Read PLOT3D Data

INTRODUCTION

EnSight supports files written in the PLOT3D block-structured mesh format. Variables are stored either in solution (Q) files or in "function" files. EnSight's PLOT3D reader supports ASCII, C binary, and Fortran binary as well as Iblanking and multizone meshes.

Reading data into EnSight is a two-step process. First, the appropriate files are selected. This step is largely the same regardless of the format of the data being read. Second, parts are constructed using an interface that is specific to the applicable data format. This article covers the second step for PLOT3D data. See **How To Read Data** for more information on selecting the appropriate files.

If the solution (Q) file is in standard form (*i.e.* it contains five variables: density, X momentum, Y momentum, Z momentum, and energy) then it can be specified in the (Set) Result slot of the Data (Reader) dialog. Otherwise, if a non-standard Q file (or a function file) is used, then a modified version of the standard EnSight results file must be specified in the (Set) Result slot. See **PLOT3D Results File Format** for more information.

PLOT3D datasets consist of the following files. Note that the entry in the File Name column is only a suggestion – it typically does not matter to EnSight what the actual file name is.

File	File Name	Notes	Required?
Geometry	file.x	Contains coordinates and mesh resolution(s).	required
Result	file.res	Provides additional information about the dataset (such as time information) as well as pointers to the files actually containing the variable data. **Note!** This is a special version of the EnSight results file! See **PLOT3D Results File Format** for more information.	optional
Solution	file.q	Standard PLOT3D solution file. **Note!** You can also give this file as the (Set) Result file (in the Data (Reader) dialog) if it is a standard Q file.	optional
Function	file.f	Standard PLOT3D/FAST function file	optional
Boundary	file.bnd	Contains boundary surface definitions within or across structured parts.	optional

Note:

To successfully read PLOT3D data, the following information must be known about the data:

1. format - ASCII, C binary, or Fortran binary
2. whether single or multizone
3. dimension - 3D, 2D, or 1D
4. whether iblanked or not
5. precision - single or double

EnSight attempts to determine these five settings automatically from the grid file. The settings that were determined (for the first four) are shown in the Part Builder dialog, where you can override them manually if needed.

The precision setting is not reflected in the dialog, but is echoed in the Server shell window. The q (or function) file precision will by default be set the same as that of the grid file. In the rare case where the automatic detection is wrong for the grid file or the precision is different for the q (or function) file than for the grid file, commands can be entered into the Command dialog to manually set the precision.

```
test: plot3d_grid_single     to read grid file as single precision

test: plot3d_grid_double     to read grid file as double precision


test: plot3d_qr_single       to read q (or function) file as single precision

test: plot3d_qr_double       to read q (or function) file as double precision
```
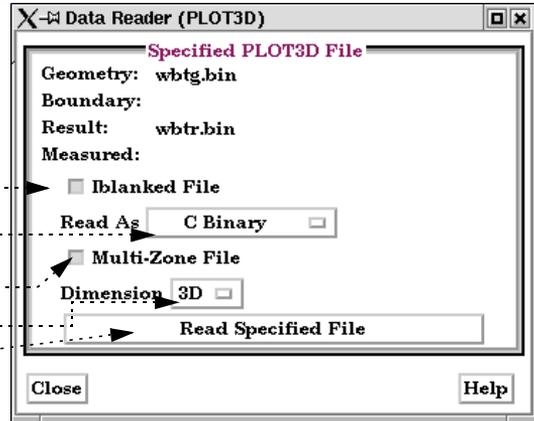
BASIC OPERATION

After you have specified the appropriate data files with the File Selector (opened with File > Data (Reader)... as discussed in **How To Read Data**) and clicked Okay, the Data Part Loader (PLOT3D) dialog will open. You use this dialog to build the desired parts. To build parts for the PLOT3D format data:

1. The first time you read PLOT3D data for a case, the Data Reader (PLOT3D) dialog will open. Otherwise, if the Data Part Loader dialog is not open, select File > Data (Part Loader)..., and skip to step 7.

