IrriMaker – Step by step – PART 3
In my previous article I explained the basic structure of the nodes and pipes database and how to add the different data types to the database. Today I will explain the basic steps to fill an irrigation block with the different elements needed to do an infield block design. Before we start I need to point out a few concepts to help the user understand the way IrriMaker think.

There are many types of irrigation systems in the world and IrriMaker can be applied to design a great number of them. Using IrriMaker, irrigation designs are placed in containers called blocks and each block is numbered. Block 0 (zero) is always reserved for the mainline and all other numbers are used for the typical block. In practice the term "mainline" usually refer to the pipeline that connect the source node of an irrigation system (also called the pump) with the demand nodes which are usually block vales. Mainline demand nodes can also be pivot valves, take-off hydrants or even sprinklers/emitters if you are designing a landscaping project. All other block numbers are used for groups of pipes and emitters usually containing the source node (Valve) and a manifold connecting a series of lateral pipes.

Users can start a block and manually point and click various nodes into position until the desired layout is achieved. The layout may be very basic (for example quick coupling or dragline systems which do not have manifolds and may include a single valve connected to a single lateral with sprinklers every 15 meters). Designs may be laid out artistically in any manner the designer requires, for example turf or landscaping systems with many patterns and configurations. I always say, if you can draw the layout in CAD, IrriMaker can probably design the hydraulics! For agricultural designs with lateral pipes in rows, IrriMaker make provision for automated block fill methods and this is the method I will discuss today.

When you start designing an irrigation block, there are two methods used when automatically filling a block with pipes and nodes. They are Sprinklers (Solid Set) or Drip/Micro. The following table highlight the main differences:

Sprinkler/Solid set:	**Drip/Micro:**
Emitter positions are represented by a physical emitter node	Emitter positions are simulated
Pipe sizes change on emitter positions	Pipe sizes can change at different positions
Emitter types used in a single block may vary	One emitter type per block
Emitter spacing may vary	Emitter spacing is fixed
Emitter spacing may be in grid or stagger format	Emitters are not staggered

For this feature I selected the Sprinkler design method.

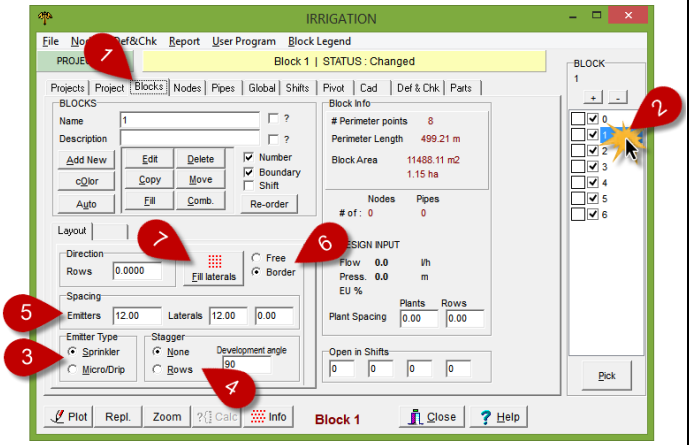
The design process:
Designing a typical block can be divided into 6 steps. In the following diagram I highlight the steps with the high level mouse clicks to follow in IrriMaker to achieve each step. I will explain each step in more depth below.

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Step 1 Define the block	Step 2 Fill Laterals	Step 3 Add valve	Step 4 Add Manifold	Step 5 Size Pipes	Step 6 Analyze Results
On Blocks page > Add New	On Blocks page > Fill Laterals	On Nodes page > Add Single	On Pipes page > Add Lines	On Global page > Design & Calculate > Size Pipes	In Design & Calculate > Results > Calc Flow > Info

Step 1 - Define the block: If you read the first article in this series you will learn about block planning and how to divide a sub area into several equally sized blocks. For this step I would like to refer you back to that article, you may download it from our website at www.mmsdesign.co.za or send me an email and I will send you the direct link to the PDF version.

