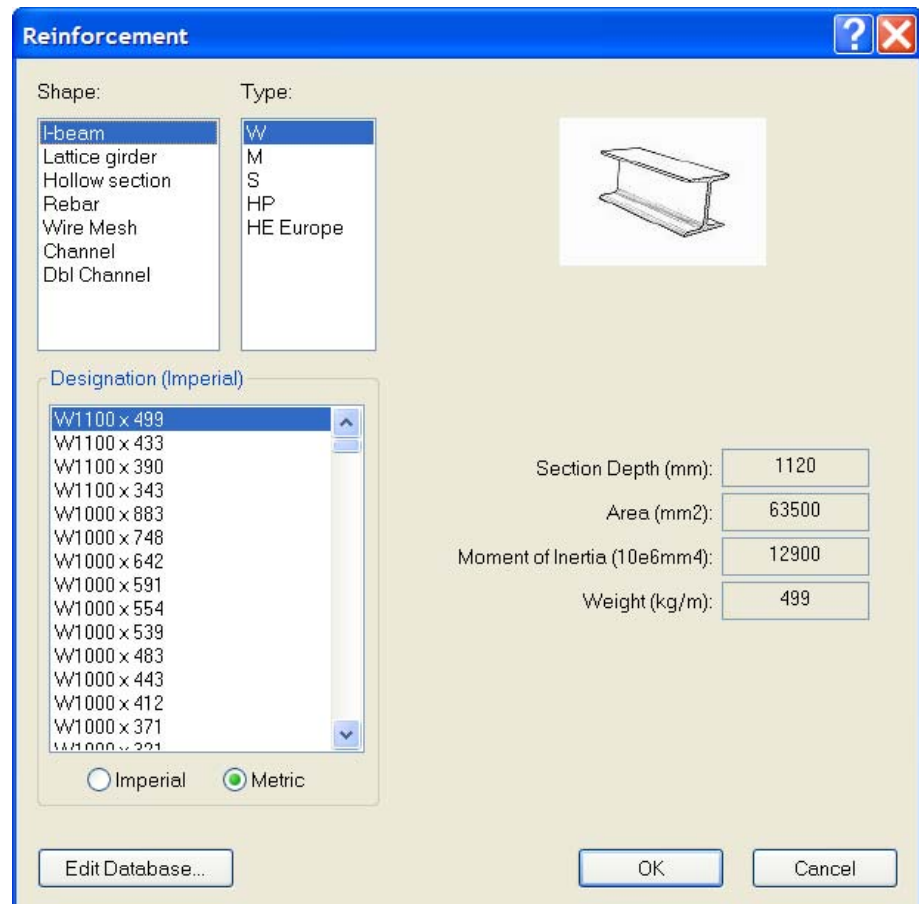


Editing the Reinforcement Database

In this tutorial, the procedure for adding user-defined reinforcement types to the *Phase2* reinforcement database is covered. The reinforcement is used when defining reinforced concrete liners.

Topics covered

- Reinforced concrete liners
- Reinforcement database
- Customizing the database



Problem

When designing reinforced concrete liners, *Phase2* offers a database of common reinforcement types. These include I-beams, lattice girders, hollow sections, rebar, wire mesh, and channels. Typical properties for a number of common sections are available for the user to choose from.

If your particular section is not in the database, it is possible to add it to a custom version of the database. This makes it easy to define the section in any future models. This custom reinforcement database can also be shared so that other engineers within your company can easily use the section in their analysis.

In this tutorial, an I-beam section commonly used in tunnels in Venezuela is added to the database. This section has the following properties:

Designation	Weight kg/m	Height mm	Width mm	Area cm ²	I _x cm ⁴	S _x cm ³	S _y cm ³
CP 160	29.3	160	160	37.5	1790	223	615

To define a new entry in the database you need to define the following quantities:

Shape
Type
Designation (Imperial)
Weight (lbf/ft)
Area (in²)
Depth (in)
Moment of Inertia (in⁴)
Designation (Metric)
Weight (kg/m)
Area (mm²)
Depth (mm)
Moment of Inertia (mm⁴*10⁶)

As you can see, you need both the metric and imperial properties of the section. The units for each are in brackets. The shape and type are user defined descriptions. If you look at the dialog on the first page of this tutorial, you'll see the various shapes and types used as descriptions in the default database that comes with the program.

