
Chapter 7 Constructor Quick Start

7.1 Introduction

This *Quick Start Guide* provides a brief overview of the facilities of CES Constructor. It does not offer step-by-step instructions on how to run the program, and is not comprehensive in its coverage of the facilities in Constructor. It assumes that you are familiar with running programs under the Windows™ operating system, and are experienced with the concepts underlying the CES system. If you are not familiar with use of CES, it is recommended that you work through the Selector *Quick Start Guide* in Chapter 4 of this manual *before* beginning work with Constructor. For detailed instructions on all aspects of Constructor, see the online Tutorials in the CES Constructor *Help* system.

The fundamentals of selection database design are discussed in Chapter 6. Although it is not necessary to read that information before you work through this chapter, it is strongly recommended that you do before beginning any large selection database design project.

This Constructor Quick Start manual has four main sections:

Section 7.2 – Editing Attributes explains how to edit the attributes of an existing record and how to use the automatic data checking.

Section 7.3 – Adding Records shows how to add a new record to the database and add links between records.

Section 7.4 – Creating Table Components demonstrates how to create discrete attributes and new units.

Section 7.5 – Creating a New Table explains how to create a new table and define its structure, as well as how to create forms and filters.

Before starting this *Quick Start Guide*, you will need to install the CES system by following the instructions in Chapter 2 of this manual.

<p>Note that the CES Constructor software is not automatically distributed with every CES system. It will only be available if you have purchased a license for Constructor.</p>

7.2 Editing Attributes


In this exercise, you will learn how to edit a record and how to use the automatic data checking system.

7.2.1 Open the ‘Starter’ Database

The installation process will make a Start Menu Programs group named ‘CES 2007’, which will contain the icons for CES software components.

To open CES Constructor, go to the *Start* menu > *All Programs* > *CES 2007* > *CES Constructor*.

The exercises in this quick start guide are based on a small 'starter' database named 'starter1.gdb'. This should be located in the 'Samples' folder of the CES installation directory. In a single user installation of the software, the default location for this file is: 'C:\Program Files\CES 2007\Samples\Database'. We recommend that you make a backup copy of this database file before you begin. (Do this using the normal facilities of Windows Explorer). Then...

Select the *Open database* option on the *File* menu (File/Open database) or click once on .

Find the sample databases directory using the options in the *Open Database* dialog (e.g. C:\Program Files\CES 2007\Samples\Database).

Open the database 'starter1.gdb'.

7.2.2 The Control Window

Operation of CES Constructor centers around the *Control* window, shown in Figure 7-1. It has two tabs along the top. The first of these 'Database' provides general information about the current Database. From this window you can perform operations on the overall structure of the database, define the attributes contained in individual tables, and edit the 'forms' and 'filters' associated with each table (see Sections 3.2.6 and 3.2.7). The second tab 'Tables' has a drop-down list of tables, just like the *Browse* window in Selector.

Open the material record 'Cast magnesium alloy AM60' as follows:

Select the *Materials* table from the list box on the *Tables* tab.



Open the materials tree as shown in Figure 7-2, by clicking once on the '+' symbols, to display the contents of some of its branches.

Note that the branches of the tree (or 'folders') are indicated by various different icons explained in Section 3.2.4.

Double-click on 'Cast magnesium alloy AM60'.

Scroll through the record until the Mechanical properties are visible (Figure 7-3).

7.2.3 The Datasheet Window

The information displayed for the material in the *Datasheet Window* (Figure 7-3) is similar to what you would see in *Datasheet* window in Selector. The numbers in the white boxes are range attributes which can be edited. The buttons down the right side of the window are the data checking buttons. The green tick marks  indicate that these attributes have all passed their automatic data checks. (The concepts behind the automatic data checking are described in Section 6.2.3.) The blue  symbols in the second column from the right indicate that some attributes are uncertain or estimated.

