

Data Validation

Excel's Data Validation tool allows you to specify what data is allowed in a cell, whether it be a number of a particular type or within a specified range; a date or time within a specified date range; text of particular length or picked from a list; or a value conforming to a given expression.

Applying Data Validation

Data Validation is applied to cells in the same way as formatting. Select the cells, rows or columns to which the validation is to be applied then use the Data Validation tool to define the rules you want to apply.

Once Data Validation has been applied to cells, Excel will reject entries into those cells that do not conform to the Data Validation rules you have applied. When applying the validation you have the option to display messages to the user, either explaining what they are allowed to enter or what they did wrong if they failed to observe the rule.

Data Validation can be applied to cells that already contain data, even if the data they contain does not conform to the validation rule. Additional tools are available to determine which cells then contain invalid data (see: *Validating Existing Data*)

The Data Validation Tool

The **Data Validation** tool is located on the **Data Tools** section of the **Data** tab of the ribbon. Click the main button to go directly to the Data Validation dialog box (*Fig. 2*) or click the lower part to see the additional validation tools (*Fig. 1*).

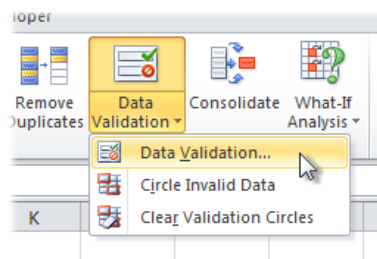


Fig. 1 Opening the Data Validation tool.

The Data Validation dialog box has three tabs (*Fig. 2*). The **Settings** tab is where you define the rules that will apply to the selected cells. On the **Input Message** tab you have the option to create a message that the user will see on entering one of the cells, and on the **Error Alert** tab you can display a custom error message to appear in place of the default one if they make a mistake.

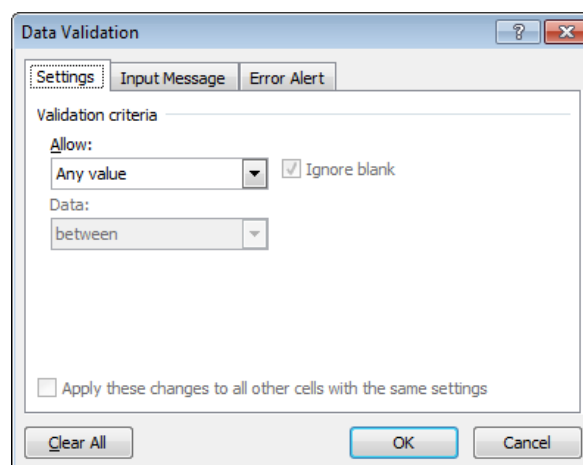


Fig. 2 The Data Validation dialog box.

Setting-up Data Validation

Defining the Rule

To start with the **Validation criteria** section of the **Settings** tab shows that *Any Value* is currently allowed, meaning that there is currently no validation applied. If there is already validation applied to the selected cells the validation rule is shown. Here are a couple of examples of what you might apply...

Suppose you want the user to enter a whole number no greater than 10.

1. First select the cell or cells that to which you want to apply Data Validation.
2. Click the **Data Validation** button on the **Data** tab of the ribbon to open the *Data Validation* dialog box.
3. Select the **Settings** tab of the *Data Validation* dialog box.
4. Open the **Allow** list and choose *Whole Number*. The **Data** list defaults to *Between* and boxes for **Minimum** and **Maximum** values appear.
5. Open the **Data** list and choose *less than or equal to*. Note that now only a box for **Maximum** is shown.
6. Enter the number *10* in the **Maximum** box.
7. The tick in the **Ignore blank** checkbox means that the rule you specify does not apply to a cell left empty. If you want to make sure that the user does not clear a value from a cell then uncheck this box.

