

【2】 Evolver 設定

點擊功能選單中的「演算設定」鈕，進行設定。

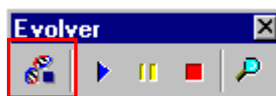


圖 3-10 Evolver 功能選單

Step 1 目標函數設定

選擇求解形式(max or min)，並輸入目標函數欄位。

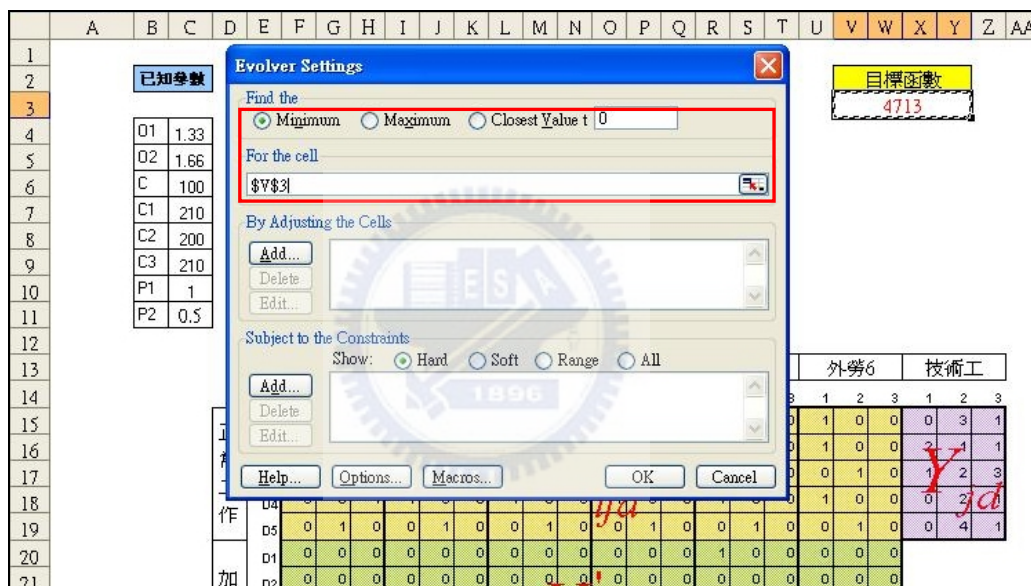


圖 3-11 Evolver 目標函數設定

Step 2 決策變數

1、按下「Add」鍵，進入決策變數選取畫面。

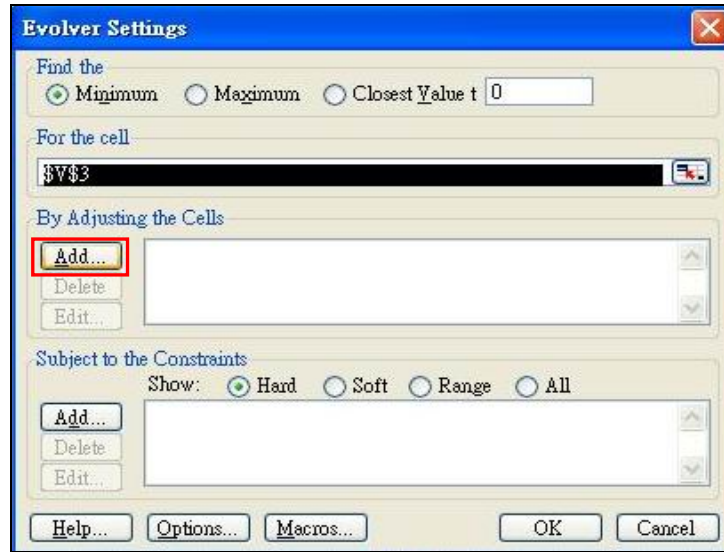


圖 3-12 Evolver 決策變數設定

2、選擇 X_{ijd} 變數欄位，並定義變數值範圍。

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	A
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		外勞1		外勞2		外勞3		外勞4		外勞5		外勞6		技術工		
		1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
正常 工作	D01	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0
	D02	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0
	D03	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0
	D04	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1
	D05	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0
加班 1	D01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	D02	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	D03	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	D04	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	D05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
加班 2	D01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	D02	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	D03	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	D04	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	D05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