For the above section, the parameters are as follows:

Shape	I-beam
Type	CP
Designation (Imperial)	CP160 x 29.3 (Metric)
Weight (lbf/ft)	0
Area (in²)	0
Depth (in)	0
Moment of Inertia (in⁴)	0
Designation (Metric)	CP160 x 29.3
Weight (kg/m)	29.3
Area (mm²)	3750
Depth (mm)	160
Moment of Inertia (mm⁴*10⁶)	17.9

Notice the imperial quantities are set to zero. If a weight, area, depth or moment of inertia value is zero, it is automatically calculated from its equivalent metric (or imperial) value. So in the above example, the weight in lbf/ft is automatically calculated from the weight in kg/m. So if all you use is imperial or metric units, and you only have the weight, area, depth and moment of inertia in one of these unit systems, you do not have to do the conversion. If you do have these quantities in both unit systems, by all means enter the values in both unit systems.

Creating a New User Reinforcement Database

Start the *Phase2* Model program.

The default reinforcement database is saved in a file called **Reinforcement.xls** that is installed in your *Phase2* 7.0 installation folder. This file is a Microsoft Excel™ format file and contains a spreadsheet with all the section information. This file should NOT be edited or changed in any way. The reason for this is that future updates of *Phase2* 7.0 will most likely update this file. So any changes you make to this file will be lost after an update.

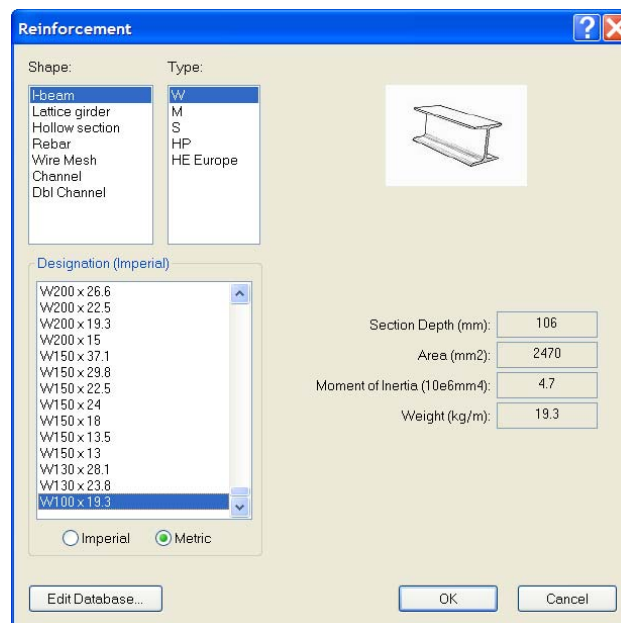
Phase2 7.0 allows the customization of the reinforcement database by allowing the user to create a new database. This new database is a copy of the default database, in a user specified location, that you can modify and add your custom support to. You can also share this database with other people in your company by 1) specifying the location of the database as a shared location that all people can gain access to or 2) simply by giving a copy of the database file to the other people and having them use it privately on their own computer.

The following procedure sets up a custom database on your computer.

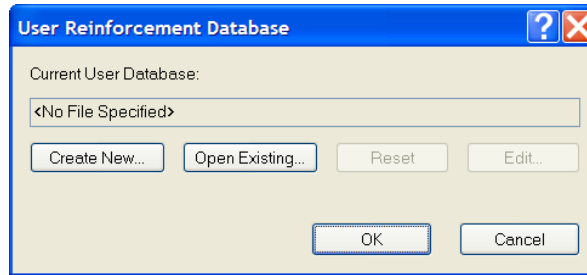


Select: Properties → Define Liners

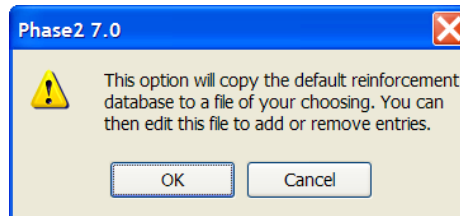
1. Change the Liner Type to **Reinforced Concrete**
2. Click on the **Common Types** button.
3. In the dialog that is displayed (see below), press the **Edit Database** button.



