

APPENDIX H

Procedure Using Excel Solver

1.1 Getting Started

To begin using Excel, double-click on the Excel icon. Once Excel has loaded, enter the input data and construct relationships among data elements in a readable way.

When building this foundation for model, think ahead about the optimization model you will be developing. Ensure the cell in spreadsheet for each of the following:

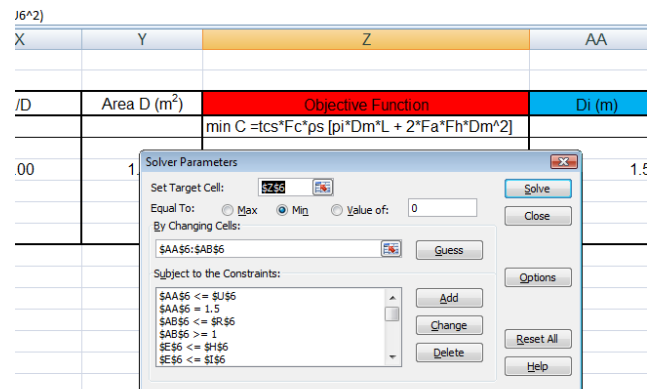
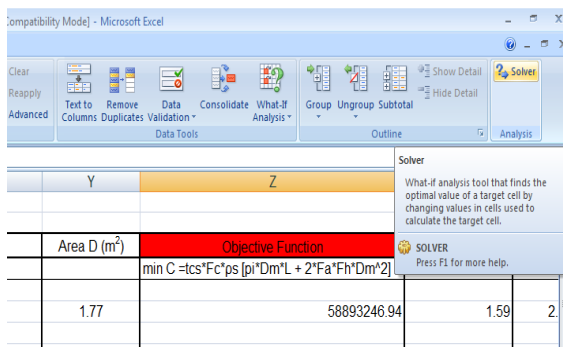
1. quantity to maximize or minimize (target cell)
2. every decision variable (adjustable cell)
3. every quantity that might want to constrain (constrain cell)

	U	V	3	X	Y	Z	AA	AB
1								
2								
3	Dm (m)	lv (s)	D (m)	L/D	Area D (m ²)	Objective Function	Di (m)	Le(m)
4	$[Di^2 + (Di + 2*tcs)^2/2]^0.5$	$Le/(Qv/\alpha*At)$	$Di + 2*tc$			$min C = tcs*Fc*ps [pi*Dm*L + 2*Fa*Fh*Dm^2]$		
5								
6	1.59	0.27	1.60	3.00	1.77	58893246.94	1.59	2
7								
8								

1.2 Constructing an Optimization Model Using Solver

Once satisfied with the basic spreadsheet model have built, ready to build an optimization model using Solver. To begin using Solver,

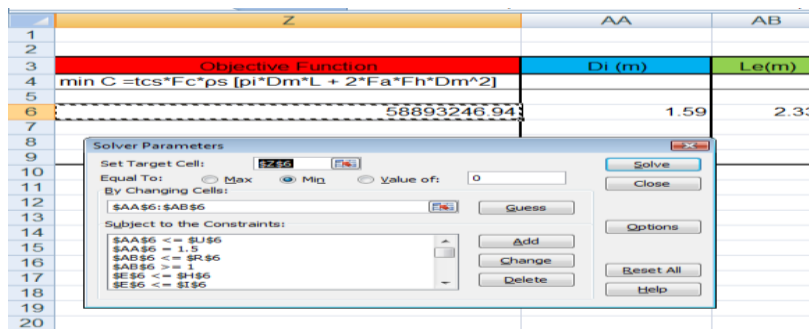
- click on “Data” and select “Solver”.



1.3 Selecting the Cell to Optimize

To select the cell wish to optimize, look at the “Set Cell” window within the dialogue box. Erase (or simply drag the cursor over) everything that is in that window. Then, either

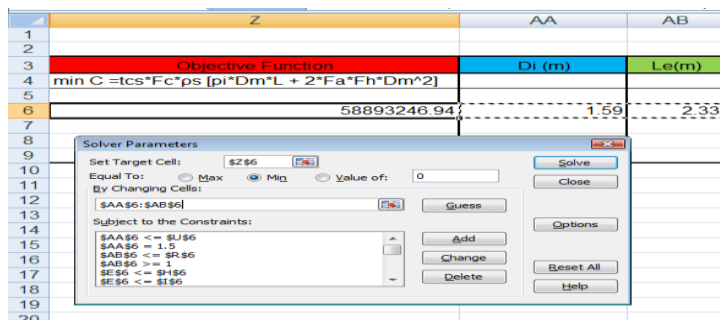
- type the address of the cell wish to optimize, or
- click on the cell wish to optimize.
- Choose either “Max” or “Min” depending on whether the objective is to maximize or minimize the target cell.



1.4 Identifying Decision Variable Cells

Move the cursor to the “By Changing Cells” window within the dialogue box. Again, erase anything that may be there (unless you put it there before and want to keep it). Must tell Excel which cells are decision variables—i.e., which cells Excel is allowed to change when trying to optimize. To do this:

- type the addresses of every cell wish to treat as a decision variable, separating them by commas, or
- drag the cursor across all cells wish to treat as decision variables



1.5 Defining Constraints

To begin entering constraints, click on the “Add” button to the right of the constraints window. A new dialogue box will appear. The cursor will be in the “Cell Reference” window within this dialogue box.

- Type the cell address that contains the quantity you want to constrain, or
- click on the cell that contains the quantity you want to constrain.

Again, if the dialogue box is in the way, you can move it by dragging the bar at the top of the box. The default inequality that first appears for a constraint is “<=“. To change this,

- click on the arrow beside the “<=“ sign.
- Select the inequality (or equality) you wish from the list provided.

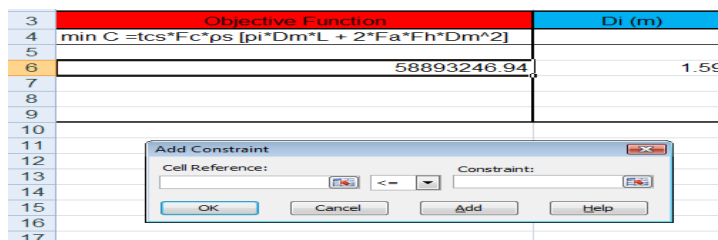
(Notice that you may also force a decision variable to be an integer using this window)

After setting the inequality, move the cursor to the “Constraint” window.

- Type the number or the cell reference you want to use as the constraining value for that constraint, or
- click on the cell you want to use as the constraining value for that constraint.

After you are satisfied with that constraint,

- click the “Add” button if you want to add another constraint, or
- click the “OK” button if you want to go back to the original dialogue box.



1.6 To solve

Click **Solve** and do one of the following:

- To keep the solution values on the worksheet, click **Keep Solver Solution** in the **Solver Results** dialog box. To restore the original data, click **Restore Original Values**.