Data Exchange Between CAD Software

Identifying Errors when Reading between Formats

Data Exchange

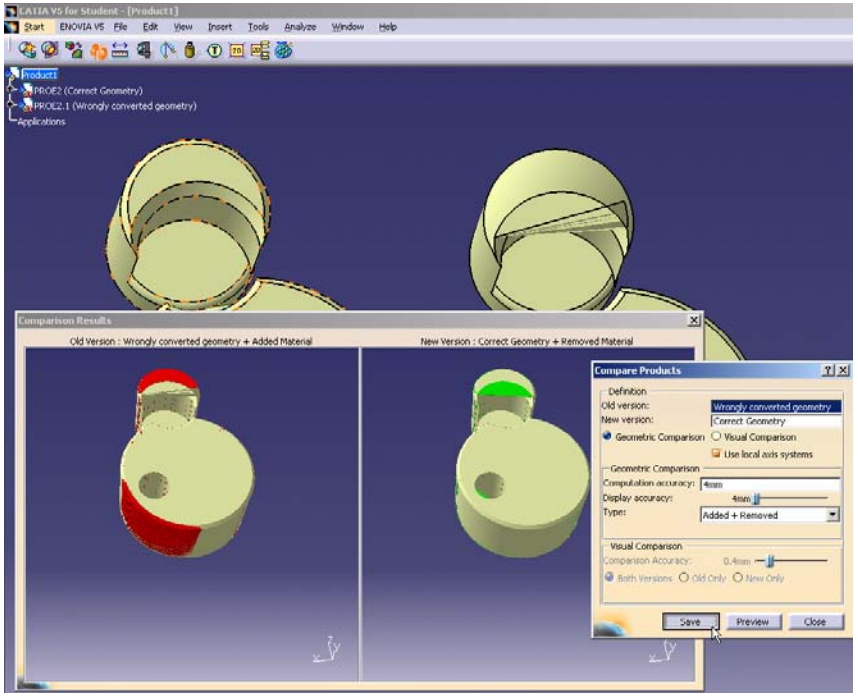
- I am currently analyzing two main file formats: IGES and STEP
- These are standard universal formats exported and imported via CAD programs with the help of a plug-in
- Data is lost or skewed when going to and from file formats not only between CAD software but also when returning to the same software of a different version

Data Exchange

- The source of this problem is the ambiguous interpretation and encoding of the geometry within the highly guarded code of the different CAD programs
- Individual plug-ins may also have a hand in skewing data
- In order to analyze the files and compare them, macros that will export visual and geometrical data will be used

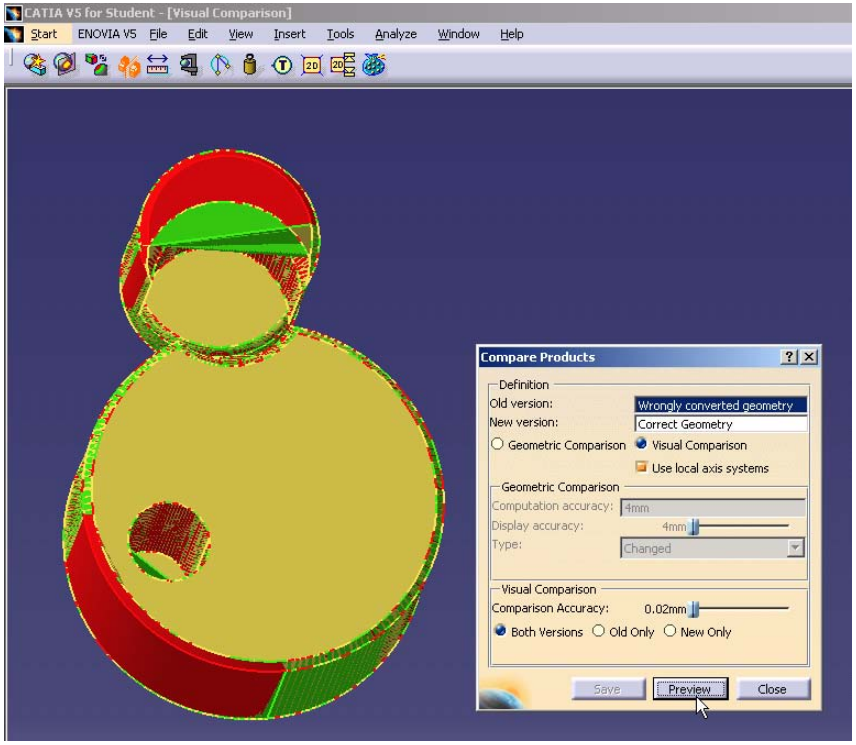
Data Exchange

- Visual analysis is a quick way to find differences between two models
- Visual analysis shows clearly where the geometry changes, but does not provide any hard data that can be analyzed
- Geometric analysis will be more efficient in providing a pattern