		外勞		外勞6		
		1	2	1	2	3
正常 工作	D01	1	0	1	0	0
	D02	1	0	1	0	0
	D03	0	1	0	1	0
	D04	0	0	0	0	0
	D05	0	1	0	1	0
加班 1	D01	0	0	0	0	0
	D02	0	0	0	0	0
	D03	0	0	0	0	0
	D04	0	0	0	0	0
	D05	0	0	0	0	0
加班 2	D01	0	0	0	0	0
	D02	0	0	0	0	0
	D03	0	0	0	0	0
	D04	0	0	0	0	0
	D05	0	0	0	0	0

		M1	
		1	2
正常 工作	D01	0	0
	D02	0	0
	D03	0	0
	D04	0	0
	D05	0	0
加班 1	D01	0	0
	D02	0	0
	D03	0	0
	D04	0	0
	D05	0	0
加班 2	D01	0	0
	D02	0	0
	D03	0	0
	D04	0	0
	D05	0	0

圖 3-13 X_{ijd} 變數設定

3、選擇 X'_{ijd} 及 X''_{ijd} 變數欄位，並定義變數值範圍。

The screenshot displays an Excel spreadsheet with columns A through AA and rows 12 through 48. The main data area is a grid of 0s and 1s, organized into three vertical sections: 'Normal Work' (rows 14-19), 'Shift 1' (rows 20-25), and 'Shift 2' (rows 26-29). Each section has columns for overtime types (外勞1 to 外勞6) and technical workers (技術工). Red handwritten annotations X'_{ijd} and X''_{ijd} are placed over specific cells in the grid. A dialog box titled 'Adjustable Cells' is open, showing the 'Adjust the Cells' section with a red border. It lists two constraints: $0 \leq \{F20:W29\} \leq 1$ [INT] and $0 \leq \{R20:W29\} \leq 2$ [INT]. The 'Use the Options' section shows a crossover rate of 0.5 and a mutation rate of 0.1. The description field contains the number '1896'. The dialog box also shows 'Min' set to 0 and 'Max' set to 2 for the selected cell range.

圖 3-14 X'_{ijd} 及 X''_{ijd} 變數設定

4、選擇 Y_{ijd} 變數欄位，並定義變數值範圍。

The screenshot displays an Excel spreadsheet with columns A through AA and rows 12 through 48. The data is organized into a grid representing variables Y_{ijd} . The grid is divided into three main sections: '正常工作' (Normal Work), '加班 1' (Class 1 Overtime), and '加班 2' (Class 2 Overtime). Each section has 5 rows (D1-D5) and 18 columns (M1-M18). The columns are grouped into '外勞1' through '外勞6' (Overtime 1-6) and '技術工' (Technical Work). The cells contain binary values (0 or 1). A red dashed box highlights a specific cell in the '正常工作' section, labeled Y_{ijd} . An 'Adjustable Cells' dialog box is open, showing the 'Adjust the Cells' section with a red box around the 'Cell Range' field, which contains '\$M\$15:\$Z\$19'. The 'Min' value is 0 and the 'Max' value is 6. The 'Integer Values Only' checkbox is checked. The 'Add' button is highlighted, and the list of constraints shows:

- 0 <= \$F\$15:\$W\$19 <= 1 [INT]
- 0 <= \$F\$20:\$W\$29 <= 2 [INT]
- 0 <= \$M\$15:\$Z\$19 <= 6 [INT]

 The 'Use the Options' section shows 'Crossover' set to 0.5 and 'Mutation rate' set to 0.10. The 'Description' field is empty. The 'OK' and 'Cancel' buttons are visible at the bottom of the dialog box.

