CICAPP-0021 (V1.0) October 17, 2022 Circular Groups in MakeComp

Core

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Purpose

This note explains how to use the new circular groups in MakeComp rev 9.1. This version is considered experimental but components created with it can be used for real jobs.

Procedure

1) Getting Started

Open MakeComp for a new project.

For this demo, it is helpful to display the tube ID in the map. Click **PARAMETERS** and enable the following in the **Parameters** tab:

Draw Sec Labels	
Print Tube Labels	
Draw Tube Labels	
Use Full Label	

Clock Ok and the **File** | **Save**.

2) Adding a Circular Group

Click File | New Component. Right-click in the map area and click:

Row Ticks Col Ticks
Edit Group Move Group Select Group
Delete Group
Select Section Select Row
Edit Tube ID
Select Landmark Set Set Landmark Set Reset Landmark Sets
Radial Array
Add Circular Group
Cancel

This will display the **Circular Group** dialog:

🔘 Circular Grou	ıp : 0		<mark>?</mark> ×
Edit			
UPDATE			
Group	0.000	Numbering -	Row (Skip Spaces)
Center X Center Y Radius Row Pitch Sweep Angle Rotation	0.000 10.000 Auto 360.000 0.000 5	Inc Rows Clockwise Cols Offset Neg First Row First Col	
Num Col Material Sec Land Set	50 0 * 0 * 0 *	Pitch θ1 θ2 ID OD	1.000 90.000° 45.000° 0.750 0.800
]			OK Cancel

Use the on-line help (click the ? on the right of the caption) to see explanations of each button.

3) Basic Settings

Change **Num Col** to 30 and **OD** to 2.0 and click the **UPDATE** button to see the results in the main map area:





The inner ring is row 1, the next one is row 2 etc with the tubes numbered in order counter-clockwise. Note that the tube **Pitch** and angles are computed automatically and cannot be edited:

— Tube ——		
Triangular		
Pitch	1.652	
θ1	60.000°	
θ2	60.000°	
ID	0.750	
OD	1.400	

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The θ **1** and θ **2** values are set to 90° and 45° for square pitch and 60° and 60° for triangular. The **Pitch** is computed based on the **Radius** and **Num Col** values and is the straight distance between two adjacent tubes in the inner ring. The formula is:

Pitch = $2R\sin(\Delta\theta/2)$

where R is the **Radius**, and $\Delta\theta$ (in radians) is **sweep_angle / (num_col - 1)** if **sweep_angle < 360** ° and **sweep_angle / num_col** if it equals 360°.

This is very different than the linear group where the user enters all those values. But the distance between tubes is not a constant for circular groups.

4) Demo Settings

Orcular Grou	p:0		? ×
Edit			
UPDATE			
Group		Numbering	
Center X	0.000	Numbering	Row (Skip Spaces) 🔻
Center Y	0.000	Inc Rows	
Radius	10.000	Clockwise Cols	
Row Pitch	Auto	Offset Neg	
Sweep Angle	180	First Col	
Rotation	0.000		
Num Row	4	Triangular	
Num Col	20	Pitch	1.652
Material	_	θ1	90.000°
Sec	0 +	θ2	45.000°
Land Set	0 -	ID	0.750
		OD	1.4
			OK Cancel

For the rest of this demo, the following setting will be used for clarity:

The **Sweep Angle** is 180° which creates a component that has the given number of tubes in 180° instead of 360°. This will make some items in the rest of the demo more clear.

Click **UPDATE** to produce:





5) Triangular Pitch

Enable **Triangular** pitch and click **UPDATE**:



The tubes for a given column are now offset for triangular pitch.



6) Offset Second Ring

Uncheck Offset Neg and click UPDATE:



Offset Neg is used for triangular pitch to account for the two possibilities of where the second ring begins. It has no effect for square pitch.

7) Numbering Column Clockwise

Uncheck Triangular pitch and enable Clockwise Cols. Click UPDATE to produce:





8) Numbering Rows Starting from the Outer Ring

Uncheck **Inc Rows** and click **UPDATE** to produce:





9) Removing Tubes

With the same settings as above, select some tubes in the map:



Click Edit | Delete Selected Tubes in the Circular Group dialog to produce:





NOTE: Do not remove unwanted tubes until everything else is set correctly since hitting **UPDATE** will put them back.

10) Row Pitch

So far, the system has automatically computed the distance between rows:

Row Pitch	Auto	
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Entering anything other than a positive number in the **Row Pitch** box will put it in auto mode. For square groups, the row pitch is the same as the tube pitch in the **Pitch** label. For triangular pitch, the row pitch is:

$$\Delta R = Pitch \frac{\sin(\theta_1)\sin(\theta_2)}{\sin(\theta_1 + \theta_2)}$$

where in this case $\theta \mathbf{1} = \theta \mathbf{2} = 60^{\circ}$. So in this case, $\Delta R = 0.866 *$ Pitch.

If that is not correct, you can manually tell it what value to use. For example, if we set it to:

Circular Grou	p:0		<mark>?</mark> ×
Edit			
UPDATE			
Group ——		- Numbering -	
Center X	0.000	Numbering	Row (Skip Spaces) 🔻
Center Y	0.000	Inc Rows	
Radius	10.000	Clockwise Cols	
Row Pitch	2.5	Offset Neg	
Sweep Angle	180.000	FIRST ROW	
Rotation	0.000	First Col	1
Num Row	4	Tube	
Num Col	20	Ditch	1 652
Material	_		
Sec		91	90.000
Lond Cot		62	45.000
Lanu Set		ID	0.750
		OD	1.400
			OK Cancel

and click **UPDATE** we get:





where the distance between rows is 2.5 instead of the automatic value of 1.652.

11) Editing a Group

In the main window, if you right-click on a tube and select **Edit Group**, the dialog appropriate for that kind of group will display. For a circular group, the **Circular Group** dialog will be shown, for a normal linear group, the usual **Create/Edit** group dialog will appear.

Final Notes

Most of the other buttons have obvious meaning or is the same as the linear groups.

You can use the features in any combination.