2. Click if geometry file has Iblanking.

3. Select the file type (ASCII, C Binary, Fortran Binary).

4. Click if geometry file has multiple zones.

5. Click to set the dimension (1D, 2D, 3D).

**6. Click to read the file.
(The Data Part Loader dialog will open)**

> **Data Reader (PLOT3D)**
> **Specified PLOT3D File**
> Geometry: wbtg.bin
> Boundary:
> Result: wbtr.bin
> Measured:
> ☐ Iblanked File
> Read As   C Binary
> ☐ Multi-Zone File
> Dimension 3D
> **Read Specified File**
> Close   Help

7. If you have Iblanking, you can select the desired Domain.

8. If you have multi-zone data, select the desired zone(s) from the Use Zones list.

9. Select a desired initial visual representation.
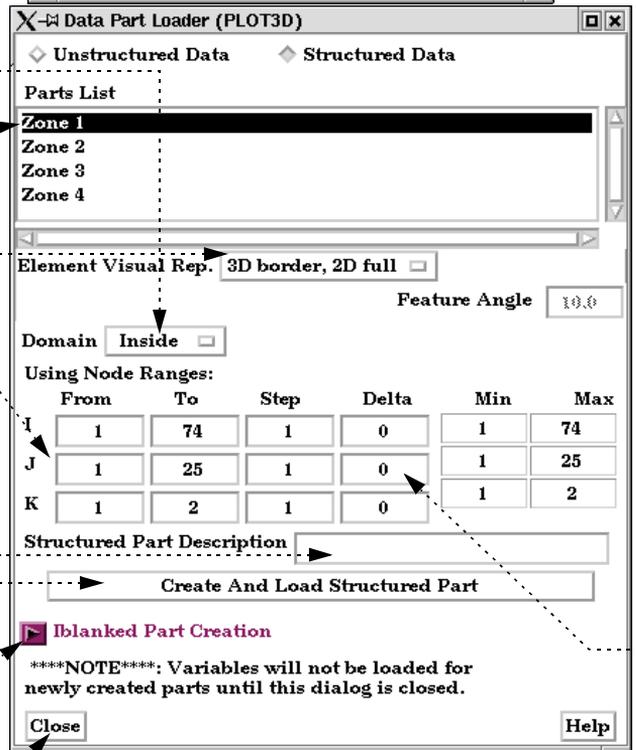
10. If only one zone is selected, you can specify From, To, and Step IJK values for the part. The From and To values are inclusive.

Valid values in the From and To fields are numbers advancing from 1(the min for each part), or numbers decreasing from 0(the max for each part):

    1,2,3,... --->   <--- ...-3,-2,-1,0
    |---|
    min   max
    (always 1)   (varies per part)
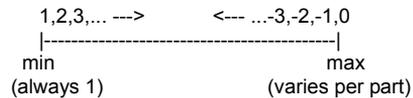
If you specify values that will be outside of the range of an individual part, the proper min or max values for the given part will be used.

The Min and Max values are for reference only.

12. If desired, enter a name for the part (to use in the Main Parts list).

13. Click Create and Load Part.

14. Open this turndown section to create unstructured parts based on boundary Iblanking from any parts created above.

15. Click Close when done.

> **Data Part Loader (PLOT3D)**
> ◇ Unstructured Data   ◆ Structured Data
> **Parts List**
> Zone 1
> Zone 2
> Zone 3
> Zone 4
> Element Visual Rep.   3D border, 2D full
> Feature Angle   10.0
> Domain Inside
> **Using Node Ranges:**
>
> | | From | To | Step | Delta | Min | Max |
> |---|------|-----|------|-------|-----|-----|
> | I | 1 | 74 | 1 | 0 | 1 | 74 |
> | J | 1 | 25 | 1 | 0 | 1 | 25 |
> | K | 1 | 2 | 1 | 0 | 1 | 2 |
>
> Structured Part Description
> **Create And Load Structured Part**
> ▶ Iblanked Part Creation
> ****NOTE****: Variables will not be loaded for newly created parts until this dialog is closed.
> Close   Help

11. If you desire to extract multiple surfaces (at a constant delta) from the same zone, set one of the directions to the desired non-zero delta value.

This is a "blade row" kind of operation. Please note that this results in an unstructured part instead of a structured one.

ADVANCED USAGE

EnSight can also handle transient PLOT3D data – the solution file as well as the grid file can change over time. The relevant file information is provided in the special results file required for PLOT3D data. See **PLOT3D Results File Format** for more information.

OTHER NOTES

You can reopen the Data Part Loader dialog at any time to build additional parts. Simply select File > Data Part Loader)... and build the desired parts as described above.

SEE ALSO

How To Read Data

User Manual: **PLOT3D Reader**, **PLOT3D Results File Format**