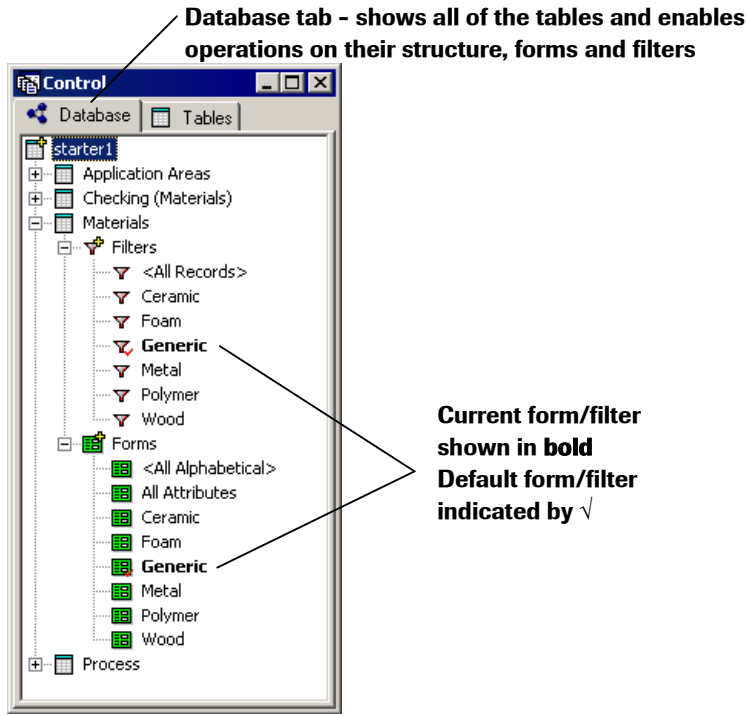


Figure 7-1. The Control window

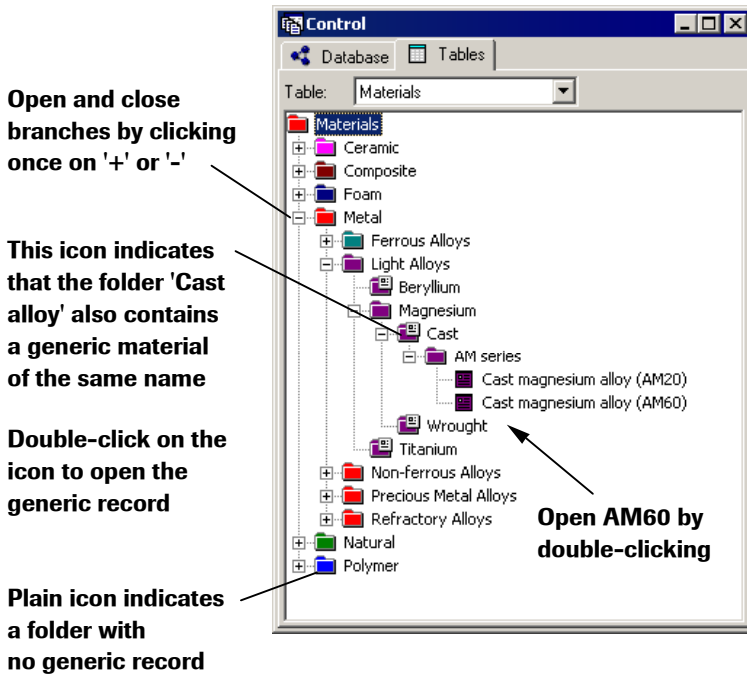



Figure 7-2. The Materials tree in the Control window

7.2.4 Checking Material Attributes

Examine the operation of the automatic data checking as follows:

Change the values of *Elastic Limit* (yield strength) to: 330 to 340 MPa (then click outside of the edit box).

The checking button beside *Elastic Limit* will become a red cross , which indicates that this attribute lies outside its checking range. (For cast magnesium alloys, including AM60, the elastic limit should lie in the range of 65 to 210 MPa.)

Click on the checking button for *Elastic Limit* .

The *Checking* window will appear. Near the top of the window are fields which show that the check record is named 'Cast magnesium' and it is located in the table named '*Checking (Materials)*'. (The *check record* contains the values that are being used to check the data in the AM60 record.) The first line in the body of the record states that the value of the *Elastic Limit* in the AM60 record lies out of the range 65 to 210 MPa¹.

Return to the *Datasheet* window.

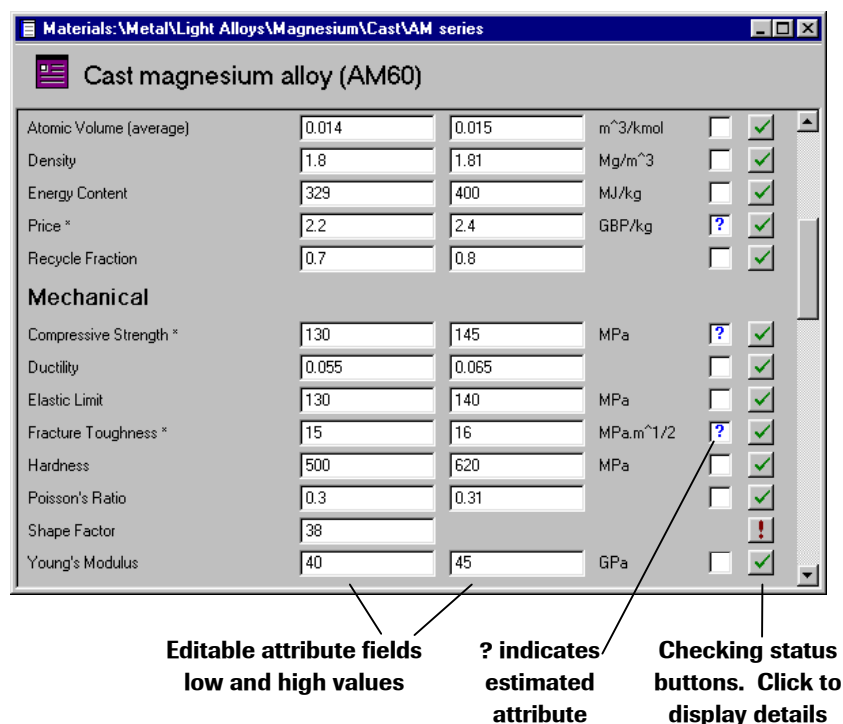



Figure 7-3. The *Datasheet* window

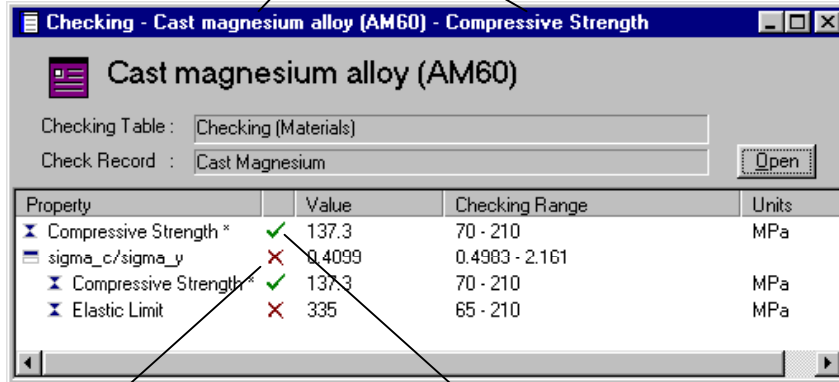
In the *Datasheet* window, the green tick next to *Compressive Strength* for AM60 has also changed into a 'tick and cross' symbol . This indicates that *Compressive Strength* has passed its range check, but failed one or more 'consistency' or 'correlation' checks with other attributes.

¹ The checking process compares the *geometric mean* of the range of properties $\sqrt{(330 \times 340)} = 335$ MPa with the range in the checking record (65 to 210 MPa).

Click on the checking button for Compressive Strength .

As shown in Figure 7-4, even though the values of *Compressive Strength* are within a suitable range, they are no longer *consistent* with the values of *Elastic Limit*. The ratio of these two attributes should be near to one for a ductile metal: i.e. the strengths in tension and compression should be quite similar.

