Collaborative Solutions Inc

Creating Parametric Models using ANSYS

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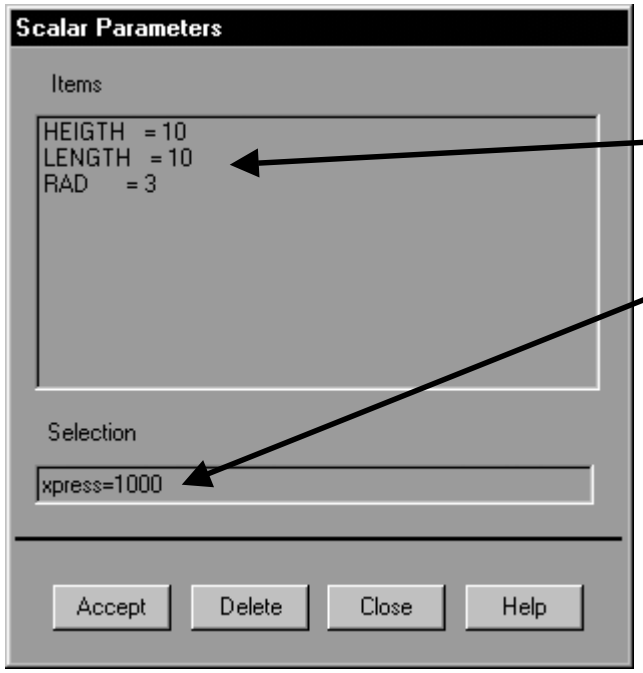
Parametric Modeling

- Outline
  - Interactively
    - Create Parameters
    - Build Geometry Using Parameters
    - Load Model Using Parameters
    - Post Process Parametrically
    - “Write out” Parametric Model
    - Modify Parameters With A Text Editor
    - “Run” Parametric Model
  - Batch
    - Run Design Studies or Design Optimization

Create Parameters

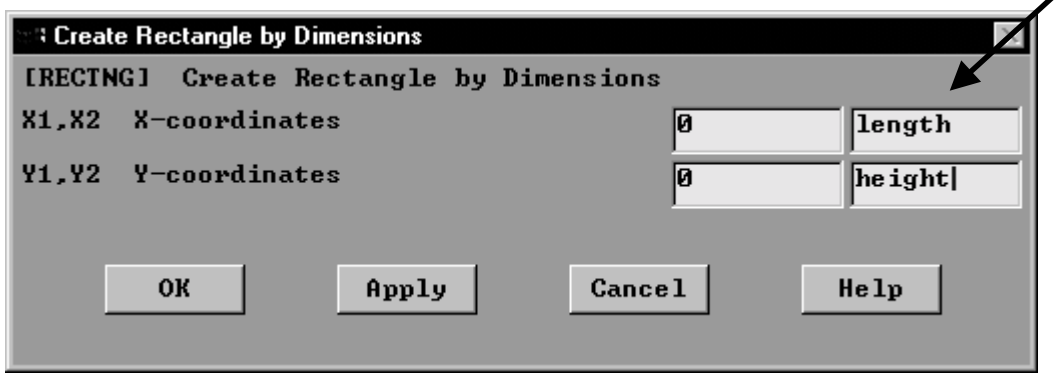
Utility Menu> Parameters> Scalar Parameters ...



- Define all geometry and loading parameters.
- Rules for Parameters:
  - Begin with a letter
  - Contain only letters, numbers, and underscore characters
  - Contain no more than eight characters

Build Geometry Using Parameters

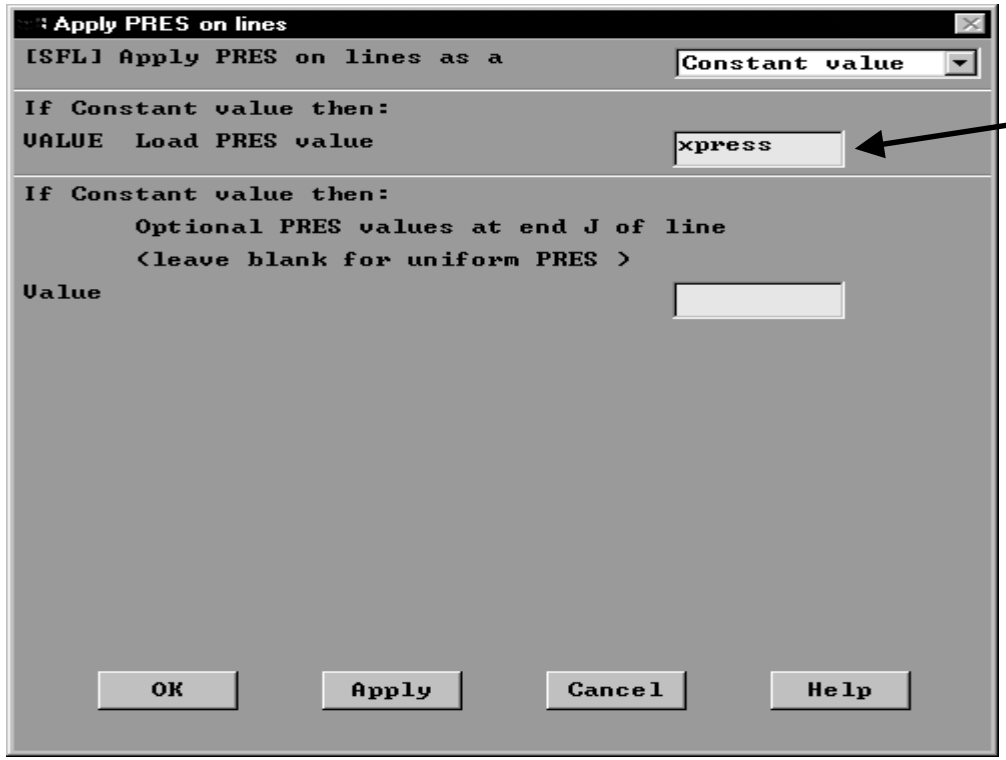
- ANSYS Main Menu> Preprocessor> Create> Rectangle> By Dimensions …



