dbMASS Standard Module

- Computes standard mass properties: total weight, contingency, center of gravity, moments and products of inertia
- Principal inertias and transformation matrix computations
- Part mass property estimations made using automated calculation sheets
- Mass properties database construct parallels associated drawing tree structure
- User expandable standard part, material and contingency libraries
- Extensive graphical display capabilities for verifying mass properties models
- Automated mass properties report generation supporting indentured drawing tree
- Advanced user interface incorporating background processing of mass property calculations, graphical display and report generation
- Find/Replace global editing
- Copy between dbMASS databases
- dbMASS Word Macros for using Microsoft Word to view/modify reports
- Export data for import to popular spreadsheet software
- Import data from popular spreadsheet software using MPEX format
- Supports English and Metric units
- Comprehensive software documentation and support
- Plus many more time saving features.

Enhancement Options

- Two plane spin balance and c.g. balance computation
- Mass properties uncertainty computation
- Weight change tracking, weight maturity and material usage reports
- Effectivities and Multiple Configurations of Entry
- Sequence Mass Properties
- User definable entry fields and custom report formats
- Import from other platforms (e.g. CATIA, IDEAS, Pro/Engineer ...)
- Sectionalized mass properties for NASTRAN analysis
- Cost tracking by drawing tree, WBS, IPT and other hierarchical categories

Hardware Requirements

- IBM or 100% compatible 386, 486 or Pentium computer
- with DOS 5 or better, Windows (optional), VGA monitor and mouse
- Coprocessor required for 386
- Minimum 640 K ram (4 Mbytes recommended)
- Minimum 6 Megabytes free on hard disk for application
- Allow approximately 1 Mbyte disk space per 1000 parts

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dbMASS Enhancement Modules
Input and Output

dbMASS has substantial capability built into the standard module. However, for some situations, our users have requested additional capabilities to perform various tasks. dbMASS supports these additional features through the use of enhancement modules. These modules are purchased in addition to the standard module as required. The following text discusses the basic features for each enhancement module. Illustrations are used to present information about the input data required for each of the modules. The results or output data for the modules are also given.

Spin Balance Module

The balance module allows you to balance any entry using either of two approaches, spin or CG balance. For each of these balancing approaches there are two methods of solution to choose from. For spin balance, the first method determines the minimum weight that could be positioned on two circular planes normal to the spin axis, and gives the weight and location of the two points. The second method allows you to specify up to four points and the desired spin axis, and then determines the required weight to place at each of the points. For CG balance, the first method determines the minimum weight that could be positioned to shift the entry CG to the specified balance CG location. The second method allows you to specify two points and the desired balance CG location, and then determines the required weight to place at each of the points.

Selecting the "balance entry" button will create and assign items to a part (if balancing a part) or entries to an assembly (if balancing an assembly) to add the calculated balance weights at their specified locations.

Uncertainty Module

The uncertainty module allows you to perform uncertainty analysis on your data. The project, installation or assembly mass properties calculated by dbMASS represent the summation of all constituent part mass properties. When the part mass properties are uncertain, the summation mass properties will also have a degree of uncertainty. Uncertainty analysis allows you to determine quantitatively how the uncertainties of the individual parts affect the uncertainty of the system or any particular subsystem of the model. The analysis calculates model uncertainties using the user defined assembly location uncertainties and part weight, center of gravity, and inertia uncertainties.

The uncertainty window given above is used to enter uncertainty data at the part level and view the calculated uncertainty at assembly, installation or project levels.

A similar window which only contains the center pain is used to entry cg uncertainty for the location of an entry within an assembly, installation or project