圖 3-15 Y_{ijd} 變數設定

Step 3 設定交配率與突變率

鍵入交配率與突變率後，點擊「OK」鍵後，即完成上述設定。

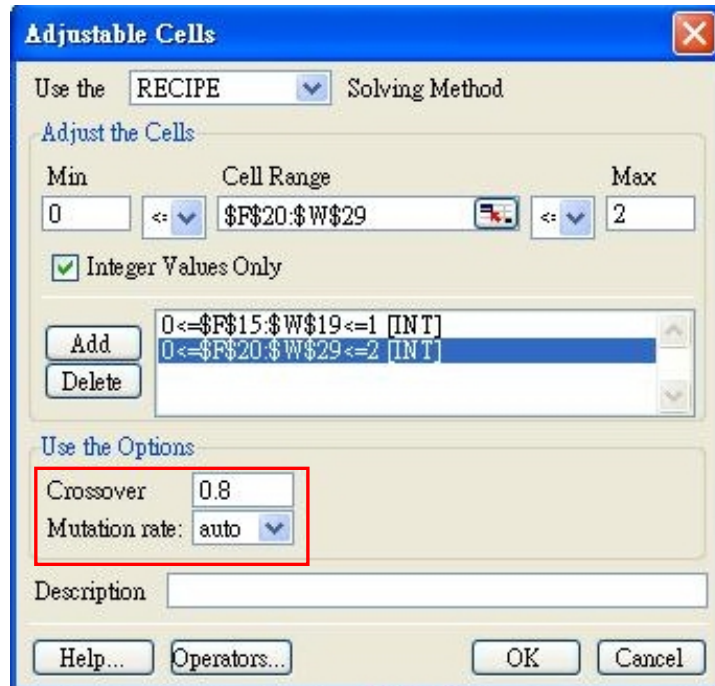


圖 3-16 交配及突變率設定

Step 4 輸入限制式

- 1、點擊「Add」鍵，進入限制條件輸入畫面

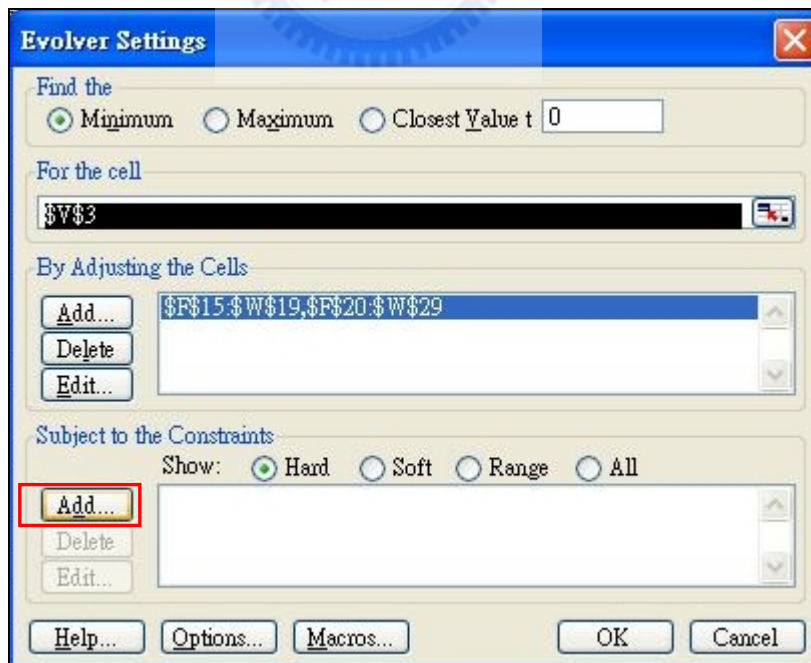


圖 3-17 限制式新增設定

2、輸入限制式 (3-13) (3-14) (3-15)，並點擊「OK」鍵完成輸入。

The screenshot shows the 'Constraint Definition' dialog box with the following settings:

- Description: 式(3-13)(3-14)(3-15)
- Constraint Type: Hard
- Constraint Format: Simple Range of Values
- Cell Range: \$AF\$49
- Value: 0

The background table shows constraints applied to cells D3, D3, and D3 in columns M1-M6. The constraints are labeled as 式(3-13), 式(3-14), and 式(3-15). The table also includes rows for '正常工作' (Normal Work) and '加班 1' (Overtime 1), and '加班 2' (Overtime 2).

圖 3-18 限制式(3-13)(3-14)(3-15)設定

3、輸入限制式 (3-16)，並點擊「OK」鍵完成輸入。

The screenshot shows the 'Constraint Definition' dialog box with the following settings:

- Description: 式(3-16)
- Constraint Type: Hard
- Constraint Format: Simple Range of Values
- Cell Range: \$AM\$39
- Max: 0

The background table shows constraint (3-16) applied to cell D3 in columns M1-M6. The table also includes rows for '外勞' (Foreign Labor) and '限制進入加班二' (Restrict entry to overtime 2).

