An Independent Development Framework
Compatible with Major CAD Databases

Ram Eswaran: Chief Technology Officer
Andy Beaupré: GM Worldwide Sales
John McCullough: GM Worldwide Marketing
Kubotek3D
Who We Are

• Headquarters – Marlborough MA

• Worldwide VAR channel in 2018

• Software Division of Kubotek USA
  Wholly owned independent subsidiary of Kubotek Corporation (Japan)
Software Products

- **KeyCreator – Mechanical CAD**
  - History free & Flexible Hybrid modeling software
  - Design & Manufacturing
  - Launched in 2003
  - Successor to CADKEY

- **Validation Tool & ECO Manager**
  - Model Comparison & Quality Documentation
  - Aerospace OEMs and several suppliers
  - Launched in 2007
State of Interoperability
Multiple CAD Databases

- **Modeling Kernels**
  - Parasolid (NX, Solidworks), ACIS, CGM (Catia), Granite (Creo), Shape Manager (Inventor),…

- **CAD Formats**
  - Solidworks, Catia, NX/UG, Creo/ProE, DWG, Inventor, JT,…

- **Neutral**
  - STEP, IGES
CAD Data Migration

Translation Challenges for OEMs

• How do you pick your suppliers?

• Do you offer multiple file formats to your suppliers?

• Do you validate files that you translate for your suppliers?

• Do you require your suppliers to validate any files that they translate from your native files?
Translation Challenges for Suppliers

• Challenge # 1: Does the file even read in?
• Challenge #2: Is all the relevant information read in?

Where’s the PMI?
• **Challenge #3: How well did the data read in?**
• Challenge # 4: Can the converted data be manipulated with the same (or better) reliability as the native system?
Translation Challenges for Developers

• Varied geometry definitions
• ACIS to STEP translation

ACIS

Face-Face Blend Surface

STEP

NURB Surface approximation

Rolling Ball Blend Surface
• Differences in Curve, surface parametrization
  ▪ How are U, V directions defined? Example: In a Cylinder is U axial or radial?
• Left handed / Right handed coordinate system
• Model Topology definitions

109 Elements in a B-Rep Cube
1 Body
1 Lump
1 Shell
6 Faces
6 (Plane) Surfaces
6 Loops
24 Coedges
24 2D Curves
12 Edges
12 3D (Line) Curves
8 Vertices
8 Points
• Varied Topology definitions
  • CATIA does not allow closed faces, ACIS does
• Flipping Flags!!! Face vs surface normal, edge vs curve direction, face loop orientation, …
• Database & Kernel Limitations
  • Parasolid & ACIS databases 3D only
    ▪ No support for PMI, 2D Drawing
    ▪ Assemblies added much later, largely unused by industry
    ▪ End user software store additional information separately
  • Tolerant modeling, afterthought in existing kernels
    ▪ Algorithms were not equipped to handle parts that varied in accuracy (1e-02 to 1e-6)
  • Database units vs File Units (CATPART in MM, X_T in meters)
  • ....
Interoperability depends on convertor’s ability to
- Keep up with changes to encryption, compression, data types
- Disregard inconsequential errors
- Account for corrupt data / missing links
- Pay attention to flavoring or known issues (neutral formats)
- Read all pertinent data
- Faithfully preserve the original data & design intent
What is it?

- A development framework that supports development of specialized design applications, CAD/CAM, CMM, and CAE utility programs, and high-fidelity movement of 3D data between engineering software programs
KOSMOS Core Modeler (KCM)

- Geometric modeler, and math library
  - Takes advantage of the many advancements in computer science and mathematics, over the last twenty years

- Designed to work with Translated Data
  - From the beginning KCM has been tested with many parts from around the world, created in different modelers

- Variable Precision
  - No global precision
• All new CAD data database designed to include superset of geometry/topology found in popular CAD formats

• Support for various CAD formats

• PMI and 2D drawing elements

• Lightweight data, features, attributes (render, metadata)
• Modern Architecture
  • Able to efficiently run on multiple processors
  • Complete Multi-Language Support
  • Platform Independent
  • Never Go Dark Code Pool

• Creation, Feature/Pattern Recognition, Query, Model Repair (Simplify, Merge, Stitch)

• Model Comparison
• New end-user products completely based on KOSMOS
  • K-Compare Validate 1.0
  • K-Display View 1.0
QUESTIONS

Phone: 800-372-3872
Email: sales@kubotek3d.com