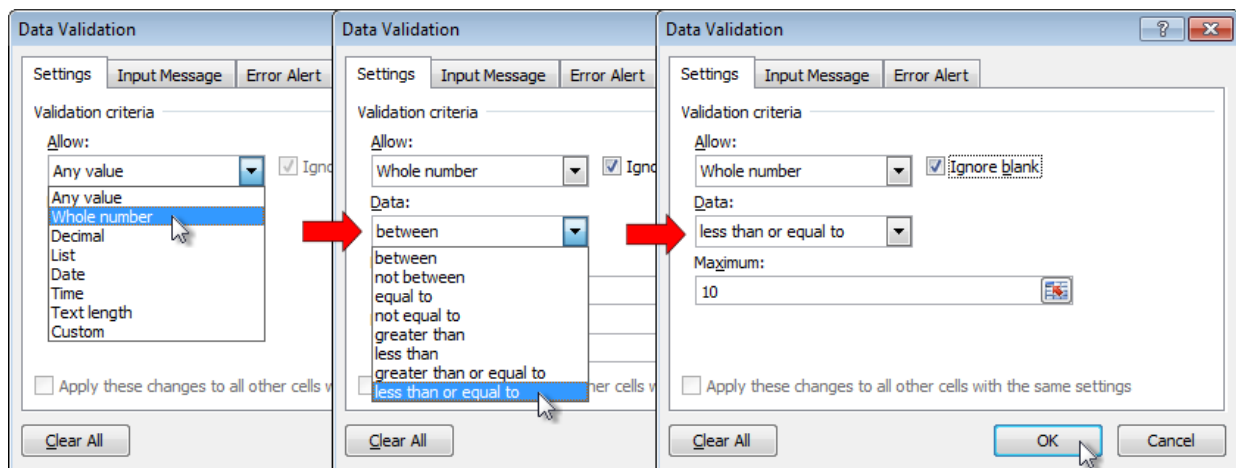


Fig. 3 Specifying a validation rule

If you don't want to add any custom messages you can click the **OK** button at this stage to apply the validation (Fig. 3), otherwise continue...

Creating an Input Message

If you want to assist the user by displaying a message when they enter a validated cell move to the **Input Message** tab and enter a message title (optional) and the message itself in the appropriate text boxes (Fig. 4). Note: You can temporarily disable the Input Message by removing the tick from the **Show input message when cell is selected** checkbox.

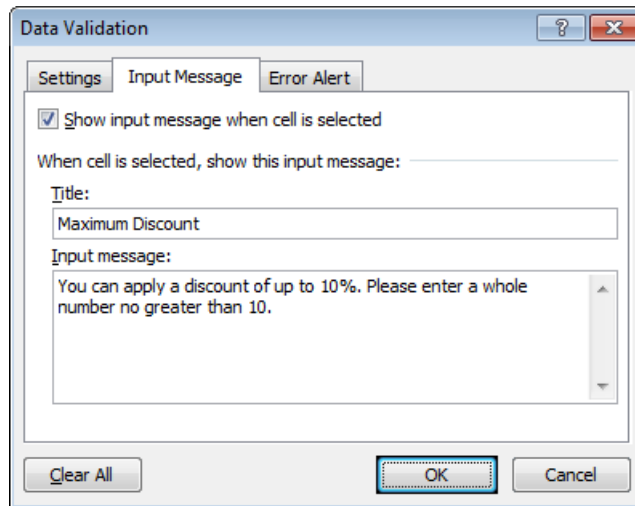


Fig. 4 Adding an Input Message.

Creating an Error Alert

You can also display a custom message to be shown if the user enters a value that does not conform to the rule. Go to the **Error Alert** tab and enter a message title (optional) and an error message in the appropriate text boxes and choose a **Style** for the message itself (Fig. 5).