The uncertainty report lists the selected entry and its associated sub-entry's mass properties and the uncertainty mass properties by a drawing tree indentured listing. This report can be view on screen, printed or imported into a spreadsheet program for subsequent manipulation.
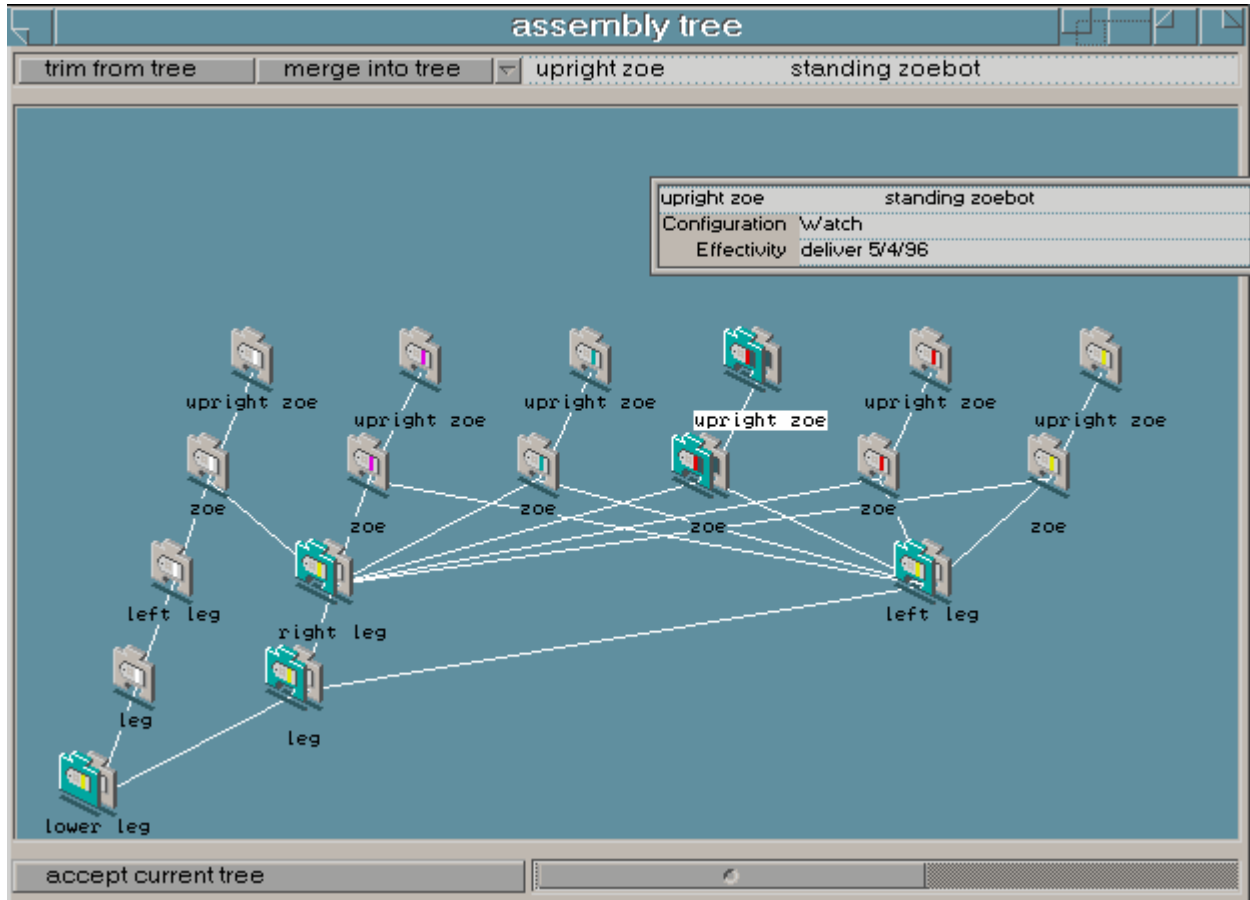
Configuration & Effectivity Module

The configuration and effectivity module allows you to define multiple project, installation, assembly, and part configurations (e.g. stowed, deployed, BOL, EOL) and effectivities (e.g. Flight 1, Flight 2).

Also included are powerful tools to automate the process of creating and tracking multiple project configurations and effectivities. Through the use of the "Copy Command" you can quickly copy an existing entry to form a new entry with a unique id, configuration, and effectivity combination. A new graphical interface will then assist you in defining the drawing

tree that references this entry. These tools will allow you to quickly define, create and manage multiple project configurations and effectivities, while the dbMASS relational database eliminates the duplication of data common to each project.

The image above gives an example usage of the configuration management features to create a new configuration/effectivity for an entry that is already being referenced by six different configurations/effectivities of the project.