Record and attribute that is being checked



Property	Value	Checking Range	Units
Compressive Strength *	137.3	70 - 210	MPa
sigma_c/sigma_y	0.4099	0.4983 - 2.161	MPa
Compressive Strength *	137.3	70 - 210	MPa
Elastic Limit	335	65 - 210	MPa

Compressive strength 'failed' this correlation check: The ratio of compressive strength to elastic limit (sigma_c/sigma_y) is 0.4099, which is outside of the range 0.4983 to 2.161

Compressive strength 'passed' the range check: Its geometric mean value lies within the range 70–210 MPa

Figure 7-4. *Checking* window showing that Compressive Strength passed its range check, but failed its correlation check with Elastic Limit

7.3 Adding Records

7.3.1 Tree Codes

The CES 'tree codes' or record identifiers provide a consistent designation system which applies to all entities in the database. The designations consist of a set of letters and numbers, as explained in Section 3.2.5.

Open the *Tools/Options* menu.

Click once in the 'Show Tree Codes' box, then click on OK to exit.

The tree codes will appear on the material tree in the *Control* window, and in the header of the *Datasheet Window*. Here the identifier for AM60 is shown as 'MMLAMGC_AM001'. This can be translated by viewing the codes on the branches of the materials tree above AM60: Metal (MM) – Light Alloys (LA) – Magnesium (MG) – Cast (C_) – AM Series (AM) – Specific alloy AM60 (001).

Close the *Checking* window and close the *Datasheet Window* for AM60.

7.3.2 Adding a Record

Create a new material branch below 'Cast' magnesium, containing materials in the 'EQ' alloy series.

Use the right mouse button to click on the 'Cast (C_)' icon . Select 'New >' from the context menu then 'Folder' using the left mouse button (Figure 7-5).

In the New Folder Wizard:

Enter the Short Name: EQ Series

Enter the Full Name: EQ Series Cast Magnesium Alloy

Enter the Short Code (tree code): EQ

Change the tree color if you like.


Click on 'Next >' to move to the next page of the Wizard.

Check the boxes to add the material to the 'Generic' and 'Metals' filters.

Click on Finish.

Create a material record under the new 'EQ Series' branch as follows:

Either: Right mouse click on 'EQ Series', then Select 'New >' and 'Record';

or: Left mouse click on 'EQ Series' and Click on the New Record button on the toolbar ;

or: Left mouse click on 'EQ Series' and select the menu option *Database/New Record*.

In the New Record Wizard:

Enter the Short and Full names: Cast magnesium alloy EQ21

Enter the Short Code: 001

Add the material to the 'Generic' and 'Metals' filters.

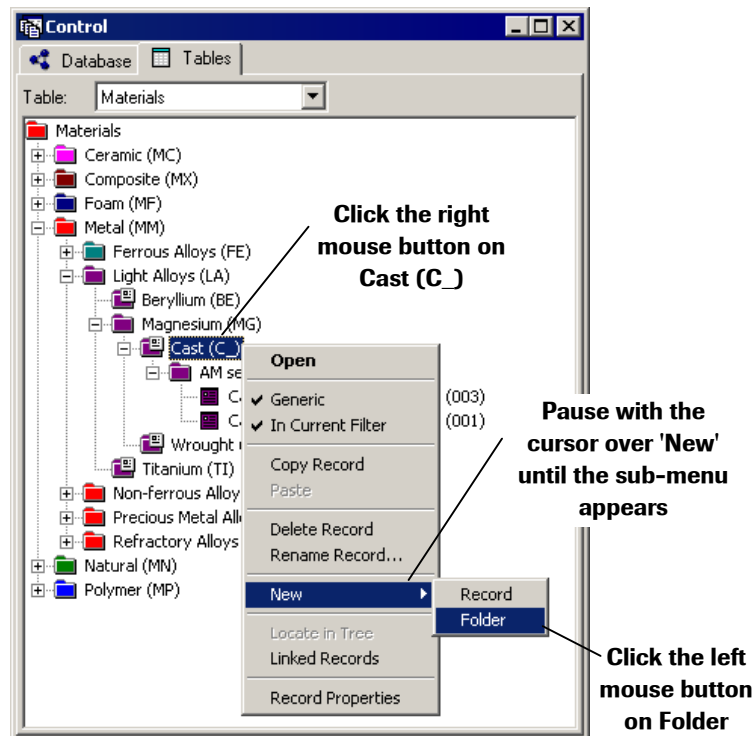


Figure 7-5. Adding a new material folder below Cast in the Materials tree

Open the record for EQ21 in the *Datasheet Window*:

Either: Double-click on the icon of EQ21 in the materials tree;

or: Right-click once on EQ21 in the table tree, and select 'Open' from the context menu;

or: Left-click once on EQ21 in the table tree, and select the menu option *View/Record Attributes*.

Enter some of the attributes of EQ21 into the *Datasheet Window*, as shown in Figure 7-6 (you need not enter them all). Click the estimate button to the right of a property to toggle the 'estimate' flag on and off as needed (e.g. for 'Price').

Scroll down the window to the section headed 'Environmental Resistance'.

Click once in the field next to 'Flammability' and select the option 'Average' from the drop-down list. (This is a 'discrete' property).

Enter some text into the 'Typical Uses' field.

Full name **Position on table tree** **Record identifier**

Property	Value 1	Value 2	Units	Estimate
Atomic Volume (average)	0.014	0.015	m ³ /kmol	<input type="checkbox"/>
Density	1.81	1.82	Mg/m ³	<input type="checkbox"/>
Energy Content	329	486	MJ/kg	<input type="checkbox"/>
Price *	6	8	GBP/kg	<input type="checkbox"/>
Recycle Fraction	0.7	0.8		<input type="checkbox"/>
Mechanical				
Bulk Modulus	35	40	GPa	<input type="checkbox"/>
Compressive Strength *	190	200	MPa	<input type="checkbox"/>
Ductility	0.035	0.045		<input type="checkbox"/>
Elastic Limit	190	200	MPa	<input type="checkbox"/>
Endurance Limit *	120	135	MPa	<input type="checkbox"/>
Fracture Toughness	16.4	16.5	MPa.m ^{1/2}	<input type="checkbox"/>
Hardness	700	900	MPa	<input type="checkbox"/>
Loss Coefficient	2.2e-003	4e-003		<input type="checkbox"/>
Modulus of Rupture *	190	200	MPa	<input type="checkbox"/>

↑ ↑
Enter data values

Figure 7-6. Attributes of Cast Magnesium Alloy EQ21

7.3.3 Adding Links Between Records

Link this material to some manufacturing processes as follows:

Scroll to the bottom of the record to the section headed 'Links'.

