

How to make use of the IrriMaker (IM) PIVOT design tool to assist with Pivot layout and design.

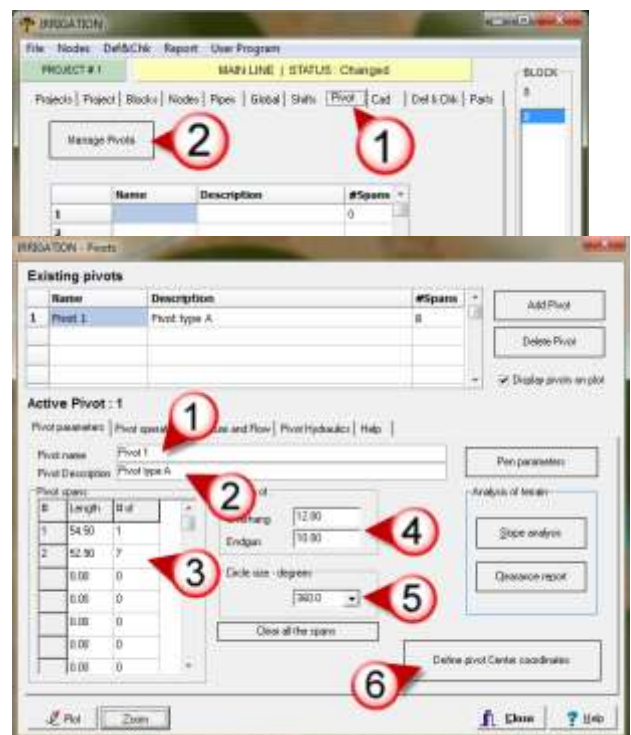
In this tips and tricks feature, I will explain how you can make use of the pivot tool in the Model Maker's design module. First, I would like to say that IM does not attempt to re-design the pivot. The pivot tool in IM is mainly there to assist the designer to make an informed decision with regard to placement possibilities of a new pivot by looking at the ground slope, span to ground clearance and vertical span kink angles. IM does however do basic hydraulic calculations to determine an estimated demand the pivot might have on the irrigation system so that IM can ultimately design the pipeline leading up to the centre pivot.

Step 1: Add a new pivot

To start using the pivot feature, on the main irrigation dialog click on **Pivot** then **Manage Pivots**.

Enter the Name (1) a description (2) the number and length of spans (3), the overhang length and end gun distance (4), the circle angle (5) then position the pivot with (6) the "Define pivot centre coordinate" button.

This will automatically draw the span circles and elevate the pivot.

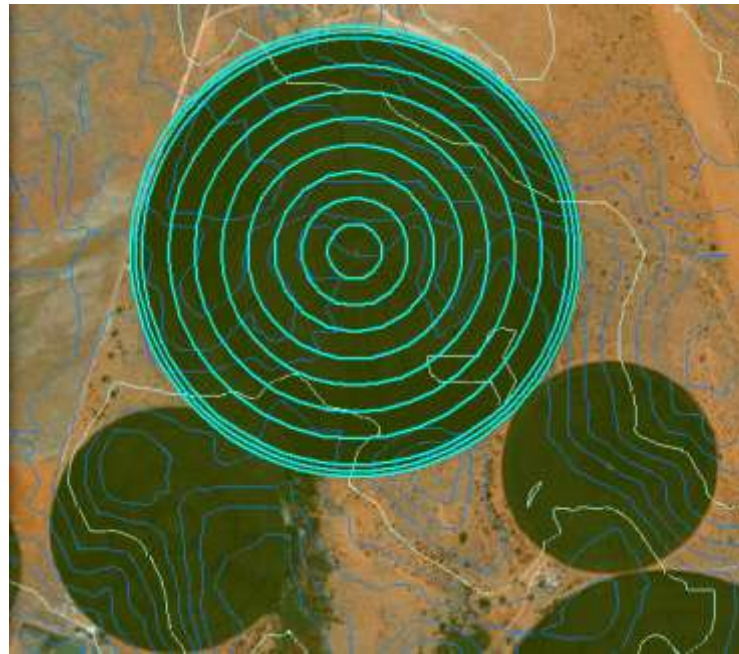


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Click the **"slope analysis"** button (1), choose slope band fill (2) set the required slope interval (3) (from flat to steep), set the required colours (4) for the degree of steepness and click OK. The whole triangle model will then be inspected and coloured based on the defined settings. The user may then visually see where there might be areas that are too steep for the pivot to operate.