The Configuration and Effectivities Module also provides **sequence mass properties** construction and reporting features. In dbMASS, one uses the configuration management features to create unique entries for each state in a sequence of events. Then these entries are listed in an Events Window in the order that they occur or that you would like to see them listed in a report. Once a sequence has been defined you simply create a report to see the mass properties for each stage in the sequence. Since the sequence definition and references are integral to the database, all changes to the system are automatically reflected in the sequence.   To see the latest mass properties of all events you just create a new sequence report.

Entry Fields & Custom Reports Module
With the Entry Fields & Custom Reports Module you can track all sorts of information on your projects through the use of expandable entry fields. Without this module you are limited to tracking the pre-defined mass properties data fields. This advanced feature allows you to

define your own numeric, text, summation and class (hierarchical) data fields as you identify the need for them.

For example, numeric fields can be added to track specified weight and size, and text fields added to track such things as manufacturer or responsible design engineer.

fields	
Description	Data
AN Code	Fuselage
Spec Weight	35
Manufacturer	i.e.SOLUTIONS inc.
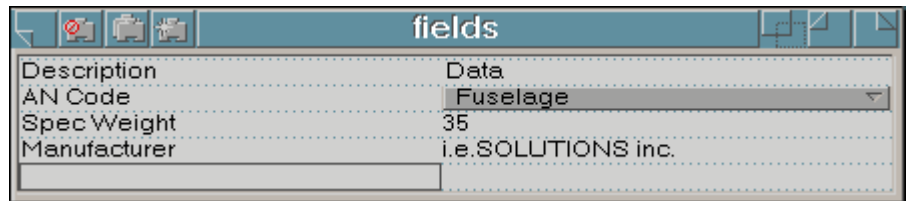
The numeric fields can have the type of units assigned. Unit types of none, density, inertia, length, mass, time or money are available. The dbMASS environment allows you to choose active units for each of these unit types. You can then enter, view or report on the data in your preferred units, changing them as needed. For example, if you create a field with the type of units assigned as mass, you can work in any of the following mass units: ounces, pounds, slugs, grams, kilograms, tons. Numeric fields can also be setup to automatically sum for assemblies and above. For summated numeric fields the values are only assigned at the part level. All projects', installations' and assemblies' summations have numeric values that are defined by the sub-entries they reference.

Class fields are used to track information which you wish to assign from a user defined list of categories. These categories can have hierarchical relationships defined as found with military standard type coding, functional listing, work breakdown structure (WBS), or even location zones. Class fields create another reporting option which will give weight breakdown by the class categories that you define and assign. You will also be able to report on the weight maturity status for each category.

With user definable fields you can maintain all part related data in one database.

The Report Layout Module adds the capability to define custom report layouts. You can construct a new layout by defining the sections of the layout and the specific database fields you wish to include in a report. You can also edit an existing layout by adding, deleting or relocating the layout information. Once a layout is defined, it appears in the list of available report types.