Click once on the 'Process' link button .

The *Linked Records* window shown in Figure 7-7 will appear. Note that the list box at the top of the window is set to the *Process* table – but this can be changed if you want to generate links between EQ21 and other tables.

Open the Machining branch of the process links tree as shown in Figure 7-7.

Check the box next to 'Fine Machining' to create a link.

Notes:

- (i) Prior to the creation of this new link a number of other process categories were already linked automatically. For example, the Casting and Deposition branches and the Machining/Polishing branch of process tree were all linked. This is because there are links in the 'Starter1' database between some 'parents' or 'grandparents' of EQ21 (e.g. 'Cast Alloys', 'Magnesium', or 'Light Alloys') and some manufacturing processes. EQ21 'inherited' these (indirect) links from its parents.

So if every member of a material class can be processed in a particular way, (e.g. all 'Cast Magnesium alloys' can be processed by 'Casting') it is not necessary to link every material individually. It is only necessary to link the parent record 'Cast Alloys' to the process 'Casting', and all the members of the Cast alloys family will inherit this link.

- (ii) When the direct link to 'Fine Machining' was created, the parent process 'Machining' was linked automatically. This enables selections to be made using the link to 'Machining' or to 'Fine Machining' – either of which would be a valid choice.

See Section 8.1 for a more detailed discussion of the linking process.

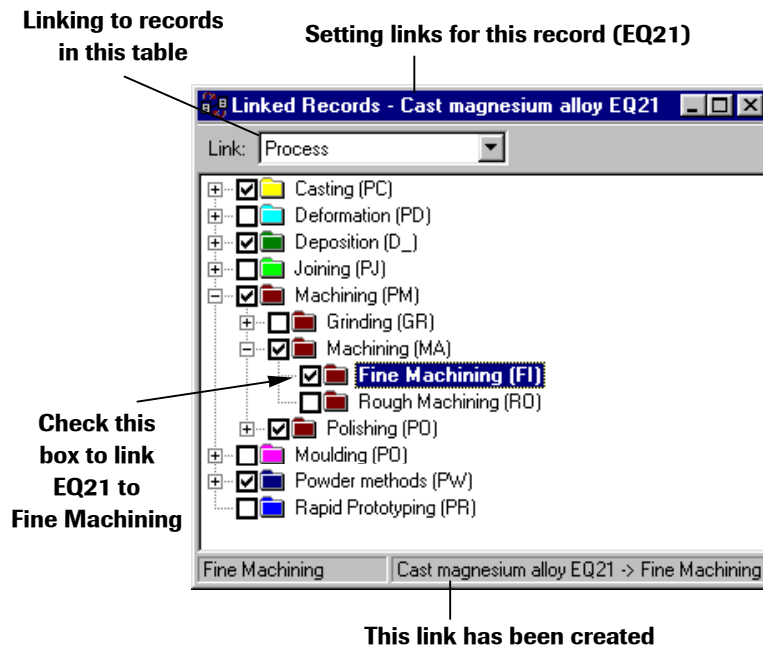


Figure 7-7. Creating a link between EQ21 and the process 'Fine Machining'

7.3.4 A Note about Properties and Attributes

Data records in Granta databases contain two sorts of data, record ‘properties’ and record ‘attributes’.

Each record and each folder in a CES database has a set of ‘properties’ – just like a file or folder in Windows Explorer. These properties contain information about the name of the record, its location on the tree, which record filters it belongs to, etc. The properties are set by the *New Folder/Record* wizard (with some input from the user) when each new record is created. See Section 7.3.2.

Each record in the database also has a set of ‘attributes’. The attributes are the data values e.g. the Young’s modulus of a material. The attributes are all user-defined.

7.4 Creating Table Components

This section explains how to create two components that are needed for building a table of material suppliers (which is the subject of Section 7.5). These are a *discrete* attribute type, with the settings ‘High’, ‘Medium’, and ‘Low’; and a new unit named ‘tonnes’ (metric tons).

7.4.1 Discrete Attributes

Create a discrete attribute named ‘3-value’ as shown in Figure 7-8:

Select the menu option *Database / Database Properties*.

Click once on the ‘Discretets’ Tab of the *Database Properties* dialog.

Create a new Discrete property type by clicking on the *New* button near the top right of the dialog (under ‘Discrete Types’).

Edit the name of the new discrete property to ‘3-value’.

Ensure that ‘3-value’ is highlighted, then create its values by clicking once on the *New* button in the middle of the dialog, (under ‘Discrete values’).

Edit the name of the new value to ‘High’.

Repeat the process to create values ‘Medium’ and ‘Low’.

Click once on *Apply* at the bottom of the dialog.

7.4.2 Creating Units

Now create a new unit named ‘tonnes’ (Metric tons) as shown in Figure 7-9. (Note that *starter1.gdb* already contains many different unit types and their conversion factors.)

Click on the ‘Units’ tab at the top of the *Database Properties* dialog.

Click on the *New* button to create a new unit. The *Unit Settings* dialog will appear (Figure 7-9).

Enter the name of the new unit Metric ton and its symbol tonne.

Click on the *Settings* button (under ‘Conversions’) to set conversion factors.

Select the option ‘This unit is derived from another unit’ (Figure 7-10), then enter the conversion factor of 1000, and select the base unit ‘kilogram (kg)’ from the drop-down list box.

Click on OK to exit the *Unit Conversions* dialog.