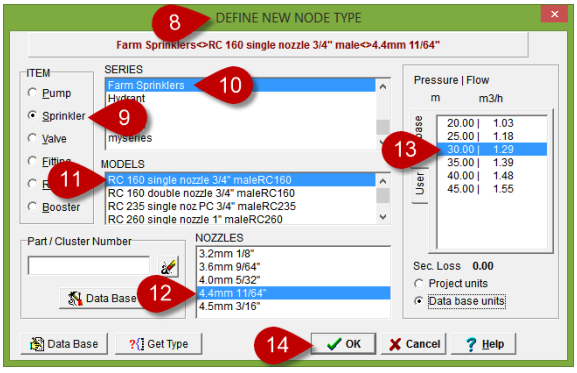
Step 2 – Fill Laterals: On the Blocks page (1), select the active block (2) that need to be filled with laterals. All nodes and pipes added in this and the subsequent steps will belong to the currently selected block *only*. Select the required emitter type (3) (Sprinkler or Micro/Drip). When the Sprinkler type is selected you can choose to have the emitters staggered or in perfect grid alignment (4). Define your required emitter and row (lateral) spacing (5). Select *Border* (6) if the first lateral must be parallel and a specified distance from an indicated block border or *Free* if you want to control the row direction and position placement manually. Click the ***Fill laterals*** button to continue to the next dialog.



Tip: In point (2) you can also use the Pick button at the bottom of the dialog to select the required block from the graphics if you do not know the block number.

Tip: Note how the title section (8) of each following dialog give you guidance. This is very useful when using IrriMaker.

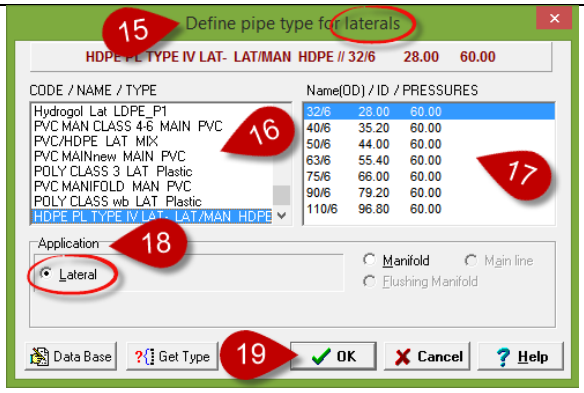
Select the node type, in this case sprinkler (9), the sprinkler series (or manufacturer) (10), the specific model (11) and nozzle (12) and lastly the design pressure (13) required at each emitter. This is a very important step as this will become the targeted design pressure for the block! Click OK (14).



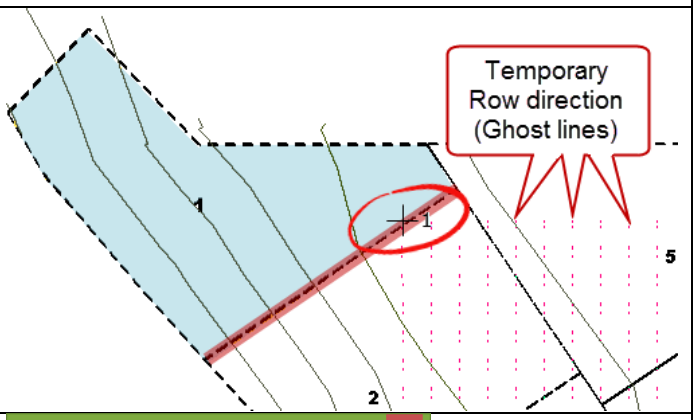
The dialog prompts us for the Lateral Pipe (15) this time. Select the appropriate pipe group that may be used for lateral pipe sizing (16) and select

any diameter (17) at this stage, because IrriMaker will size the pipes for me later, don't worry about the correct size at this stage. What is extremely important is the **Application**. This is often where mistakes come in. We are busy with the laterals at the moment so make sure *Lateral* is selected (18). Click OK (19)

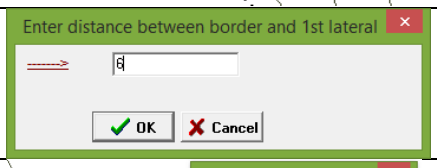
Info: Any pipe group may be selected at any stage, but the Application will define the purpose of the pipe group.



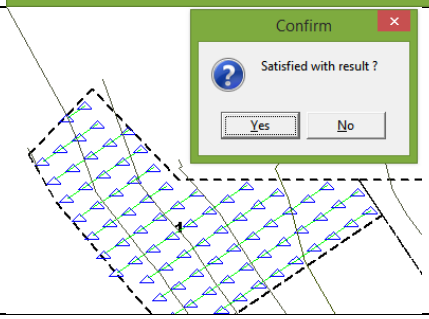
IrriMaker will now show the laterals as dotted or ghost lines on the mouse cursor. Move the cross of the mouse cursor to the block border that should be used to define the row direction and from which the position of the first lateral must be calculated. Click the block border to be used.



Enter the distance between the border and the first lateral. Click OK.



