R18, R19, R20 or R21).
  – IBM LUM 4.6.8 or DSLS configured with a CATIA V5 (MD2, HD2, or ME2) license.
  – CADNexus CAPRI Gateway V3.15.2.

• For UG NX
  – All NX bodies must be within a 1000 x 1000 x 1000 meter cube, centered about the origin of the absolute coordinate system.
  – Some solids, surfaces and lines containing Bspline geometries may not import correctly into the DesignModeler application, but should import correctly in the ANSYS Mechanical application.
  – NX 5.0.6 or higher is recommended for importing models containing spot welds
  – After installation of ANSYS Workbench, importing an NX model using the Reader mode requires the CAD be launched one time.

• Refer to the documentation for further details on licensing requirements
CAD Connections: Advanced Geometry Options

- **Analysis Type**
  - Specify 2D or 3D simulation

- **Use Associativity**
  - To allow CAD associativity

- **Import Coordinate Systems**
  - Import CAD coordinate system

- **Import Work Points**
  - Import work points defined in CAD

- **Reader Mode Saves Updated File**
  - Save CAD file at the end of update

- **Import Using Instances**
  - Import part instances from CAD

- **Smart CAD Update**
  - Accelerate refresh of modified parts

- **Enclosure and Symmetry Processing**
  - Automatically creates named selections if turned ON

- **Mixed Import Resolution**
  - Import parts with mixed dimensions
Importing Legacy Gambit Models
• This is a stand-alone reader that does not require an installation of the GAMBIT program or GAMBIT licenses.
  – Supports real and virtual geometry import.
  – No CAD associativity.
  – No CAD Parameters.
  – Supports GAMBIT volumes, faces, edges, and vertices (excluding stand-alone vertices). Reads Real (ACIS) geometry from a Gambit database
  – Does not include reading meshing information