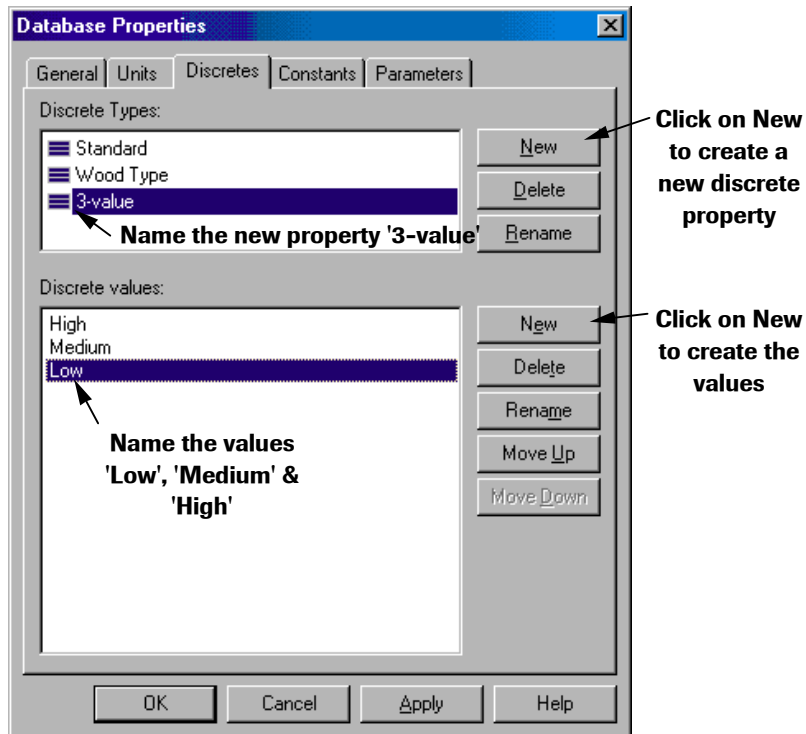


Figure 7-8. Creating a new discrete property in the *Database Properties* dialog

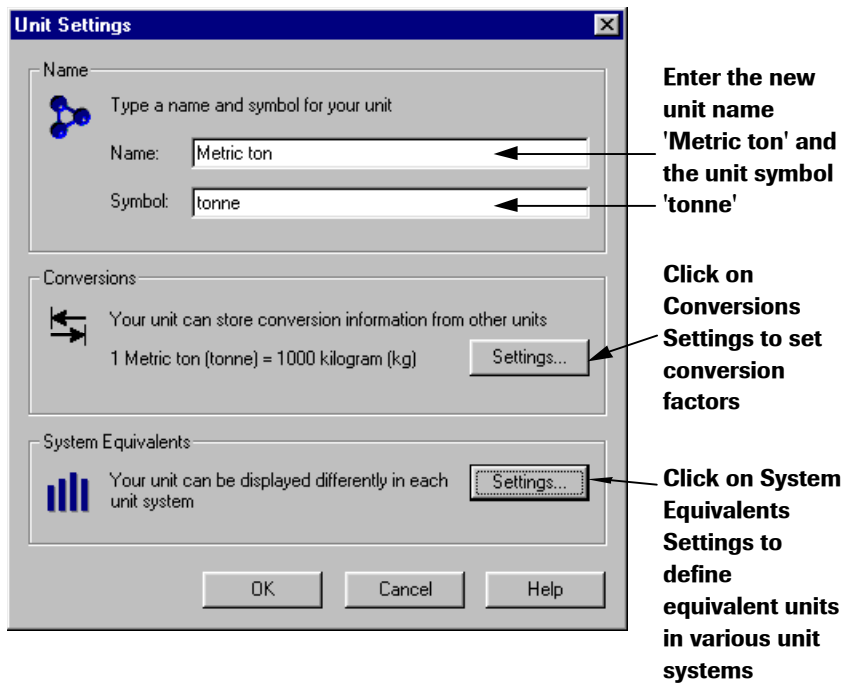


Figure 7-9. Creating a new unit type

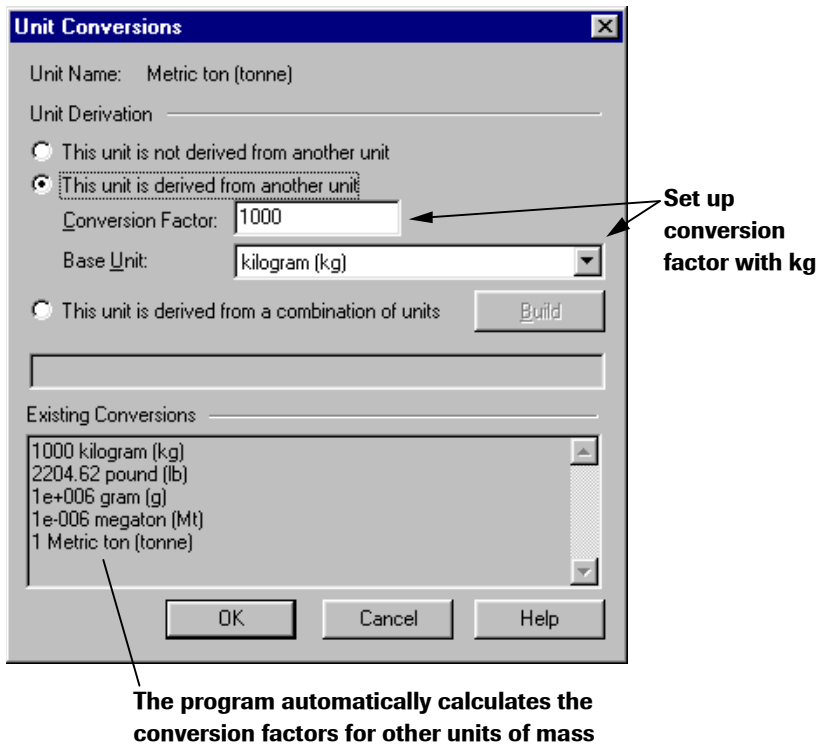


Figure 7-10. Setting unit conversion factors

It is possible to change unit *systems* in CES Selector (see Section 4.7.1). To achieve this it is necessary to define the equivalent units in each system. Do this as follows:

Click on the *Settings* button (under 'System Equivalents') in the *Unit Settings* dialog (Figure 7-9).

Click once on the unit system 'US Imperial' (Figure 7-11), then select 'pound (lb)' from the drop-down list box. Note that the program is able to calculate the conversion factors automatically.

Set the other equivalent units as shown in Figure 7-11.

Click on OK to finish.

Close the *Database Properties* dialog.