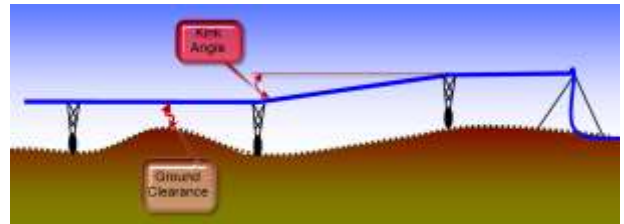
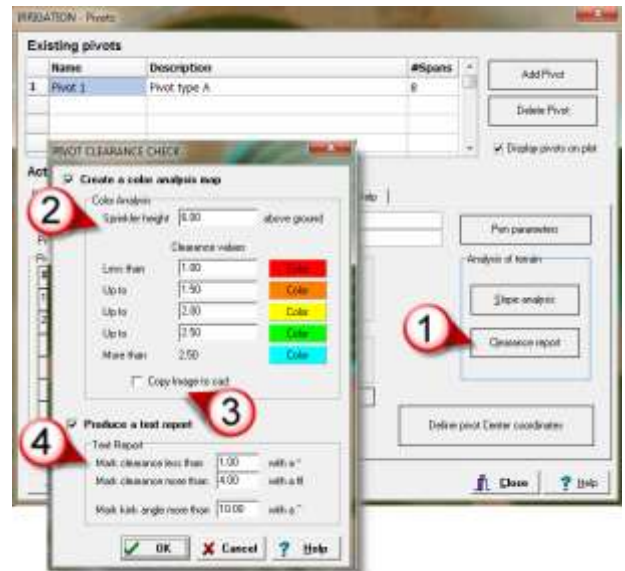
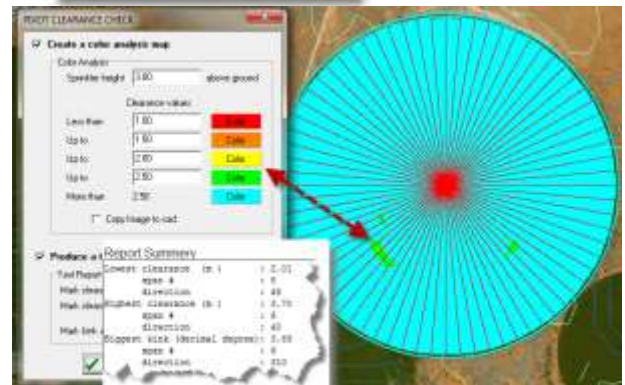
Important: To use this feature a DTM survey must be loaded into IM before you start.



Step 3: Perform a ground clearance analysis

This function will show the ground clearance and a kink angle report for each span.

Click the “**clearance report**” (1) button, enter the sprinkler height and clearance intervals above ground (2), remember to set the colours to represent the clearance intervals, select the “**Copy image to CAD**” option to add the analysis to your design and finally enter the clearance and kink angle values (4) to generate a useful report for the whole pivot at 1 degree intervals. This means that IM will report the clearance and kink information in 360 positions around the pivot centre.



Step 4: Determine the required flow

Click on (1) **Pivot operation** and enter the **Operating time** and **Efficiency** (2) of the pivot as well as the **Precipitation required** (3) and run the report. IM will calculate the pivot area, the required flow as well as the elevations of the pivot centre and the highest points on the inside and outside circles respectively.

IRRIGATION - Pivots

Existing pivots

Name	Description	#Spans
1 Pivot 1	Pivot type A	8

Active Pivot: 1

Pivot parameters | Pivot operation | Pressure and Flow | Pivot Hydraulics | Help

Operating
Hours/day: 24.0
Efficiency %: 90.00

Precipitation required: 12.00
☒ mm/day ☐ Inch/day

Operation Report

Run Report

Copy > Edit
Save > Text file

Plot Zoom Close Help

Step 5: Pressure and flow

Click on "Pressure and flow" (1) and enter the design pressure and flow values (2) for the pivot to operate. Click on **Edit** (3) to enter the pipe Hazen Williams factor, tower height, diameter and lengths that will be used. Click on "Pivot Hydraulics" (5) to calculate critical points pressures over the length of pivot pipe.

Pressures are shown for the main pipe and do not consider the drop pipes in any way.

The pivot top of pipe, starting pressure is calculated as the inlet pressure at the base less the tower height.

Critical elevation pressures calculated as:
Pressure in main pipe at the calculated distance from the pivot centre:

- less the elevation loss (for highest point)
- plus the elevation gain (for lowest point)

Tip: Use the flow from step 4 in point (2)

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Existing pivots

Name	Description	#Spans
1 Pivot 1	Pivot type A	8

Active Pivot: 1

Pivot parameters | Pivot operation | Pressure and Flow | Pivot Hydraulics | Help

Required by this pivot (designed):
Pressure: 30.00 m
Flow: 348.27 m³/s

Pipe diameters (factor):

Distance m	Diameter mm
107.40	250.00
213.20	200.00
319.00	160.00
424.80	140.00
530.60	125.00

Tower Height: 6.00
C Factor: 140

Pivot Hydraulics

Number of diameters (5 min): 5

Number	Diameter mm	Start	End
1	250.00	0.0	107.40
2	200.00	107.40	213.20
3	160.00	213.20	319.00
4	140.00	319.00	424.80
5	125.00	424.80	530.60

To calculate the end pressure of the pivot, click the Pivot Hydraulics tab.

Edit values

Plot Zoom Close Help

Pivot Name	:Pivot 1		
Pivot Description	:Pivot type A		
	Press m		Flow m3/h
Pivot Center			
Top of pipe	24.0		348.3
At tower #			
1	23.3		343.0
2	22.6		327.9
3	20.9		303.0
4	19.5		268.4
5	16.3		223.9
6	14.2		170.7
7	12.1		106.8
8	11.4		33.2

End of spans Main pipe pressure			
11.3 m			
Assuming even distribution on level surface			
and pressure regulators on outlets.			

Critical elevations in pivot area			
	Distance	Elevation	Pressure
Highest	424.8	843.8	3.7
Lowest	371.9	831.6	16.6