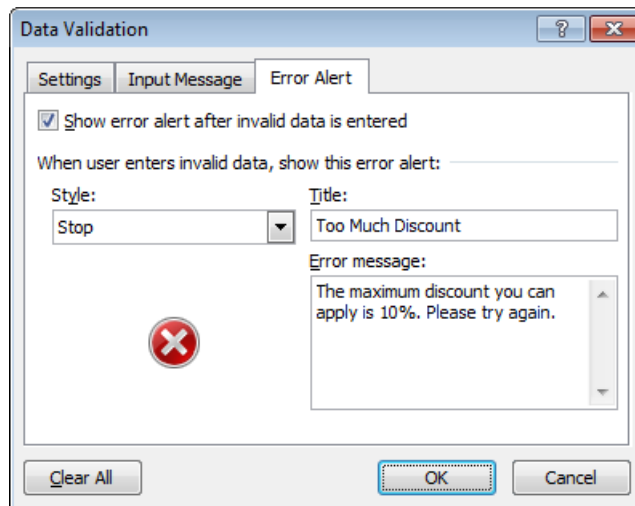


Fig. 5 Adding an Error Alert.

The checkbox labelled **Show error alert after invalid data is entered** should be left checked. Removing the tick not only disables the message but also switches off the validation rule.

How the Rule Works

Input Messages

If you have specified an Input Message the user will see the message displayed when a validated cell is selected (Fig. 6).

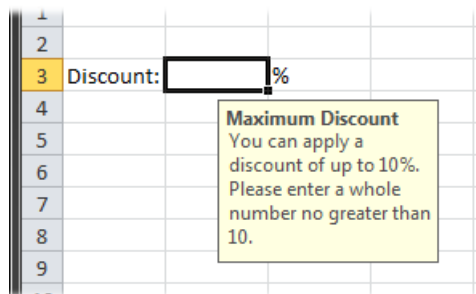


Fig. 6 Excel displays your Input Message.

Error Alerts

What happens after they enter some data and try to leave the cell depends upon what they entered, whether you specified an error alert and, if so, what style of error alert you choose.

Selecting the **Stop** style displays the "critical" icon and offers the user the option to try again or cancel their entry (Fig. 7). It will not tolerate an invalid entry.

If the user clicks **Retry** they are returned to the cell with their invalid entry highlighted. If the user clicks **Cancel** they are returned to the cell and their invalid entry is removed.

Use the **Stop** style if you want to prevent any entry breaking your validation rule.

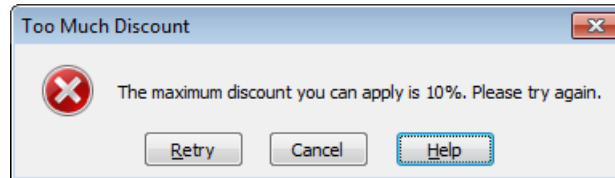


Fig. 7 The effect of choosing the Stop style of Error Alert.

Selecting the **Warning** style displays the "exclamation" icon and asks the user if they wish to continue with their entry (Fig. 8). It will tolerate an invalid entry but suggests that the user corrects it.

If the user clicks **Yes** they are allowed to leave the cell and their invalid entry remains in place. If the user clicks **No** they are returned to the cell with their invalid entry highlighted. If the user clicks **Cancel** they are returned to the cell and their invalid entry is removed.

Use the **Warning** style if you want the use to be notified that their entry breaks the rule and be prompted to change it, but be allowed to keep it if they wish.

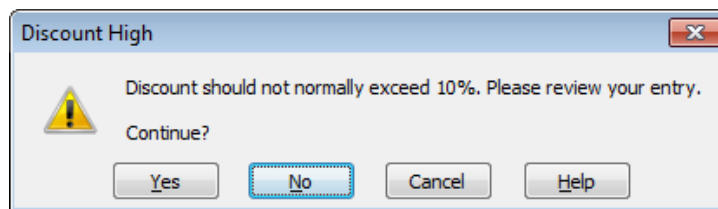


Fig. 8 The effect of choosing the Warning style of Error Alert.

Selecting the **Information** style displays the "information" icon and simply lets the user know that they have made an invalid entry without enforcing the rule (Fig. 9).

If the user clicks **OK** they are allowed to leave the cell and their invalid entry remains in place. If the user clicks **Cancel** they are returned to the cell and their invalid entry is removed.

Use the **Information** style if you simply want to let the user know that they have made an invalid entry but you do not need to enforce it.