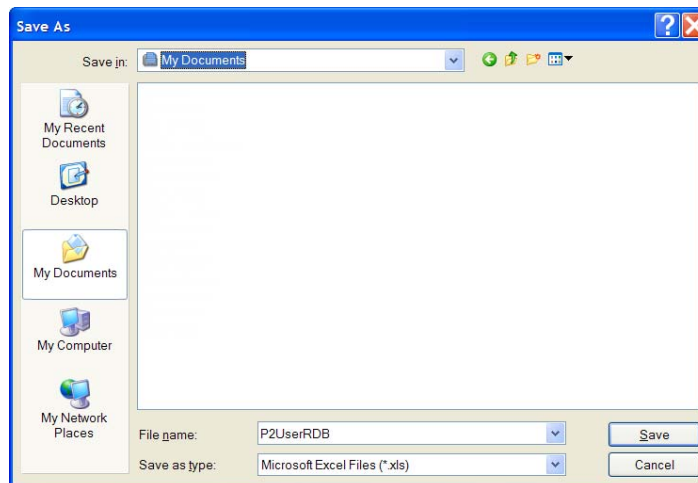
4. In the User Reinforcement Database dialog (see below), press the **Create New** button.



5. A warning dialog will appear explaining that the default reinforcement database will be copied to another location for editing (see below), press the OK button.



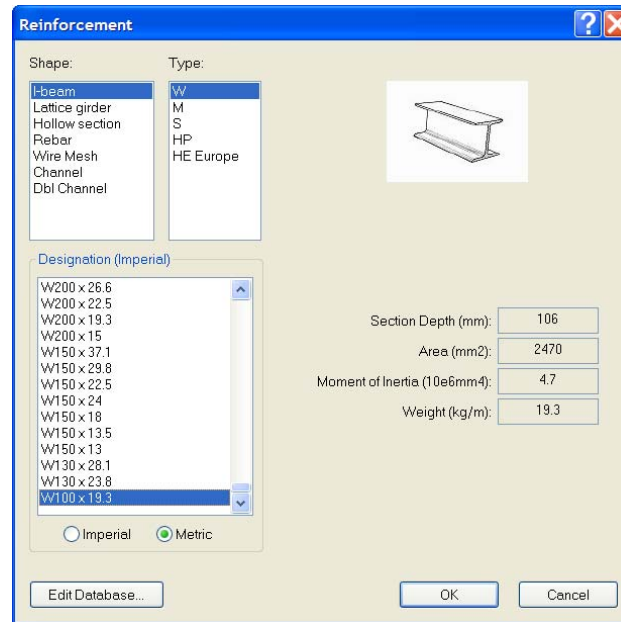
6. In the Save As dialog, navigate to a folder in which you want to save the database. In the following figure, the database is being saved in the My Documents folder with the filename **P2UserRDB.xls**. You must have read/write privileges for files in the folder you choose. Press the Save button.



7. You'll now find yourself back in the User Reinforcement Database dialog. Press the OK button to exit the dialog.

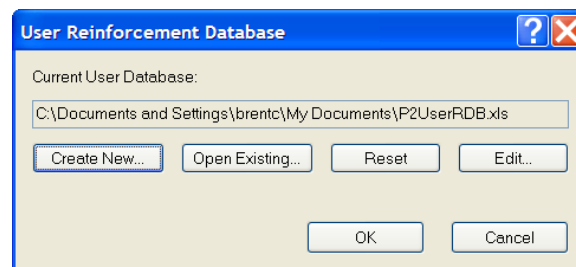
Phase2 is now set up to use a custom reinforcement database. The database is a simple Excel™ spreadsheet; its name and location as you defined in step 6 above. You can edit this file with Microsoft Excel™ independently of *Phase2*, or use the User Reinforcement Database dialog to Edit the file.

