Pointwise**Pointer**

Automating Small Repetitive Tasks

Have you ever found yourself doing the same tedious thing over and over when creating a grid? Ever wondered if there was a faster way? Pointwise's Glyph scripting language allows you to create scripts to perform repetitive operations that you would have to do manually otherwise. Glyph scripts also can be used to extend a command's functionality, letting you customize a Pointwise feature to perfectly suit your needs.
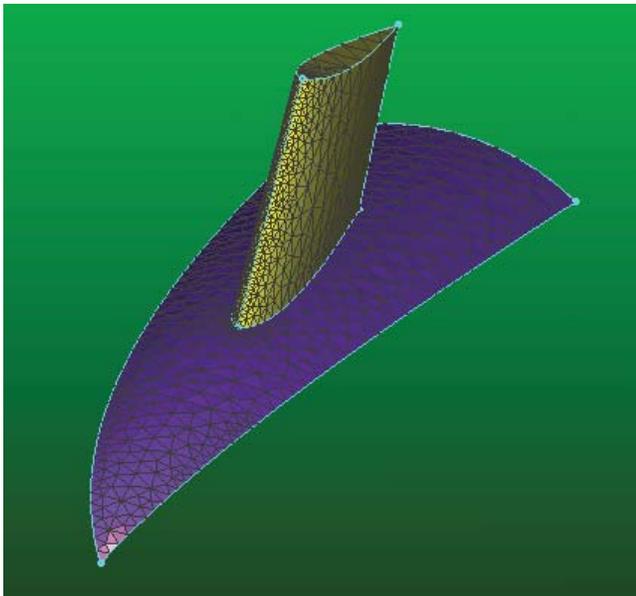
As an example, let's take a simple axisymmetric blade on a hub. A common operation for this type of grid would be to copy and paste the geometry and the grid so you have a complete 360-degree hub with six blades. You can customize Pointwise to copy and paste the geometry and grid multiple times by writing a simple parameterized script. This script then can be used to perform the same operation on other similar geometries and grids.

Startup

In your favorite text editor, open a file called ArrayCopyRotate.glf. Begin by telling Pointwise to load Glyph and its libraries:

```
package require PWI_Glyph 2
```

This command will load the latest version of the Glyph libraries present on your workstation.

Next, define the parameters that could change from case to case: the rotation axis, rotation angle, number of copies desired and create variables for them with the **set** command.

```
set RotAxis1 "0 0 0"
set RotAxis2 "1 0 0"
set RotAngle 60
set numRotCopies 5
```

The first two variables are two points on the rotation axis. The last two variables define the rotation angle as 60 degrees and the number of copies as five.

Identifying the Entities to Copy and Rotate

Assign a variable containing a list of all database and grid entities to be copied and rotated, which for this example will be all entities currently in your project. To do this, put all database entities in one variable, and all grid entities in another variable. Then, combine the contents of the two variables with the **concat** command.

```
set AllDB [pw::Database getAll]
set AllGrid [pw::Grid getAll]
set AllEnts [concat $AllDB $AllGrid]
```

Copy, Paste, and Rotate

Next, set up a control loop in which the grid and database entities are copied, pasted, and transformed iteratively until the number of rotated copies is achieved.

```
for {set i 1} { $i <= $numRotCopies} {
incr i } {
```

In the **for** control loop, the counter i increments from 1 to the value set for **numRotCopies**. **numRotCopies** is one less than

the blade count because one blade already exists.

```
set copyMode [pw::Application begin Copy
$AllEnts]
```

The copying, rotating, and pasting is done in a copy mode using **pw::Application begin Copy**. The advantage to creating a copy mode is that changes made to entities while in that mode do not affect dependent or duplicate entities until the mode is *ended*.

```
set Copies [$copyMode getEntities]
```

Copies of all entities are made and assigned to the **Copies** variable.

```
set Rotate [pwu::Transform rota-
tion -anchor $RotAxis1 $RotAxis2 [expr
$RotAngle*$i]]
```

The rotation angle is calculated next, based on the two rotation axis points (**$RotAxis1** and **$RotAxis2**) and then multiplied by the i counter. The result of the rotation angle calculation is assigned to the **Rotate** variable.

```
pw::Entity transform $Rotate $Copies
$copyMode end
}
```

The copied geometry and grid are rotated via the **pw::Entity transform** command to paste the copies (**$Copies**) based on the calculated rotation angle (**$Rotate**). When the mode is ended, Pointwise performs duplicate checking of the existing grid against the newly created entities.

Execution

Now, you have created a Glyph script that will take an existing mesh and copy and rotate it a prescribed number of times and angle about an axis that you specify.

Since this script did not clear all geometry and grid from memory initially, you will need an existing grid present in Pointwise to run the script. From the **Script** menu, the **Execute** command will open a file browser in which you can find and select your script to execute.
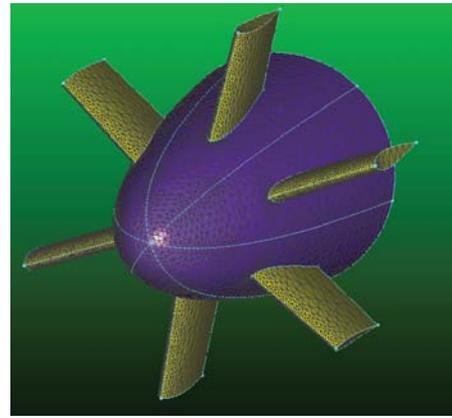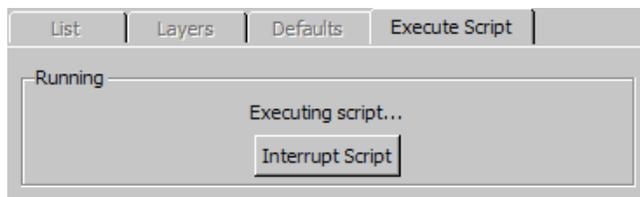
During execution, you will have the option to interrupt the script by clicking the **Interrupt Script** command. Once the script has finished running, your grid will appear updated in the Display window.

Now, you can easily change how the grid is created or apply this script to another similar case. For example, if you needed a half-symmetry grid instead of a 360-degree grid, you simply would change the **numRotCopies** parameter at the top of the script to 2. Re-running the script will give you the half-symmetry grid you need.
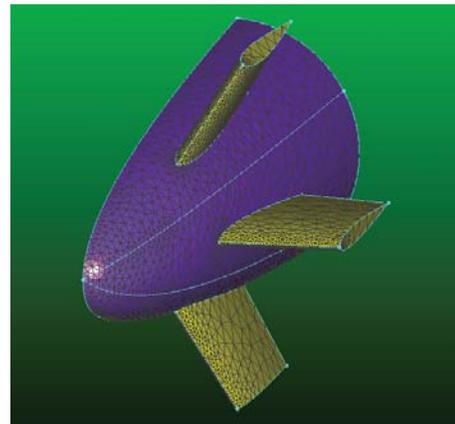
To apply the script to a different grid entirely, you would import the new mesh, update the parameters for your new case, and run the script.

For more information about the Glyph commands used in these examples and about Glyph scripting in general, check out the Glyph Reference Manual accessible through Pointwise's Help menu. To try this script, visit our Glyph Script Exchange online at www.pointwise.com/glyph/ArrayCopyRotate/. Other examples of Glyph Scripting can also be found at www.pointwise.com/glyph/.