•Use parameters when defining geometry

Load Model Using Parameters

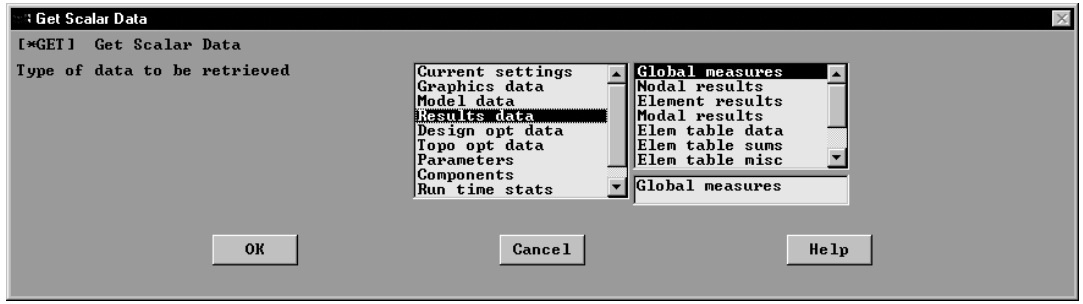
- ANSYS Main Menu> Solution> Apply Pressure> On Line ...

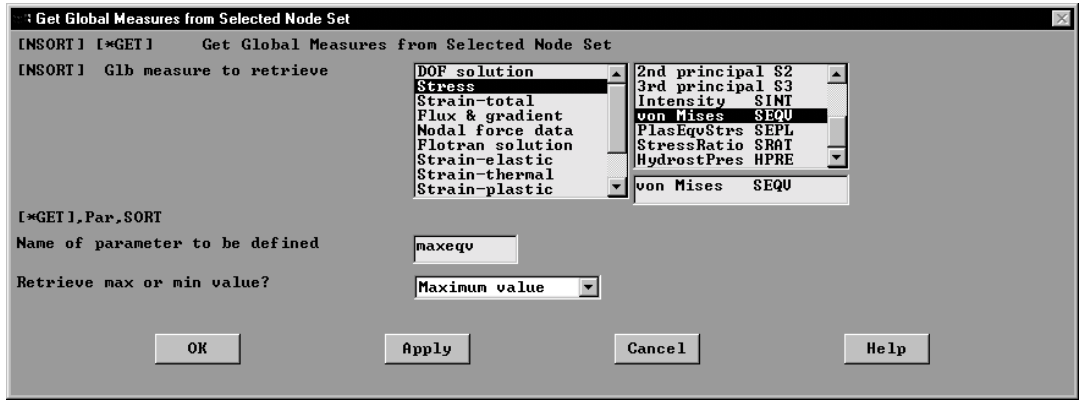


- Use parameters when defining loads.
- Also, all loads need to be defined parametrically with respect to location, for example
  - Boundary conditions and loads should be applied using select logic to first parametrically select the entities or
  - Boundary conditions and loads can be applied to the solid model (note if the numbering of the solid model entities changes you will have to use the above technique i.e.. the topology of the model changes).