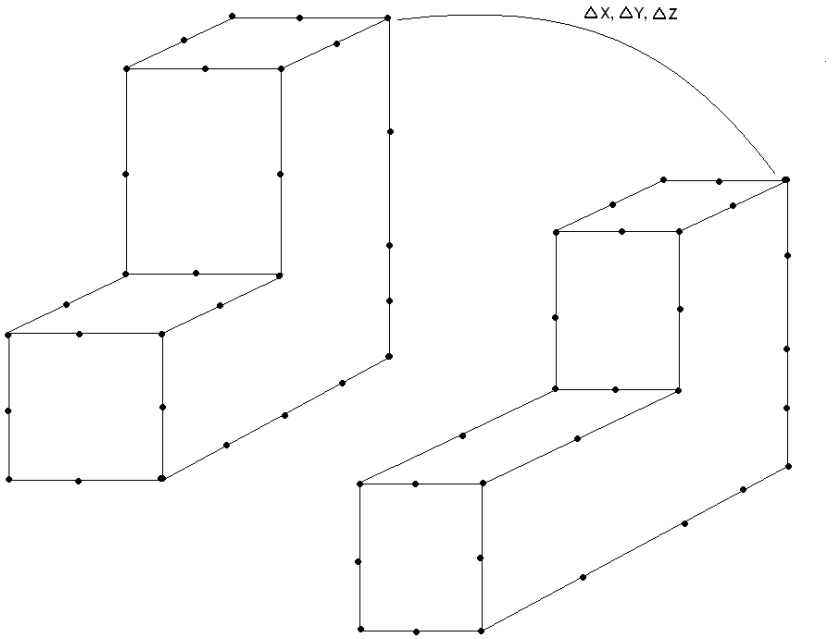
Data Exchange

- The point cloud technique will analyze the surface of two geometries and compare them
- Points are placed all over the surface of the first geometry at locations important to the shape
- When the file is exported and imported, these points move to reflect the unwanted change in geometry



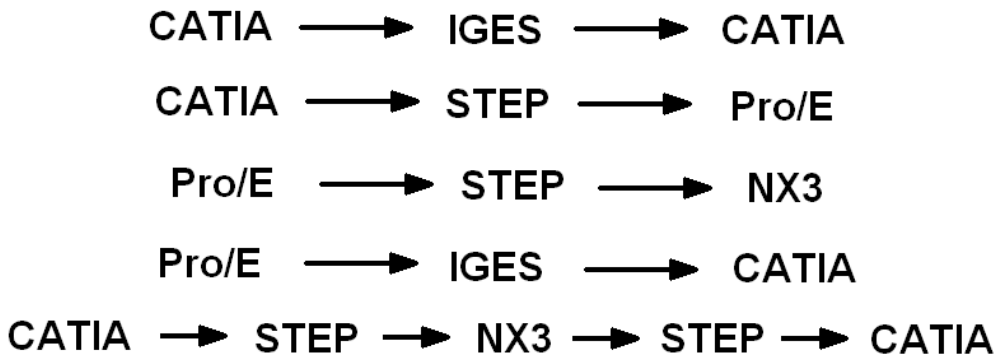
Data Exchange

- Using a loop based algorithm, connections between these points will be made based on proximity
- The distance to the closest point on the modified geometry will be recorded to find where and how much exactly the geometry has changed
- The algorithm will also find the distance in the opposite direction to ensure points aren’t skewed enough to fall into a different point’s range, as this will provide inaccurate measurements



Data Exchange

- Upon examining many different models and many different combinations of exchange between software, hopefully a pattern can be found to help decode some of the errors
- With this information, many errors may be overcome simply by building the geometry slightly differently



Data Exchange

- The software being observed includes CATIA v4 and v5, NX3.0, and Pro/ENGINEER Wildfile 3
- The file formats being observed include IGES and STEP
- Models are moved between neutral file formats and back to the original software or between software to be analyzed