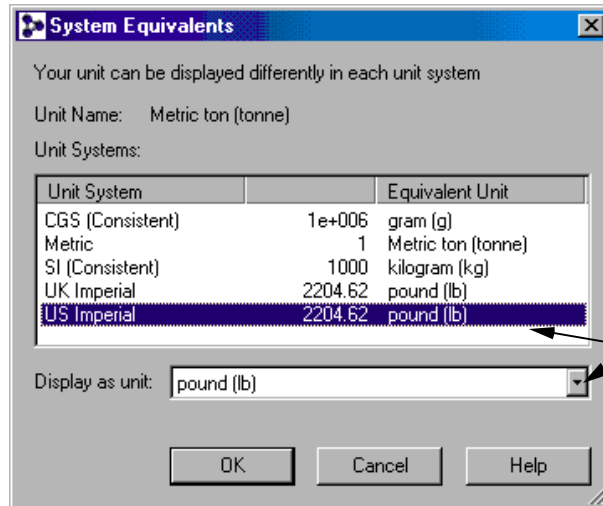


Figure 7-11. Setting equivalent units in each unit system

7.5 Creating a New Table


In this exercise you will create a new table containing information about material suppliers, then make links between this table and the materials table. You will also learn how to create a form to change the format of the information displayed in the *Datasheet Window*.

The Suppliers table will include the following attributes:

Text attributes	'Name', 'Address', and 'Telephone number'
Range attributes	'Batch size capability' (tonnes) and 'Lead time' (weeks)
Discrete attribute	'Quality of product' (High, Medium, or Low)

Create a new table of suppliers, as follows:

Click on the *Database* tab in the *Control* window.

Click on the *New Table* button .

Create an empty table in the *Create Table* page of the *New Table Wizard*.

Note that you can also base the new table on a standard template in the *New Table Wizard*. This does a lot of work for you, by automatically creating all the attributes, units, etc. for the new table, in the same form as the tables from Granta.

Give the new table the name Suppliers in the *New Table Wizard*.

Link the new table to the *Materials* table, by checking the box in the *Table Links* page of the *New Table Wizard*, then *Finish* the Wizard.

A new table 'Suppliers' will appear in the list in the *Control* window. You will open this table later to add suppliers.

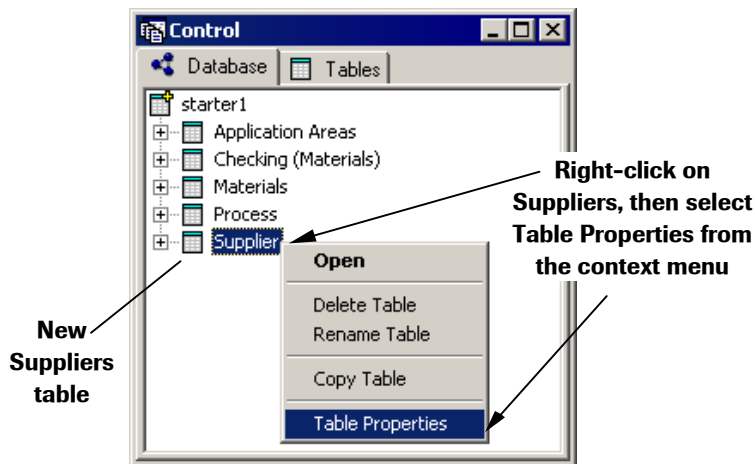


Figure 7-12. The *Control* window showing the new Suppliers Table

7.5.1 Defining the Structure of a Table

We now need to create the structure of the Suppliers table – i.e. define its fields. Do this as follows:

Click on the Database tab in the *Control* window.

Either: Right-click on the Suppliers table entry on the Database tree, and select the 'Table Properties' option from the context menu (Figure 7-12);

or: Left-click on the Suppliers table entry on the Database tree, and select the menu option *Database / Table Properties*.

Click on the Attributes Tab on the *Suppliers Properties* dialog (Figure 7-13).

We wish to add the following fields: Name (which will be of type 'short text'); Address (long text); Tel No (short text); Fax No (short text); Quality of material ('3-value' discrete); Typical batch size (range) in tonnes; Lead time (range) in weeks; Web address (hyperlink); and Last updated (date).

Click on *New* in the *Suppliers Properties* dialog to add a new field.

Enter the name of the new field (e.g. 'Lead time') in the left column and select the data type (e.g. 'range') and units where applicable (e.g. 'weeks') from the list boxes near the bottom of the dialog, as shown in Figure 7-13.

For the Discrete property 'Quality of material', set the property type to *Discrete*. The units list will change to a list containing the available discrete properties. Select the Discrete Type '3-value' from the list box.

Add the remaining attributes as shown in Figure 7-13.

Click on *Apply* when you have finished. The attributes will be arranged alphabetically.

Notes:

- (i) The new discrete type '3-value' is available in the list of discretés as a result of the actions described in Section 7.4.1; and the new unit type 'tonne' is available in the units list, as a result of the actions described in Section 7.4.2.
- (ii) To delete a row from the table, click once on the attribute name to highlight the row, then click on the *Delete* button or press the 'Del' key on your keyboard.
- (iii) It is possible to include graphical information in database records using the 'picture' data type. (An example is the process schematic in each process record – see Figure 5-12.) The attribute is set to 'picture' using the list box at the bottom of the *Table Properties/Attributes* dialog. The *Picture Gallery* is used to import pictures into the database (see Section 7.5.5).

The relationships (links) between tables can be changed using the Related Tables tab on the *Table (Supplier) Properties* dialog.