Possible layout sections include: First Page Header, Sub Elements, Header, Trailing Grand Total, Leading Grand Total, Footer, Body and First Page Footer.
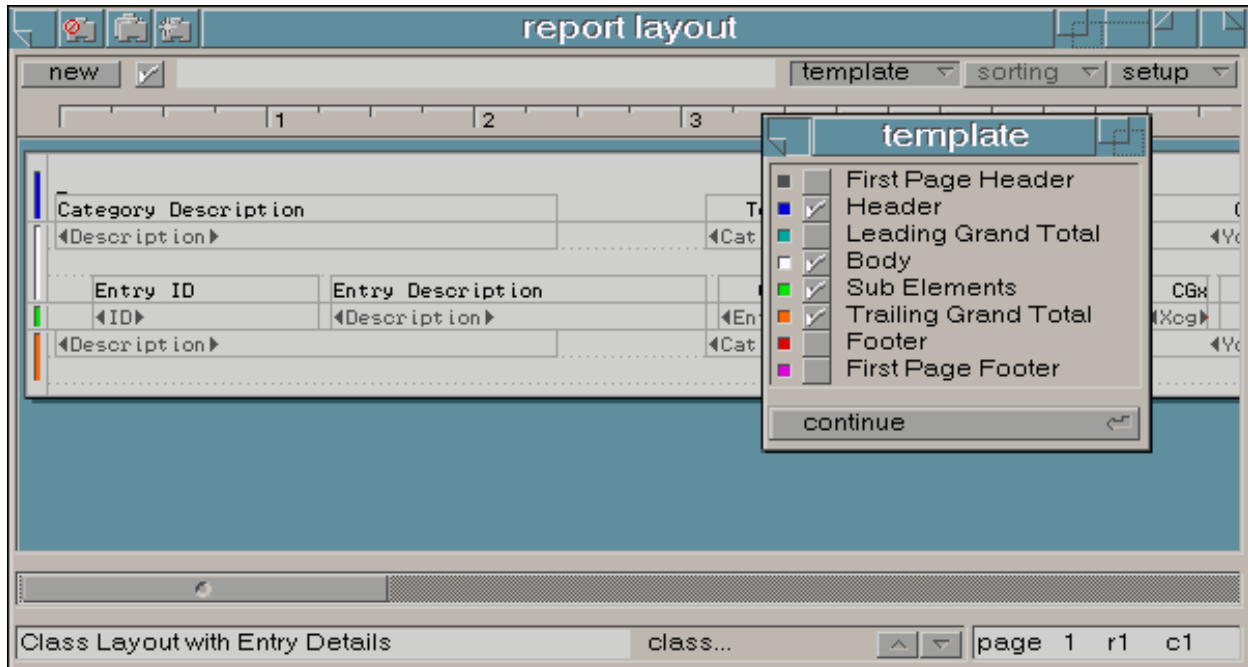
All sections are optional except the layout body. When you "Create" a report using a report layout as a template, the Body Section is repeated for each entry in the report. The primary sort can be either based on the product structure of the entries or a class field. For product structure based reports, the "Sub Element" section gives the items that define the parts. For class based reports, this section gives the entries that sum into each of the class categories. The class based report supports full mass properties for each class category.

You define the report layout contents by locating layout cells on the Layout Pane. The layout cells types include:

- Text
- Entry Field
- Element No.
- Date
- Time
- Page

dbMASS uses the section type and the layout cells positioned within the section to define the report.

Weight Change Tracking Module

The Weight Change Reporting Module allows you to publish weight change reports over any specified time period. The data includes the weight after change, delta weight, category of

weight change, reason for change, actual date and name of person who made the change. The package provides the ability to enable or disable the automatic tracking. With it enabled, any time a change in weight is introduced to the database the user will be asked to specify the weight change category and give the reason for change; selecting from user expandable pop-up lists. Default weight change category and reason can also be specified for automatic selection.

Included with this module is the ability to limit access permission to databases through a 'logon' process. The owner of a database can limit read, write and delete operations to only those individuals given specific access. A guest access status can also be set for those who may attempt to 'logon' without otherwise specified access.