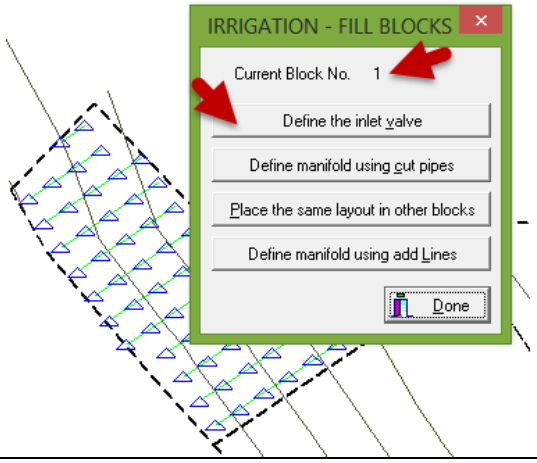
Sprinkler nodes and lateral pipes will be drawn. Click *Yes* to confirm if you are satisfied with the result.



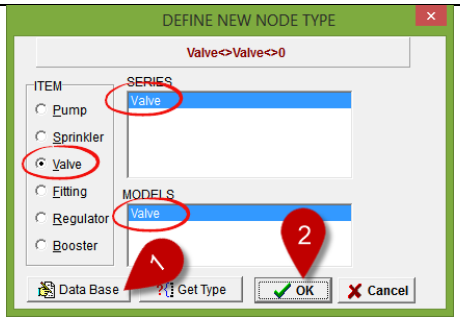
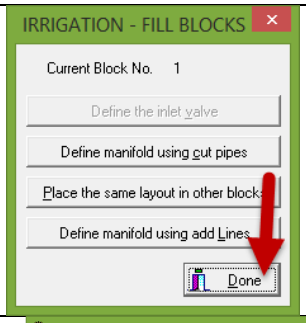
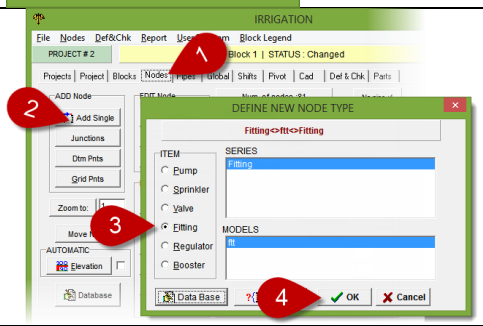
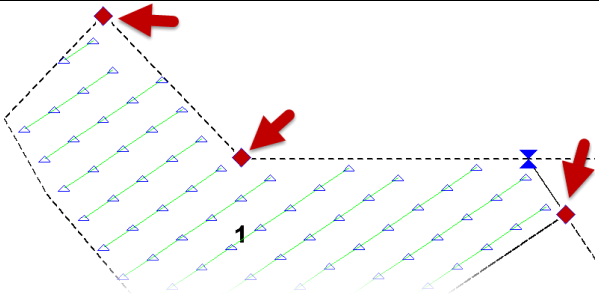
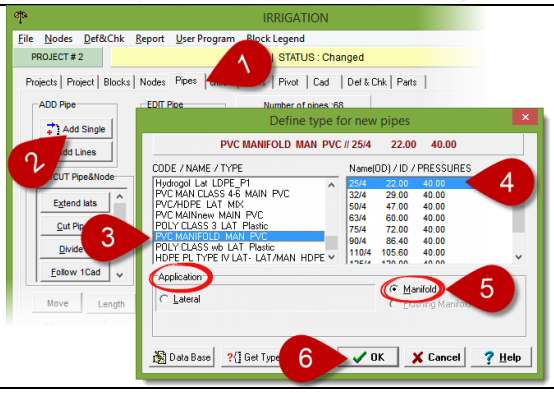
Step 3 – Add Valve: IrriMaker will display the following dialog for convenience to flow with the design process, but the designer may choose to exit the process at any stage and manually add any component in any sequence later.