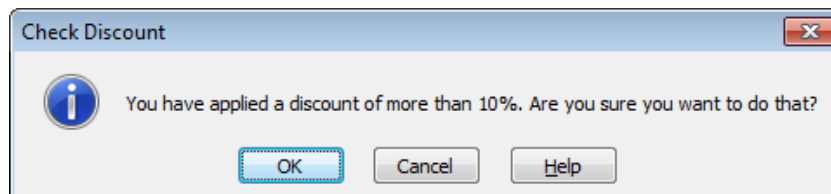


Fig. 9 The effect of choosing the Information style of Error Alert.

In all cases clicking the **Help** button prompts Excel to display online help about Data Validation.

If you prefer not to enter a custom Error Alert you can still have the same range of tolerance options for invalid entries. Do this by choosing one of the three **Style** options. When you do this without entering a custom message Excel displays its default message with the appropriate icon and selection of buttons (Fig. 10).

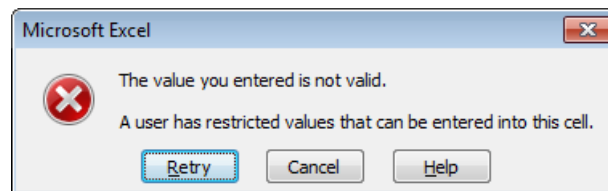


Fig. 10 The effect of choosing a Style without creating a custom message.

Working with Numbers

Choose **Whole Number** to allow any whole number, positive or negative. If the user enters a decimal value the entry is rejected. If you want to prevent negative entries use the **Data** option to specify, for example, *greater than or equal to 0*.

Choose **Decimal** to allow positive or negative numbers that include fractions. Whole numbers are also allowed.

Working with Dates and Times

If you specify a **Date** or **Time** data type you are offered the same list of **Data** options as for numbers (*less than, greater than* etc.). You can enter limiting date values in any format that Excel will recognise (e.g. *27/09/2015* or *27 September 2015*).

Limiting time values must be entered in the standard 24hr format (e.g. *09:30* or *09:30:00*). You cannot use the AM/PM format.

Working with Text

The only limits you can set for text refer to the number of characters that are entered, using the same **Data** options as for numbers. Remember that the text length you specify should take account of all the input characters including text, numbers, punctuation and spaces.

To limit entries to specific text items you can use the **List** option (see *Working with Lists*)

Working with Lists

A useful feature of the Data Validation tool is the ability to add a drop-down list to a cell. First you must create a reference list somewhere in the workbook (it does not have to be on the worksheet where you are applying the validation). The list values can be text or numbers, and can be arranged in a row or a column.

To apply List validation to a cell (Fig. 11):

1. First select the cell or cells that to which you want to apply Data Validation.
2. Click the **Data Validation** button on the **Data** tab of the ribbon to open the *Data Validation* dialog box.
3. Select the **Settings** tab of the *Data Validation* dialog box.
4. Open the **Allow** list and choose *List*. The **Data** text box is greyed-out and a **Source** box appears. Click in the **Source** box then select the cells that contain your list.
5. The tick in the **Ignore blank** checkbox means that the rule you specify does not apply to a cell left empty. If you want to make sure that the user does not clear a value from a cell then uncheck this box.
6. The tick in the **In-cell dropdown** checkbox indicates that a button for a dropdown list will appear when the cell is selected. Remove the tick only if you want to apply validation by means of a list but do not want to provide the user with a list to choose from.
7. As with the other methods of Data Validation you can assist the user by specifying an **Input Message** (see: *Creating an Input Message*) and **Error Alert** (see: *Creating an Error Alert*).
8. Finally, click **OK** to close the dialog box and apply the validation to the cell.