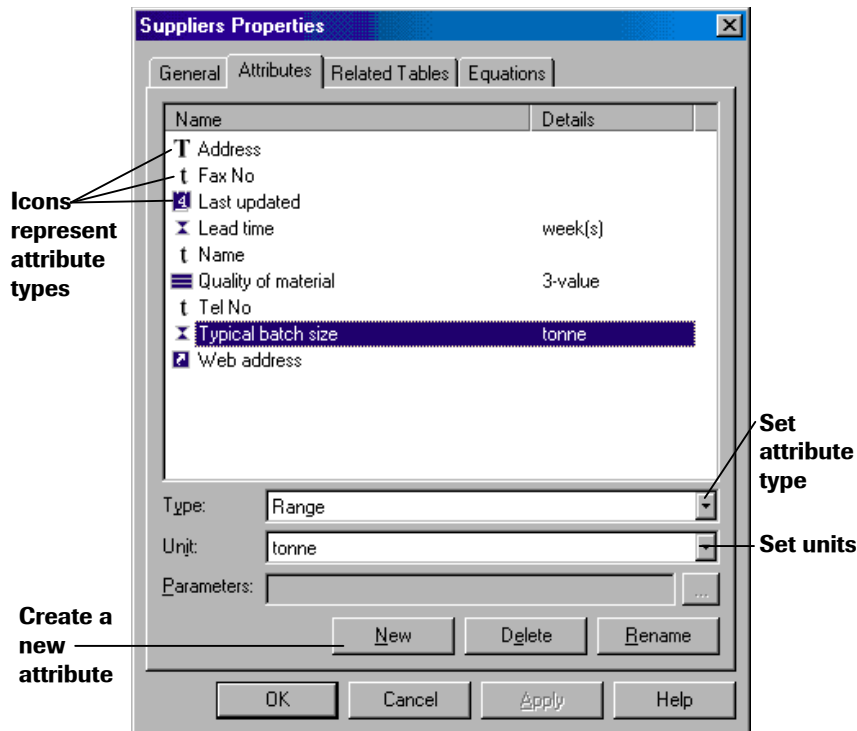


Figure 7-13. Defining the structure of the Suppliers table

Add records to the Suppliers table using the methods described in Section 7.3.2. Build the tree structure shown in Figure 7-14.

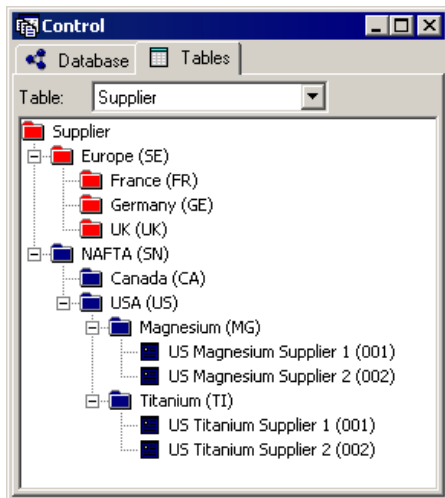


Figure 7-14. Suppliers table tree

Now add some data to the record 'US Magnesium Supplier 1', as shown in Figure 7-15. To enter the 'Last Updated' date, click on the button, and select a date from the *Date Picker* dialog. Today's date will be highlighted.

To enter a Web Address, either:

- (i) type a URL into the Web Address field or
- (ii) open your web browser at the relevant web page and copy the URL from the 'Address' field at the top of the browser to the clipboard and then paste it into the 'Web Address' field ; in the *Suppliers* table in Constructor or
- (iii) drag the URL icon from the 'Address' field at the top of your web browser into the 'Web Address' field in the *Suppliers* table in Constructor. (You will need to arrange the windows so that you can see both your browser and the *Datasheet Window* in Constructor at the same time.)

You can open the URL automatically by clicking on the button in the 'Web Address' field, and clicking on the Launch button in the *Web Address* dialog.

Note that the attributes are organized alphabetically according to their type – i.e. all range attributes are listed together, all short text is stored together etc. This is the style of the form named '<All Alphabetical>' which is the default form when a table is first created.

7.5.2 Converting Between Numerical Data Types

It is possible to convert some data types into others, in the *Table Properties* dialog. Constructor may prompt you for some user-input, depending on the conversion. For example, to convert the 'Typical batch size' attribute from a Range to a Point variable:

Open the *Supplier Properties* dialog, as shown in Figure 7-13.

(Open the *Suppliers* table on the *Table* tab in the *Control* window, then select Database\Table Properties.)

Click on the *Typical batch size* property.

Then change the *Type* (near the bottom of the dialog) from 'Range' to 'Point'.

Click on 'Yes' to Continue, then select the method of conversion: Geometric Mean or Arithmetic Mean.

If you choose the Arithmetic mean, the Point value will be the arithmetic average of the minimum and maximum of the range, i.e.

$$\text{Point} = (\text{Range}_{\min} + \text{Range}_{\max})/2, \quad \text{e.g. } (0.05 + 2)/2 = 1.025$$

If you choose the Geometric mean, the Point value will be the geometric mean, i.e.

$$\text{Point} = \sqrt{(\text{Range}_{\min} \times \text{Range}_{\max})} \quad \text{e.g. } \sqrt{(0.05 \times 2)} = 0.316$$

Conversions that are allowed are shown in the following table:

Convert From:	To:
Long Text, Short Text	Hyperlink
Long Text, Short Text	Date
Point	Range, Integer
Range	Point, Integer [†]
Integer	Point, Range

Table 7-1. Allowable conversions between data types.

[†] Conversion can use an arithmetic or geometric average.

For all other conversions (e.g. from Range to Text), the data will be lost. (See Section 3.3 for further information on attribute types.)

7.5.3 Creating a Form

The format of the information about the supplier shown in Figure 7-15 could be improved. This can be achieved by creating a 'form' which specifies the order in which the fields are displayed and the format of headings. We will create a form for the Suppliers database named 'Standard'. Proceed as follows:

Open the *Database* tab on the *Control* window.

Open the *Suppliers* branch of the tree.

Open the *Forms* sub-branch of *Suppliers*.

Right-click on *Forms*, and select the *New Form* option from the context menu.

Figure 7-16 shows the *Edit New Form* dialog. Create the headings 'Contact Details' and 'Product Information', and position the attributes under these headings as follows:

Click on the *New* button to create a new heading, then change the heading name in the left window pane to Contact Details.

Transfer the attributes 'Name', 'Address', 'Tel No', 'Fax No', 'Web Address', and 'Last Updated' from the right window pane to the left, using the *<-Add* button. (Use *Remove ->* to do the reverse.)

Note that you can change the order of attributes in the left window pane using the *Move Up* and *Move Down* buttons.

Add the Product Information heading, and transfer the remaining attributes under it.

Click on *OK* to exit the dialog.