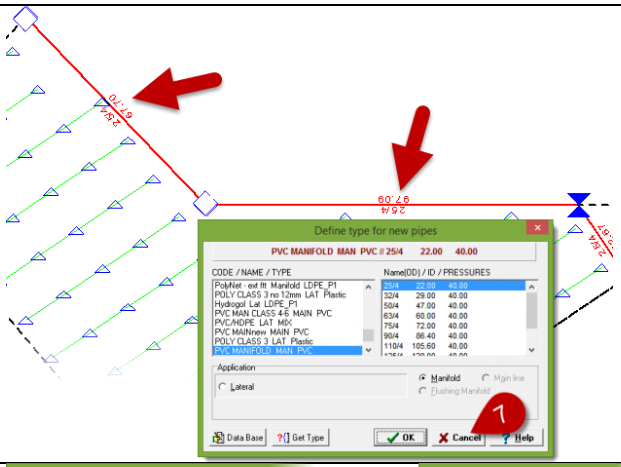
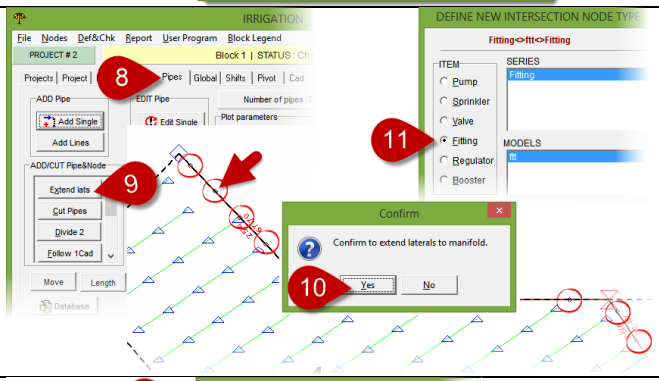
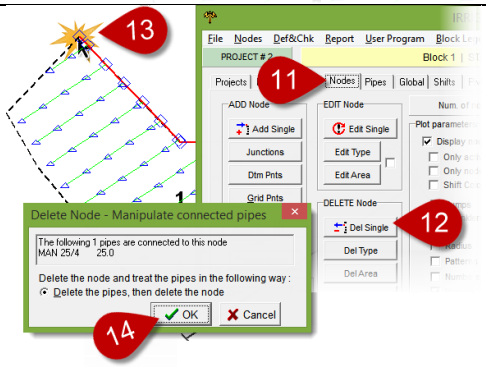
On this dialog we have a few options related to adding manifold pipes and the valve. Select the *Define inlet valve* option.

Important Tip: Notice that the current block is block 1, so we can *only* add the valve of block 1 at this time. Do not fall into the trap of adding valves for all other blocks at this stage, as this will be incorrect.



Select the required valve from the database. The valve name is not important, but IrriMaker will require some guidance form the user to select the correct diameter valve at this stage due to the fact

that secondary losses are calculated in the mainline based on the inside diameters of valves. If the required valve is not available at this stage, the database (1) may be edited and the appropriate valve with proper sizes may be added and selected as part of this process. Click OK (2) once the correct valve is selected. Place your valve in the suitable position, we recommend a high position (topography high) causing the manifold to run downhill.	
Step 4 – Add Manifold: Because of the nature of a sprinkler block not all the laterals may be the same length, especially if sprinklers are staggered, the endpoints of the laterals may not be in a straight line. To draw a nice neat manifold (placing the pipe in a straight trench) we need to deviate from the normal steps a little bit, but the effort is well worth it. So, on the next dialog, we will simply click **Done** and carry on manually from here.	
I will now place some standard fittings as bend points where the manifold will run and I do this using the *Nodes* page (1), specifically the *Add Single* button (2) were I will select a standard fitting (3) and click OK (4).	
Place the fittings where needed. Next we will add the manifold pipe and extend the laterals to the manifold as follows.	
On the *Pipes* page (1), click *Add Single* (2) select the applicable pipe group (3) and pipe size (4). As with the laterals, the pipe diameter you choose here is not so important because IrriMaker will size the pipes later. What is of the utmost importance is to select the correct **Application**. We are busy with the Manifold, so it is important to select the Manifold application (5) then click Ok (6).	

Connect the fittings with the valve and each other. Notice how I am not connecting the manifold to the laterals as yet. This will happen in the next step. When you are finished connecting pipes to the fittings, *Right Click*, then Click *Cancel (7)*.	
Use the *Pipes* (8), *Extend Lats* (9) option to extend a blank lateral pipe segment from the last sprinkler of each lateral to the closest Manifold intersection. Notice the small diamond symbol to indicate the intended intersection between the laterals and the manifolds. Click Yes (10) to confirm the intersection and select a standard fitting (11) in the following dialog to allow the laterals to intersect with the manifolds. Click OK.	
Finally we will clean up the terminal nodes that we do not need by clicking on the *Nodes* (11) page, *Del Single (12)* Click the node/s to be deleted (13) and the OK (14) to delete any unnecessary pipes as well.	

Pipe sizing and block hydraulics will be discussed in the next issue, for now you may need to practice these steps a couple of times to get it right. The key is to take it slow. Remember that you define the block, fill the laterals, add a valve then connect the manifold. Send me an email if you get stuck and I will gladly assist. I look forward to hearing from you.