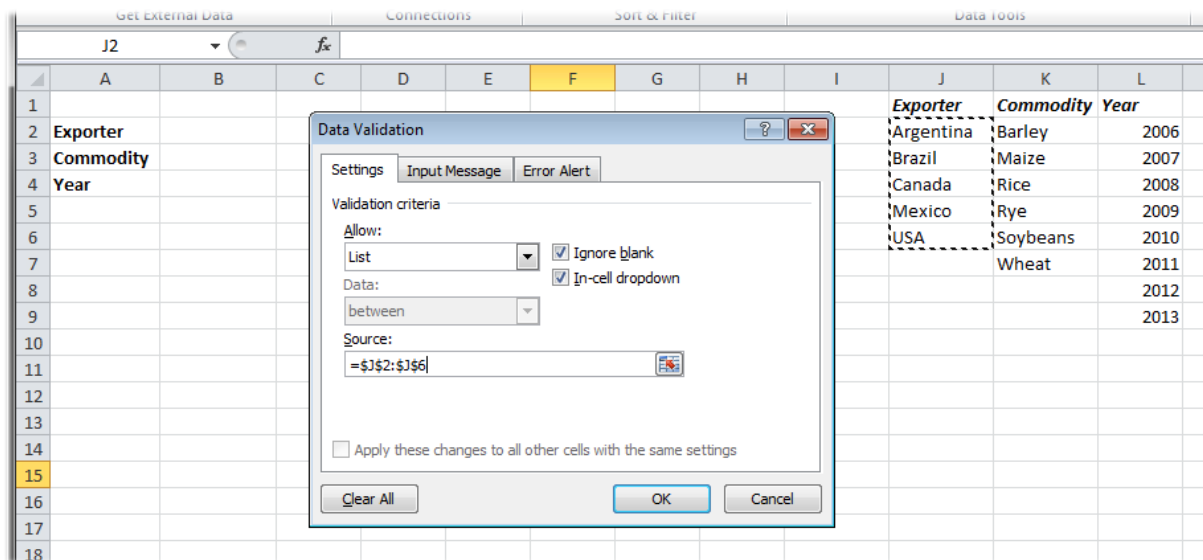


Fig. 11 Applying Data Validation using a List.

When the user selects a list validated cell a button appears alongside the selected cell together with any Input Message you have specified. Clicking the button opens the list. When the user chooses an item from the list (Fig. 12) that item is entered into the cell and the list closes.

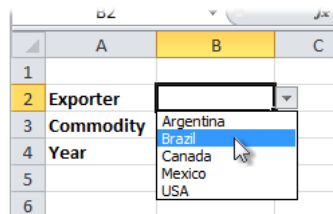


Fig. 12 Using a Data Validation List.

Users can type an entry directly into a cell without using the list. The Data Validation still applies so an Error Alert will appear if their entry does not match any of the list entries.

Custom Validation

Sometimes the standard validation options do not suit your needs. When this happens you can usually solve the problem by using a custom expression to define a suitable rule. A typical example is when you want to apply "relative" validation, in which the actual values permitted change according to the cell to which they are applied. Instead of applying validation separately to each cell Custom Validation allows you to enter an expression that describes your rule and applies it to all the chosen cells at one go.

The illustration (Fig. 18) shows an example that requires custom validation. Each of the cells in the range C2:C11 must contain a value greater than the corresponding cell in the adjacent column to the left (range B2:B11). The custom validation is applied like this:

1. Select the cells to which Data Validation is to apply (range C2:C11) are selected.
2. Open the **Data Validation** dialog and from the **Allow** list choose *Custom*.
3. In the **Formula** text box enter the expression `=C2:C11>B2:B11`
4. Click **OK** to close the dialog box and apply the validation.

Now each of the cells in the range C2:C11 is restricted to a value greater than the cell immediately top its left (e.g. C2 must be greater than B2, C3 greater than B3 and so on).