Import Translation Modules

The import translation modules provide interfaces to other commercially available tools such as CATIA, I-DEAS and Pro/ENGINEER. Custom interface modules will also be provided to interface to your existing mass properties databases or other data unique to your working environment. Each translator is purchased as a separate module.
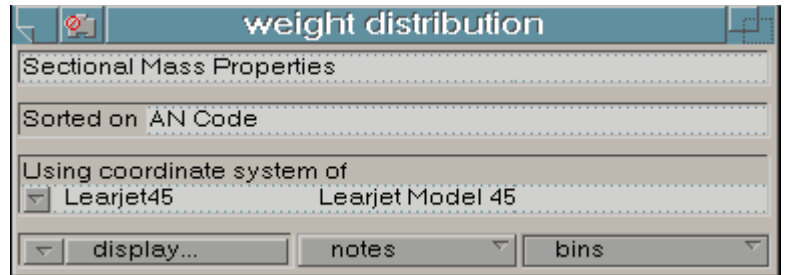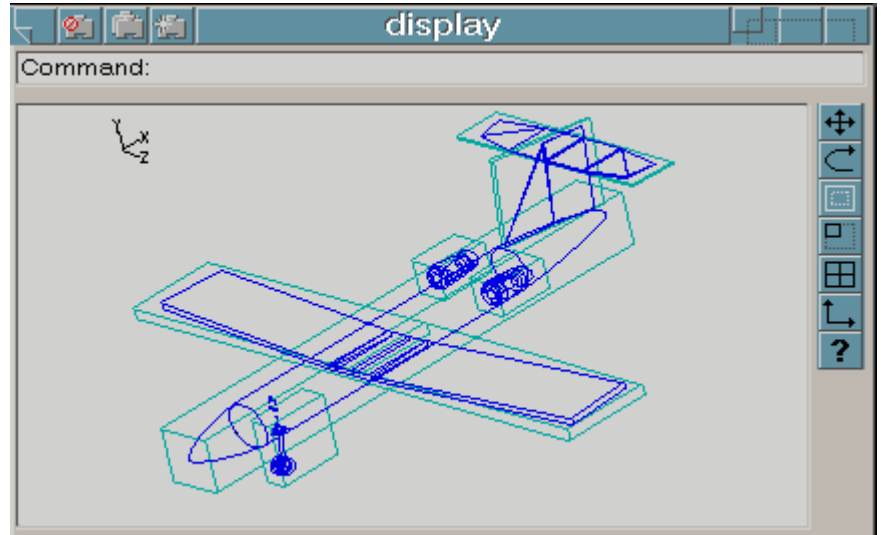
Sectional Mass Properties Module

The sectional mass properties module provides mass properties by physically defined boundaries. This is most often used to support NASTRAN type analysis where weight distribution is required.

This module allows the user to define 'bins' by specifying boxes in three-dimensional space that contain a volume of interest. Each bin can be sliced along its length, width and height to give a finer resolution grid. Also each bin can have assigned filtering criteria to limit which weight is included. This allows separation of such things as electrical harness from the structure.

The module supports defining multiple weight distribution analyzes. Each defined analysis becomes another report type. So once a weight distribution analysis is defined, the user simply selects it as the report type of interest to perform the weight distribution analysis. The report list the complete mass properties for the total of all bins, each bin individually and each slice within each bin.
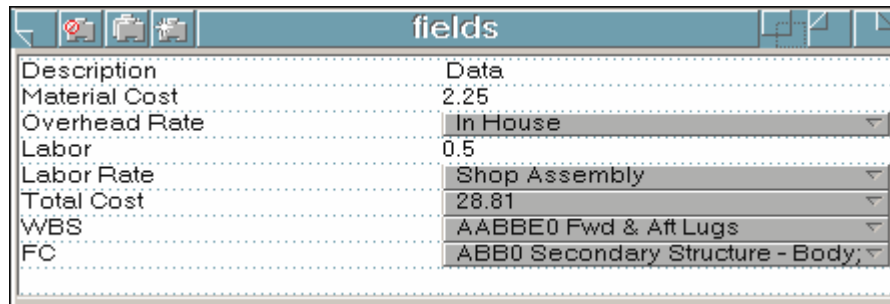
Cost Tracking Module

The cost tracking module extends the dbMASS capabilities to include additional data fields and reporting capabilities for tracking costs associated with a project. This module supports assigning the following costs and factors at the part level: a raw cost, an overhead rate factor associated with the raw cost, labor in units of time and a labor rate associated with the labor. A total cost for the part is also included as a calculated field which is computed based on the following formula.

part total cost = (raw cost x overhead rate) + (labor x labor rate)

At the assembly level and above, the sum of the sub-assemblies and parts will be totaled to give the five following values: total raw cost, average overhead rate, total labor, average labor rate and total cost of the assembly.

The custom report layout features of dbMASS are then used to create user definable reports including these cost tracking fields. The costs can thereby be reported on by the same drawing tree structure used to track the projects mass properties and other related data. The cost data can also be summed by a user defined Work Breakdown Structure (WBS) or other user defined hierarchical data structures.

Having the cost data integrated with the drawing tree and mass properties data means that you can now easily perform configuration management using the advanced features of dbMASS and minimize duplication of effort. When costing data is updated for any part, all configurations that reference that part will automatically be updated.

The entry fields and custom reports module is required to use the cost tracking module.