Post Process Parametrically

- Utility Menu> Parameters> Get Scalar Data …





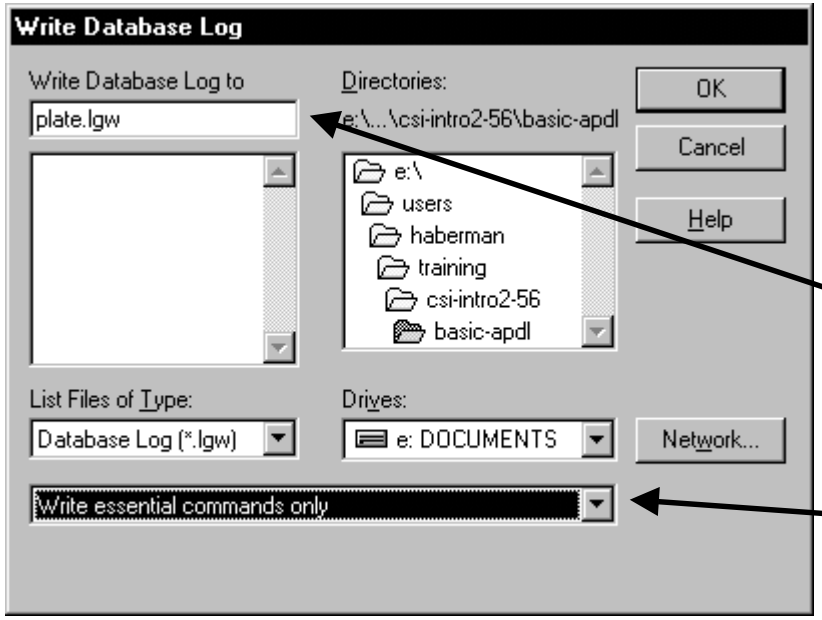
•Creating parameters with the results of the analysis.

•The "*get" function allows users to retrieve almost all model data and create a parameter with it.

- •Maximum Stresses
- •Maximum Displacements
- •Model Volume
- •Maximum Frequency
- •Number of Nodes
- •Length of a Line
- •Jobname
- •Etc.

“Write out” Parametric Model

- Utility Menu> File> Write DB Log File ...



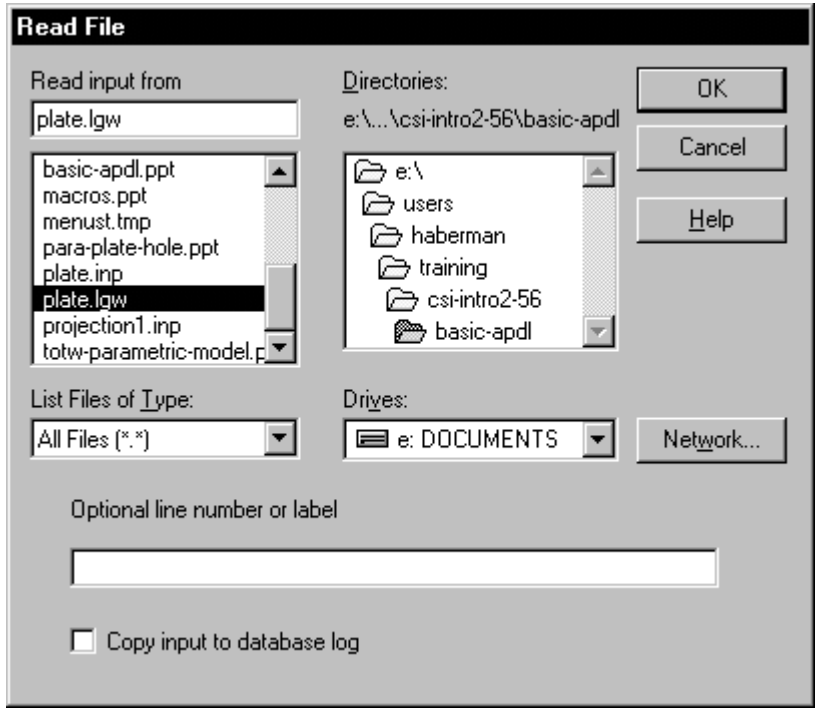
- Write out to a file all the commands used to create the model.
- The following options should be used
  - The default is to write the data to the jobname.lgw file or a user can define the file name to write to.
  - Write essential commands only (this will “strip” out all the graphics and plotting commands.

Modify Parameters With A Text Editor

- Using a text editor of your choice edit the parametric model
- The parametric model file can be modified to make the file easier to use or come back to at a later time.
  - Add notes by using "!"
  - Clean up unnecessary commands
  - Add commands.

“Run” Parametric Model

- Utility Menu> File> Read Input From …



•By “re-playing” the parametric model run “what if” scenarios.

•After editing the parametric model in a text editor the use will save the modified text file and “run it” in ANSYS.

Run Design Studies or Design Optimization

- Once a parametric model is created a user can automate the running of 10's to 1000's of analysis. Examples are
  - Using a "DO loop" run a different users defined scenarios.
  - Using the design optimization capabilities a users can
    - Run sensitivity studies (sweep a single variable)
    - Design Optimization: minimize an objective (volume, cost, etc.) subjected to various constraints (do not exceed a given stress, displacement, etc. limit), while being able to vary user defined parameters.
    - Run a design of experiments.
  - Run probabilistic design studies (coming at 5.7)