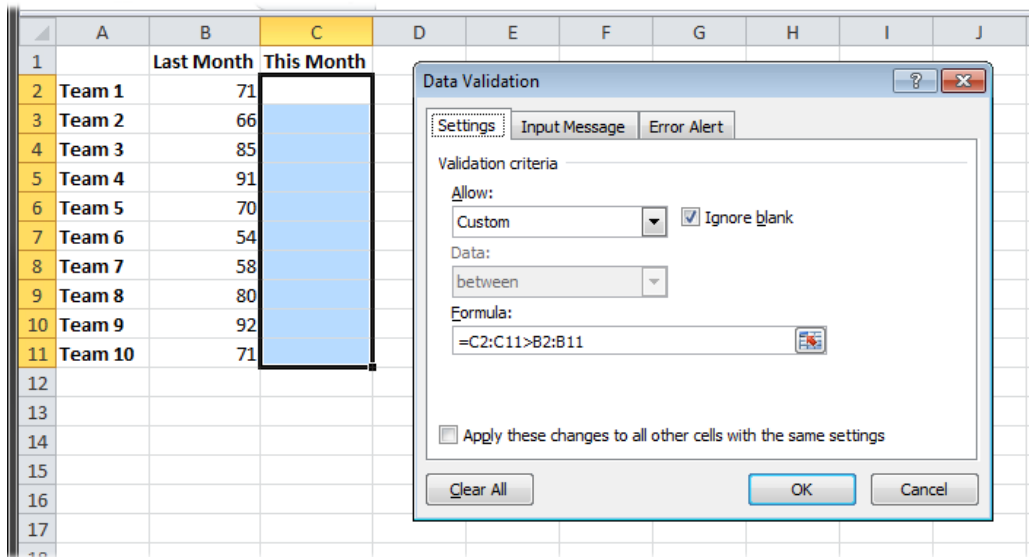


Fig. 13 Applying custom data validation.

When Data Validation Doesn't Work

There are circumstances in which Data Validation does not work...

- If the user copies another cell and pastes it into a validated cell the value is accepted, even if it breaks the validation rule and the cell's Data Validation is lost.
- If the user copies a value from another source (e.g. Microsoft Word) and pastes it into a validated cell the value is accepted even if it breaks the validation rule, but the cell's Data Validation remains.
- If a value is placed in a validated cell programmatically (i.e. by a VBA macro) the value is accepted even if it breaks the validation rule, but the cell's Data Validation remains.

These problems can be addressed using VBA programming but this is beyond the scope of this document. An Internet search will find numerous suggestions for dealing with the problem.

Validating Existing Data

Data Validation rules can be applied to data that is already in place, even if the data does not comply with the rules. In addition to preventing the entry of more invalid data, this allows you easily identify any existing data that does not satisfy the validation rules.

The illustration (Fig. 14) shows a table of data with values between 700 and 1000. Suppose you want to identify the cells containing value of 725 or less.

	A	B	C	D	E	F	G	H	I	J	K	L
1	Machine Output (Units)											
2												
3		Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	
4	Line 1	971	809	808	722	816	996	854	945	836	910	
5	Line 2	789	985	934	743	764	821	882	967	799	946	
6	Line 3	864	927	987	943	781	939	796	817	814	982	
7	Line 4	877	707	882	789	777	933	716	716	709	831	
8	Line 5	986	762	809	874	912	753	762	706	999	713	
9	Line 6	766	890	852	801	979	744	750	939	736	700	
10	Line 7	934	951	900	764	854	858	842	921	708	788	
11	Line 8	829	873	886	744	942	720	714	701	942	778	
12	Line 9	825	777	966	781	740	904	973	811	978	730	
13	Line 10	992	883	990	803	846	839	713	899	936	706	
14												

Fig. 14 Which cells in the table have values of 725 or less?

To use Data Validation to identify existing invalid data:

1. Select the cells to be checked then apply a validation rule. In this example it requires values **greater than 725** (Fig. 15).

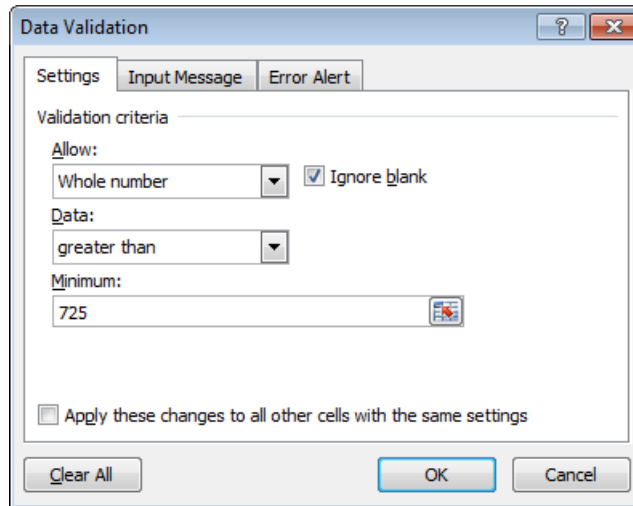


Fig. 15 The validation rule requires values greater than 725.