Editing the Current User Reinforcement Database

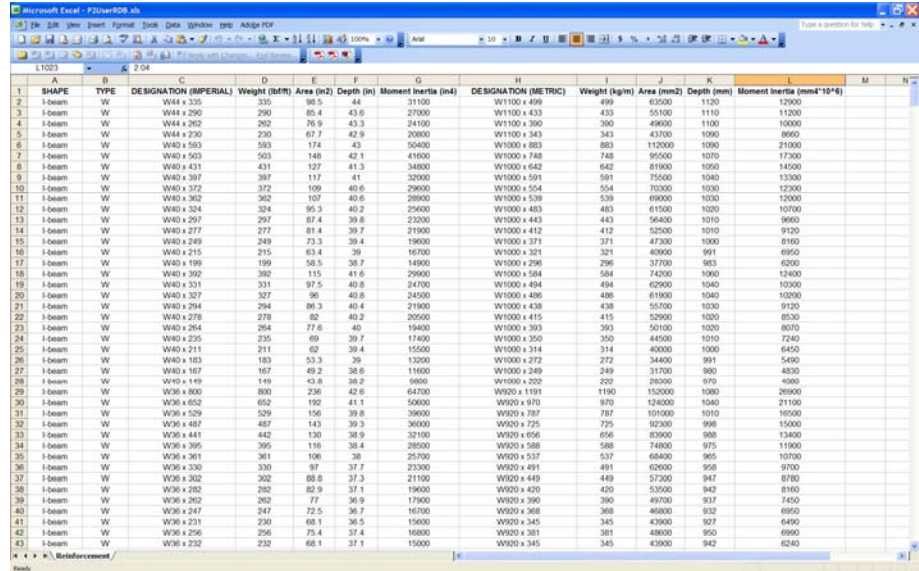


From within the Reinforcement dialog:

1. Press the **Edit Database** button.
2. In the User Reinforcement Database dialog (see below), press the **Edit** button.



3. Microsoft Excel™ will launch, and read in the custom database that you defined in the previous section. Scroll up to the top of the spreadsheet. You'll see the following:



Notice the column headers match the quantities that we defined earlier in this tutorial.

4. Scroll down to the last line in the spreadsheet. Now append the following information into the Excel™ spreadsheet. Place each cell value in the appropriate column as listed below.

