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# How to quickly import CAD geometry into Thermal Desktop

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# Presentation Outline

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- JPL's Concurrent Design Environment
- Bridging the Gap
- The Import Process
- Model Reduction Methods
- Demonstration
- Acknowledgements



## JPL's Concurrent Design Environment



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There are several groups at JPL that are committed to concurrent design efforts, two are featured herein

- **Center for Space Mission Architecture and Design (CSMAD):**  
Enables the practical application of advanced process technologies in JPL's mission architecture process
- **Team I:**  
Functions as an incubator for projects that are in the Discovery, and even pre-Discovery proposal stages



## JPL's Concurrent Design Environment (cont'd)



- JPL's concurrent design environment is to a large extent centered on the CAD file
- During concurrent design sessions CAD geometry is ported to other more specialized engineering design packages such as
  - ZeMax/Code V (for detailed optical design)
  - NASTRAN (for structural dynamics)
  - ADAMS (for rigid body dynamics)
  - *and now* Thermal Desktop (for thermal analysis)



## Bridging the Gap



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- Given Thermal Desktop's integration with AutoCAD 2000, it was believed to offer the highest potential for success and was selected over other thermal tools for use in the concurrent design environment
  - Following some experimentation it was determined that CAD geometry exported as a 3D Studio file could be imported by AutoCAD 2000 and very easily converted to Thermal Desktop surfaces



## Bridging the Gap (cont'd)



- Benefits of working with 3D Studio geometry include the speed and simplicity in which very complicated models can be imported into Thermal Desktop
- 3D Studio geometry is imported to AutoCAD 2000 by way of a translator (which is included as part of the standard installation of AutoCAD 2000); hence it is NOT necessary to have 3D Studio installed in order to take full advantage of this technique



## The Import Process



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In its most basic form, the import process uses only three steps:

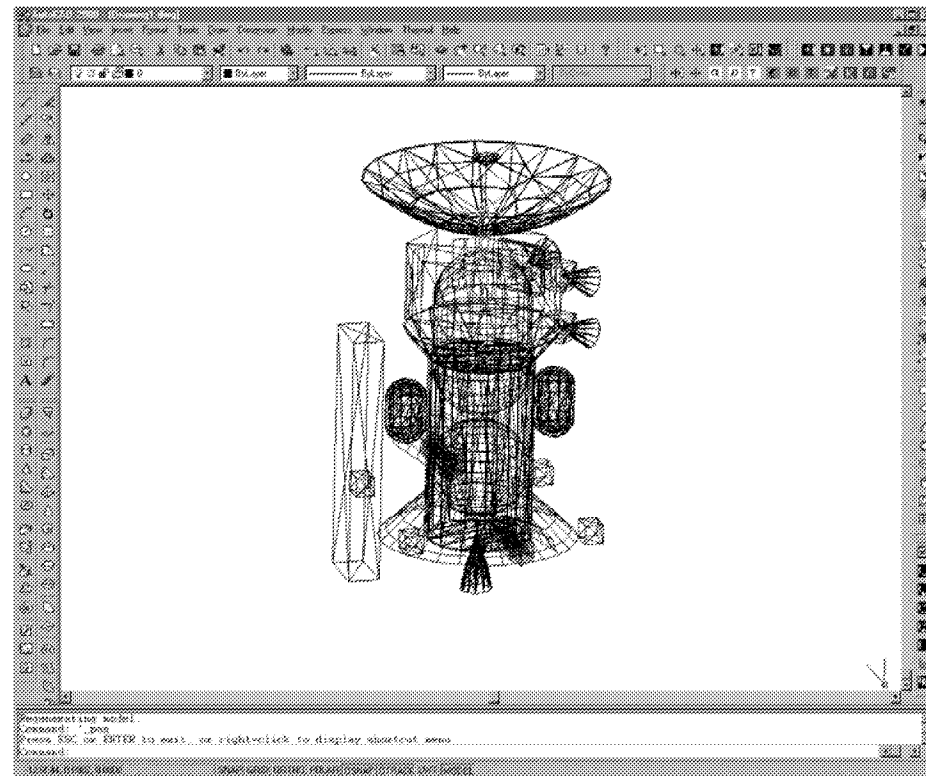
- 1) Select “3D Studio” from among the file types listed under the *Insert* menu.
- 2) Select the 3D Studio filename and the pertinent file import options.
- 3) Use AutoCAD’s *Explode* command to reduce the object into individual elements (if it arrives as one single object)