圖 3-19 限制式(3-16)設定

4、輸入限制式（3-2），並點擊「OK」鍵完成輸入。

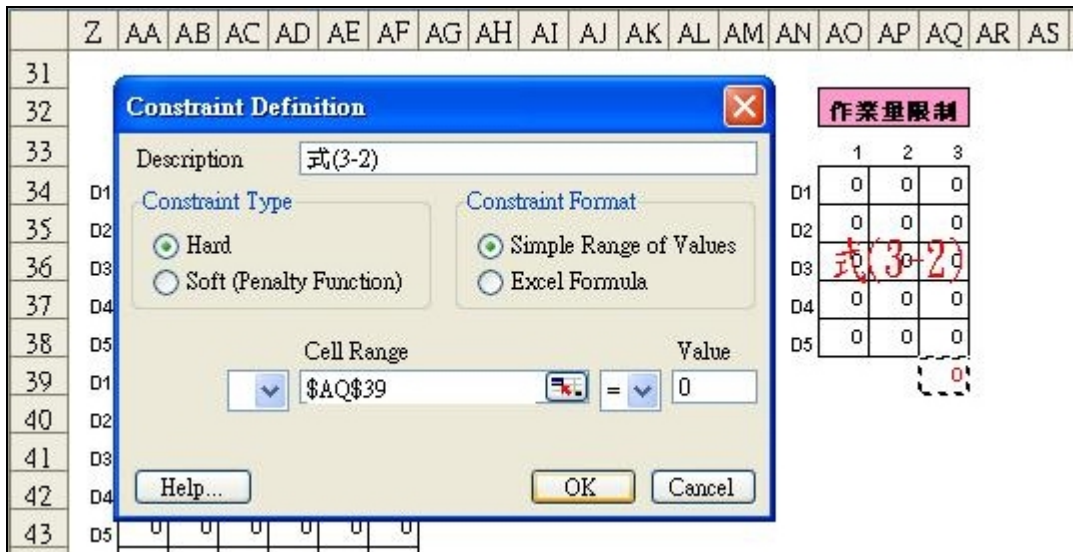


圖 3-20 限制式(3-2)設定

Step 5 設定族群數與搜尋停止條件

1、點擊「Options」鍵，進入設定畫面。

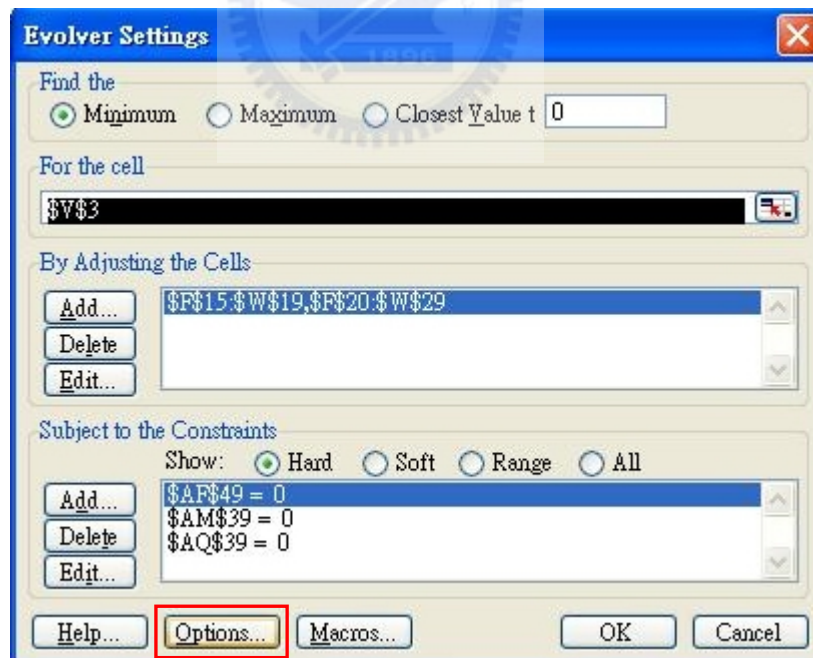


圖 3-21 族群數與搜尋停止條件設定

2、鍵入「族群數」並選擇「搜尋停止條件」，點擊「OK」完成輸入。

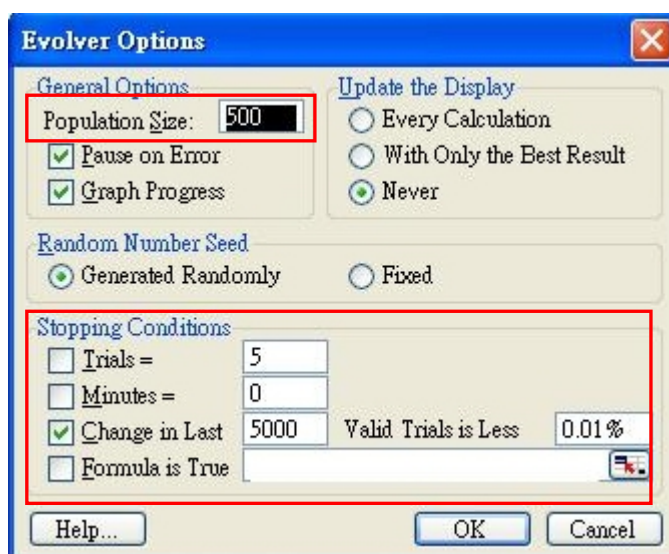


圖 3-22 輸入族群數與搜尋停止條件