Rename 'New Form' to Standard on the *Database* tab of the *Control* window.

Figure 7-15. A record in the Suppliers Table using the *default* form (<All Alphabetical>)

Figure 7-16. Creating a new form for the Suppliers Table

Having created the new properties form, we wish to view the record. It is first necessary to set the new form ('Standard') to be the *current* form – i.e. the form currently in force in the Constructor session. (You can have as many forms as you like, displaying some or all of the attributes in different formats.) We will also set this form to be the 'Default' – i.e. the form which is used for the *Suppliers* table when the database is opened in Selector.

Right-click on the 'Standard' form icon on the Suppliers branch in the Control window. Select the option 'Set Current' (Figure 7-17).

Note that 'Standard' is now shown in **bold face** to indicate that it is the current form.

Right-click on the 'Standard' form icon again and select the option 'Set Default'.

This time a small red tick mark appears on the form icon, indicating that it is the default form. View the new form, and then create some links...

Return to the record 'US Magnesium Supplier 1'. It should now be displayed with the improved format.

Scroll to the bottom of the record and click on the *Materials* link button.

Use the methods described in Section 7.3.3 to add a link to all Magnesium Alloys. (Check the box next to Magnesium in the *Linked Records* window.)

Finally, open the record for 'Magnesium alloy EQ21' (created in Section 7.3.2), and check its supplier links. It should be linked to 'US Magnesium Supplier 1'.

7.5.4 Filters

Filters provide a facility for defining which records are viewed in Selector (see Section 3.2.6). A new filter can be created on the *Database* tab of the *Control* window in a very similar way to a new form (e.g. see Section 7.5.3). Once a new filter has been created, its name will appear automatically in the *New Folder* and *New Record* Wizards (see Section 7.3). So new records can be added to the new filter easily (see Section 7.3.2).

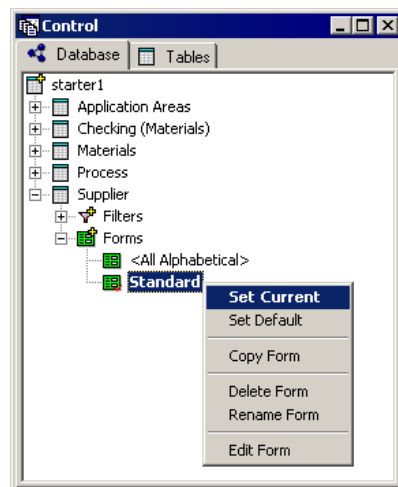


Figure 7-17. Setting the current form

An existing record can be added to a filter as follows:

- (i) Right-click on a record name on a table tree (e.g. Magnesium EQ21 on the Materials tree), and select 'Record Properties' from the context menu. Then click on the 'Filters' tab in the dialog, and select the filters for the record.
- (ii) When setting the filters for a folder record (using the procedure in (i)), there is an additional option: 'Add all children of this record to the selected filter'. Check this box if you would like all records below this folder to be included in the filter. For example, a class-specific filter, like 'light alloys' might include *all* materials on the tree below the Magnesium folder.
- (iii) To add/remove a record from the *current* filter, right-click on the record name on the table tree and select /de-select 'In Current Filter' on the context menu.


7.5.5 Picture Gallery

Importing a picture into a data record utilizes the *Picture Gallery*.

Select the *Process* table from the drop-down list on the Tables tab of the *Control* window.

Open a record on the *Process* table tree, for example: Process\Casting\Ceramic Mould Casting.

Scroll through the record until you see the attribute 'Process Schematic'.

Click once on the  button.

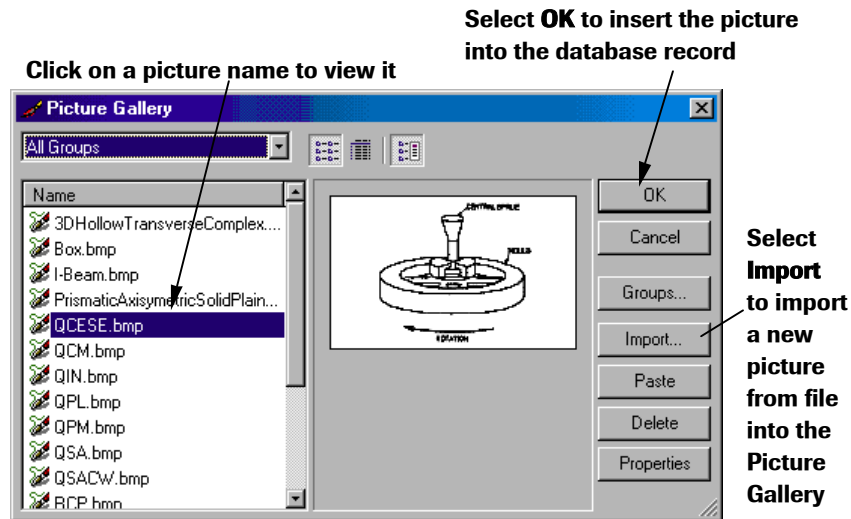
This will open the Picture Gallery as shown in Figure 7-18.

Select the name of a picture in the left window pane. A preview of this picture will appear in the middle of the *Picture Gallery* dialog.

Click on *OK* to insert this picture into the Process data record.

Notes:

- (i) For the pictures to be available in the picture gallery, they must first be imported from an external file. Do this using the **Import** button in the *Picture Gallery* dialog. Alternatively use the **Paste** button to paste a picture from the Clipboard into the Gallery. The picture must be in one of the following file formats: Bitmap *.bmp; Enhanced metafile *.emf; Windows metafile *.wmf (See Appendix B1).
- (ii) Pictures in the gallery can be classified into 'groups' to simplify their management. Click on the **Groups** button to do this. (See further details in the online *Help* tutorials.)

Figure 7-18. The *Picture Gallery* dialog

7.6 Conclusions

This chapter has shown you how to use some of the key components in CES Constructor. There are many other facilities. Once you have made a start, we hope you will find most of these to be intuitive. They are easily learned by working through the Tutorials in the online *Help* system.

A few aspects of the workings of Constructor are a little more complex, and these are described in the next chapter.