# Model Reduction Methods



The user is advised to exercise caution since CAD geometry imported using this method will be meshed, and even the most simple models can get very large, very quickly as illustrated below







## Model Reduction Methods (cont'd)



In these instances one of three approaches has been taken:

- 1) Deletion of inconsequential geometry prior to import
- 2) Using Thermal Desktop's "Super Node" capability
- 3) Replacing complex geometry with Thermal Desktop Primitives



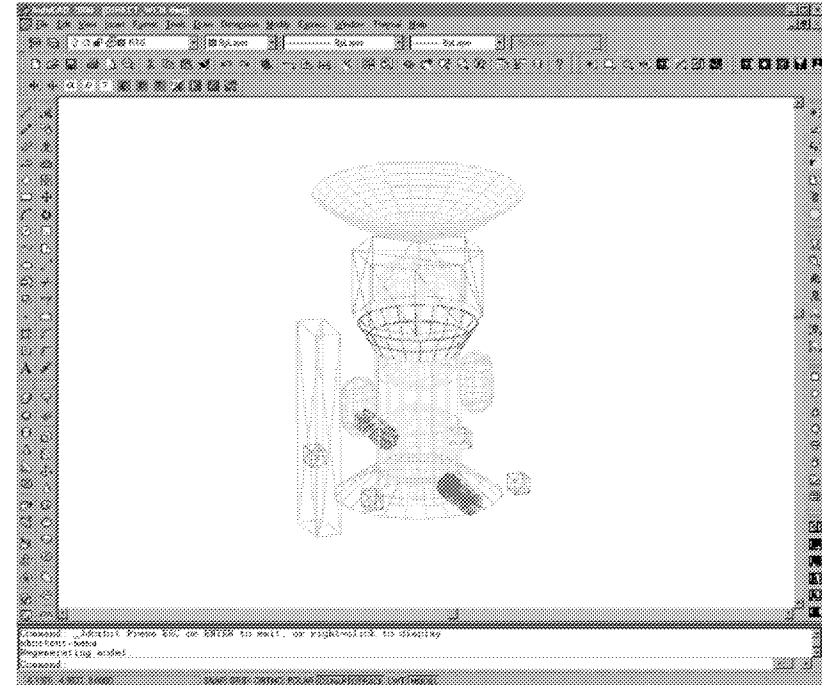
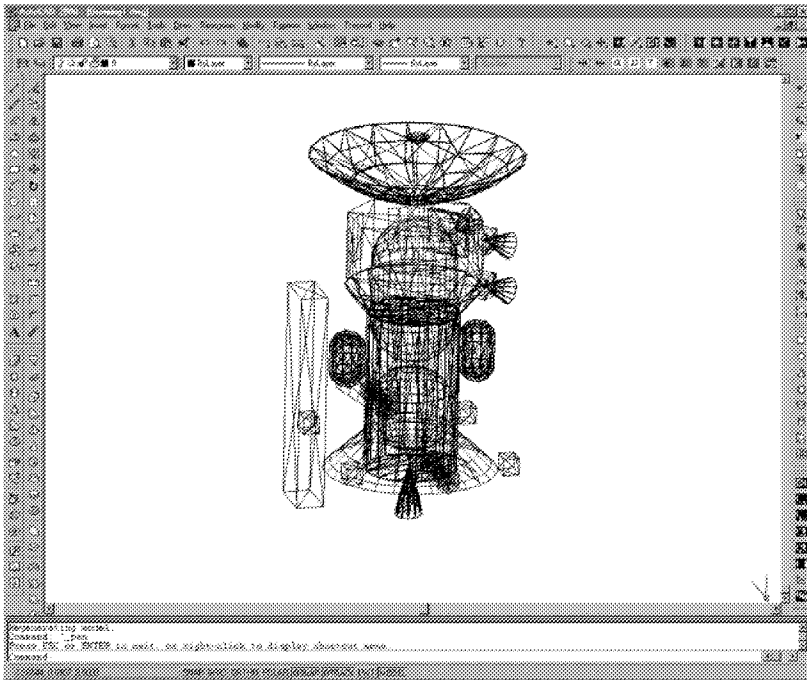
## Model Reduction Methods (cont'd)



By using a combination of the methods discussed, a model can be layered and reduced

*From*

*To*



In a matter of minutes!!!



# Demonstration



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The following demonstration is based on work performed for  
JPL's Center for Space Mission Architecture and Design



## Acknowledgements

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