Weight & Center of Gravity Output

The Weight & Center of Gravity output file (.NCG) contains the volume for each element in the model. Unlike other results file, this one does not require an "analysis" to be performed. Instead, this file is created by performing a weight and center of gravity calculation using the **"Tools: Weight and Center-of-Gravity..."** menu in FEMPRO.

The format of the file can be viewed as consisting of three sections:

- the Main Header gives information about the file
- the Part Header is repeated for each part in the model and gives information about each part
- the Results are the mass density and volume for each element in each part.

Main Header

The format of the main header is as follows:

Variable	Type	Description
len	2-byte integer	The length of the main header.
ver	2-byte integer	Version number. If the version number is negative, the file is a long format file. Otherwise, the file is a short format file.
ngroups	*	The number of element parts in the file.
nlcase	*	The number of load cases. Since the mass and volume are not dependent on any results, the number of "load cases" is set to one.
ndyn	*	The type of analysis.
icode	*	Active direction used by some post-processors.
ghdrlen	*	The length of the each part header.

* The values after the version number are 2-byte integers for short format files and 4-byte integers for long format files.

Note: When designing your programs, do not depend on the main header being of fixed length. It is possible to add information to the main header in the future. Programs should be designed to use this length.

There are several more bytes of information that are currently defined but not implemented. By using the byte length of the main header to determine how much to read (or skip), programs can be written to be compatible with and without these values.

Part Header

After the main header is an array of part headers; one part header for each part in the model. The length of the part header is specified in the main header.

Variable	Description
type	Element type for this part.
numResults	Number of results for the part, which equals the number of elements in the part plus 1 (nele+1).
nloc	Number of output location records per result.
lbytes	Number of bytes per output location.

For a short format file these will all be short (2-byte) integers, and for a long format file these will all be long (4-byte) integers. The format is defined in the main header.

Note that the actual part number is not stored in the output file. The results are stored sequentially part by part.

Results

The results for all elements of the first part are given, followed by the results of all elements in the second part, and so on.

The output results are as follows. Unlike other element-based results in which the records repeat exactly for each element, the mass density appears only once in the first result.

Result	Variable	Type	Description
Result 1	density	8-byte real	mass density of the part
Result 2 through nele+1	volume i	8-byte real	volume of each element i, for element 1 through number of elements (nele).