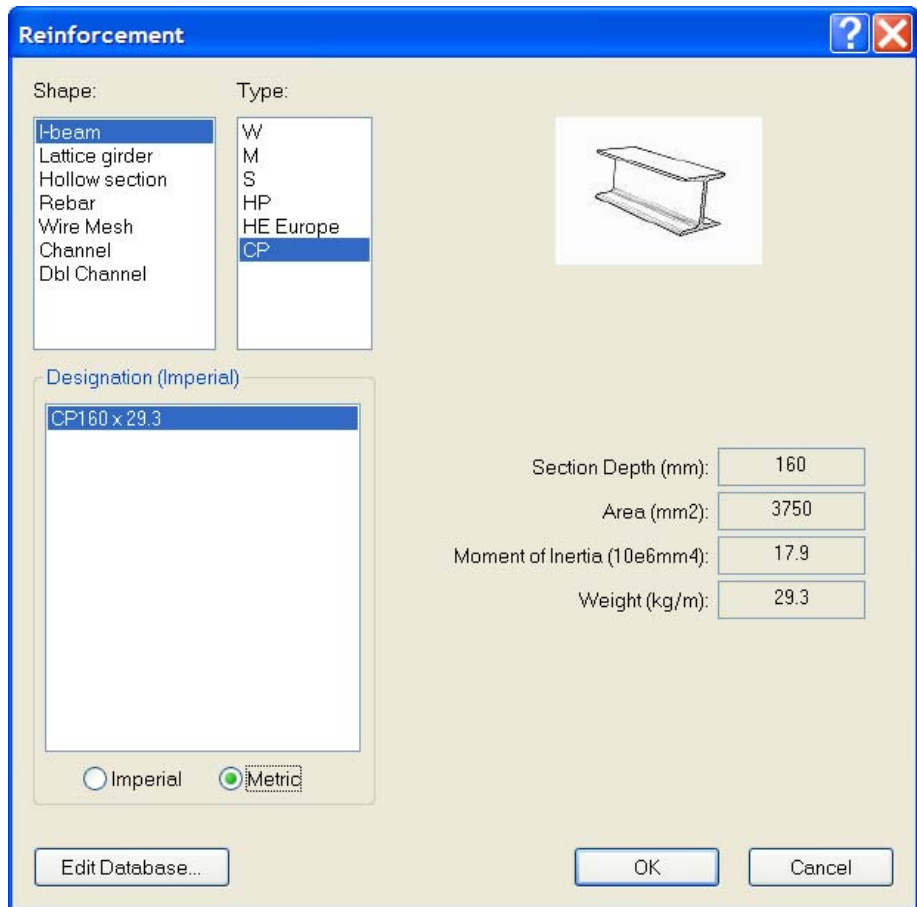
Data	Excel Column	Cell Value
Shape	A	I-beam
Type	B	CP
Designation (Imperial)	C	CP160 x 29.3 (Metric)
Weight (lbf/ft)	D	0
Area (in2)	E	0
Depth (in)	F	0
Moment of Inertia (in4)	G	0
Designation (Metric)	H	CP160 x 29.3
Weight (kg/m)	I	29.3
Area (mm2)	J	3750
Depth (mm)	K	160
Moment of Inertia (mm4*10^6)	L	17.9

The Excel™ spreadsheet should look something like:

	A	B	C	D	E	F	G	H	I	J	K	L
1100	Dbl Channel	MC	MC3x7 1	14.20	4.22	3.00	5.44	MC75X10 6	21.2	2720.0	76.2	2.26
1101	I-beam	CP	CP160 x 29.3 (Metric)	0	0	0	0	CP160 x 29.3	29.3	3750	160	17.9

5. Save and close the Excel spreadsheet. Press OK in the User Reinforcement Database dialog.

You'll now see that CP type has been added to the I-beam shape. Select this reinforcement section (see below) and you'll see that all the properties that you entered into the database are now displayed.

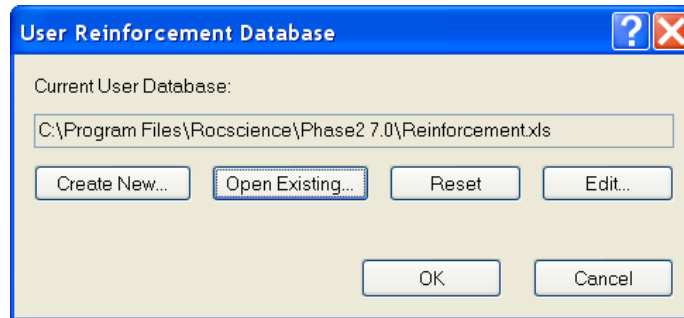


If you press OK after selecting the CP section in the reinforcement dialog, you'll see that the liner properties dialog is updated with the CP section data.

Opening a User Reinforcement Database

If someone sends you a reinforcement database file, or sends you a link to a database file in a shared folder on your company's network file system, you can easily open this file in *Phase2* 7.0.

In the User Reinforcement Database dialog (see below), press the **Open Existing** button. Now use the Open File dialog to navigate to the folder containing the reinforcement database file. Select the database file and press Open. Press OK in the User Reinforcement Database dialog. The new sections should now be seen in the Reinforcement dialog.



This completes the tutorial. You may now exit the *Phase2* Modeler.