2. Click the lower part of the **Data Validation** button to display a list of choices and choose **Circle Invalid Data** (Fig. 16).

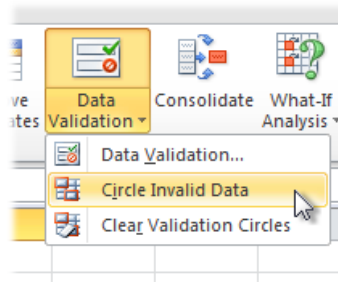


Fig. 16 Choose to Circle Invalid Data.

3. Excel draws a red line around cells that currently contains invalid data, in this example values of 725 or less (Fig. 17).
4. To remove the circles go back to the **Data Validation** button and choose **Clear Validation Circles**.

	A	B	C	D	E	F	G	H	I	J	K	L
1	Machine Output (Units)											
2												
3		Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	
4	Line 1	971	809	806	722	816	996	854	945	836	910	
5	Line 2	789	985	934	743	764	821	882	967	799	946	
6	Line 3	864	927	987	943	781	939	796	817	814	982	
7	Line 4	871	707	882	789	777	933	710	710	709	831	
8	Line 5	986	762	809	874	912	753	761	706	999	713	
9	Line 6	766	890	852	801	979	744	750	939	730	700	
10	Line 7	934	951	900	764	854	858	842	921	708	788	
11	Line 8	829	873	886	744	941	720	714	701	942	778	
12	Line 9	825	777	966	781	740	904	973	811	978	730	
13	Line 10	992	883	990	803	846	839	713	899	930	706	
14												
15												

Fig. 17 Excel circles the cells containing invalid data.

If the value in a circled cell is manually changed to a valid value then the red circle disappears (the validation rule prevents you from changing a valid value to an invalid one).

However, if cell contains a formula and it changes as a result of a change to its input, or if the cell's value is changes programmatically, then although the rule remains in place the change is allowed

and the state of the red circles does not change (a circled cell keeps its circle even though its value is now valid, and an uncircled cell does not become circled if it now contains an invalid value). In these circumstances it is necessary to repeat the **Circle Invalid Data** command to refresh the appearance of the cells.

If this becomes a problem then it is worth considering **Conditional Formatting** as a method of highlighting specific data. The illustration (*Fig. 18*) shows data to which both Data Validation and Conditional Formatting has been applied. The values in some of the cells have been changed after the command to **Circle Invalid Data** was given. The value changes were made either programmatically or because they contain formulas that have changed their displayed values. You can see that some cells are now incorrectly circled. Cell E4 previously held an invalid value but is now valid but its circle remains. Cell F7 previously held a valid value and now contains an invalid one, but is not circled.

Conditional Formatting has been applied to the same range of cells and has correctly responded to the changing values. The circling must be refreshed before it correctly highlights only the cells that are now invalid following the changes.

	A	B	C	D	E	F	G	H	I	J	K	L
1	Machine Output (Units)											
2												
3		Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	
4	Line 1	971	809	808	855	816	996	854	945	836	800	
5	Line 2	789	985	934	743	764	821	882	967	799	946	
6	Line 3	864	927	987	943	781	939	796	817	814	982	
7	Line 4	877	707	882	789	712	933	716	716	709	831	
8	Line 5	986	762	809	874	912	753	762	706	999	713	
9	Line 6	766	890	852	801	979	744	750	939	736	700	
10	Line 7	934	951	900	764	854	858	842	921	708	788	
11	Line 8	829	873	886	744	942	720	714	701	942	778	
12	Line 9	825	777	966	781	740	904	973	811	978	730	
13	Line 10	992	883	990	803	846	839	713	899	936	706	
14												
15												

Fig. 18 Cells to which both Data Validation and Conditional Formatting has been applied.