Step 6 完成並儲存設定

完成 Step 1~5 後，於主設定畫面按下「OK」鍵完成上述設定。

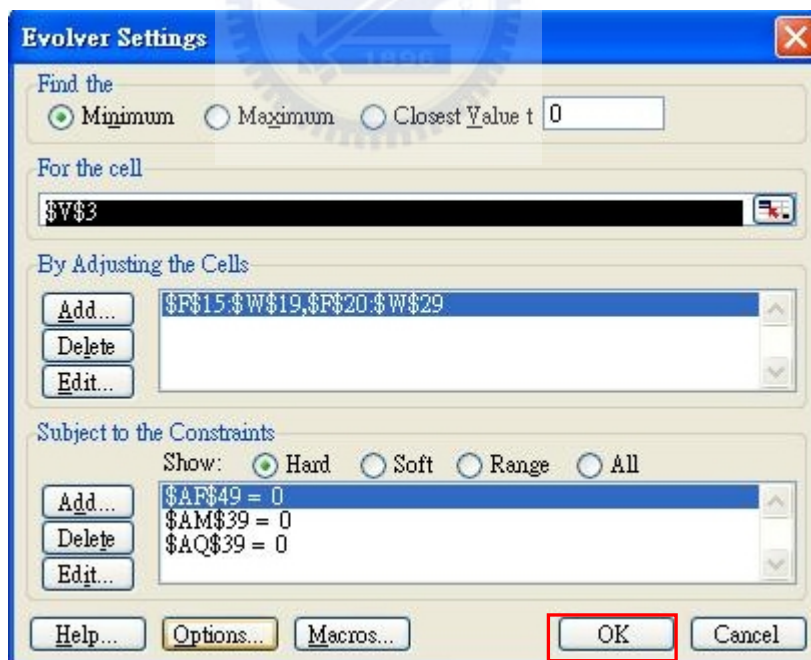


圖 3-23 完成並儲存設定

【3】演算開始

Step 1 點擊功能選單中的「啟動搜尋」鍵



圖 3-24 Evolver 功能選單

搜尋過程

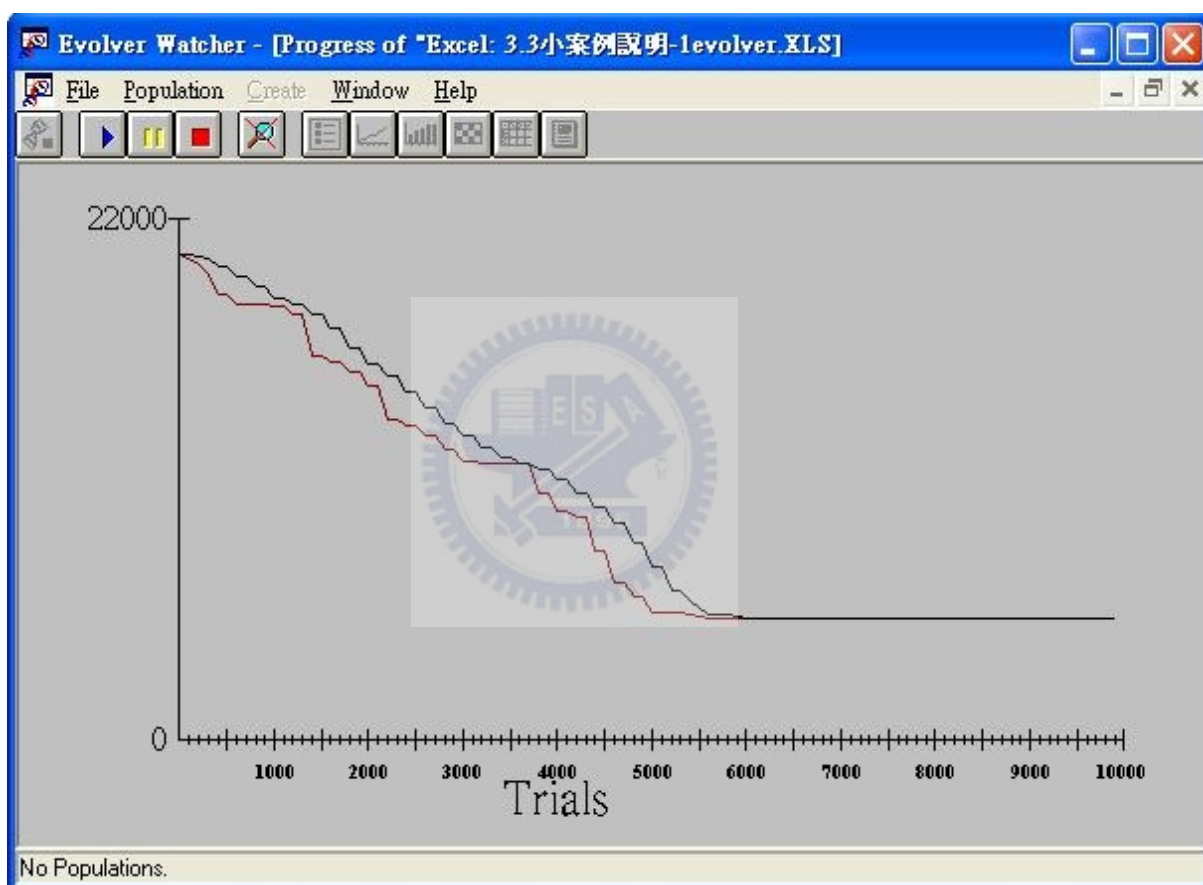


圖 3-25 Evolver 搜尋過程

Step 2 停止搜尋

符合停止條件即停止搜尋，點擊「Stop」鍵結束搜尋。

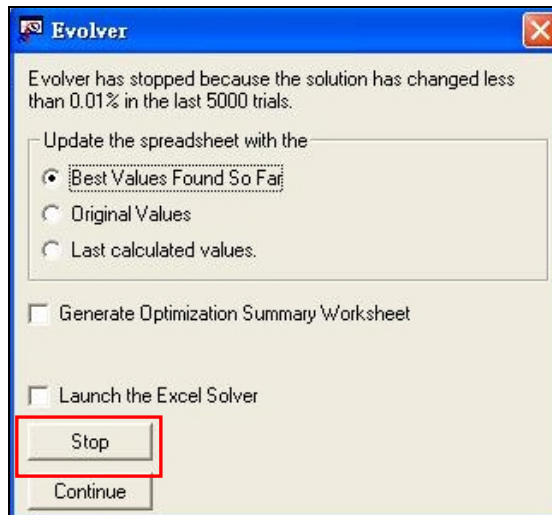


圖 3-26 Evolver 停止搜尋方塊

Step 3 輸出

得最佳目標函數值，及決策變數值。

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC
1																													
2																													
3																													
4																													
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圖 3-27 搜尋結果