Valve Gates
Valve Gates

- Hot runner with a gate opened and closed by a pin
- Used to control the filling
  - Sequential gating
  - No gate vestige
  - Packing control
  - Balancing
Modeling Valve Gates

- The “valve gate” is the last element in the hot drop

- Model the pin in the open position

- The flow channel is
  - Annular when the valve pin passes through the flow channel
  - Circular when the pin is not in the flow path
Modeling an Annular Hot Drop

- Select element(s)
- Set cross-section as Annular
- Enter outer and inner diameters
  - Inner diameter is the pin diameter
Modeling the Valve Gate

- Ensure all elements in the gate are hot
- Use a fine mesh to capture the flow as the valve pin moves
- Ensure only the last element is assigned a valve gate controller
Valve Gate Controls

- Create gate controllers
- Trigger
- Initial state
- Velocity
  - Constant
  - Variable speed
    - Pin stroke
    - Pin diameter
    - Velocity profile
Valve Gates Control Type – Parameter Matrix

- Several combinations of control and parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Control Type</th>
<th>Time</th>
<th>Flow Front</th>
<th>Pressure</th>
<th>% Volume</th>
<th>Ram Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial State</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Trigger Location</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Delay Time</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Valve Gates Control Type

<table>
<thead>
<tr>
<th>Control Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Time</strong></td>
<td>Specifies the time from start of injection when the valve gate state is changed. The state can change several times during the cycle.</td>
</tr>
<tr>
<td><strong>Flow Front</strong></td>
<td>Specifies the gate to open when the flow front in the cavity reaches the gate. Additional change of state times can be entered. This is used to set up sequential gating.</td>
</tr>
<tr>
<td><strong>Pressure</strong></td>
<td>Specifies the change of state based on a pressure at the gate or a specified location. Additional changes of states based on pressures can be entered.</td>
</tr>
<tr>
<td><strong>%Volume</strong></td>
<td>Specifies the change of state based on a % of part volume filled. Additional changes of states based on volume can be entered.</td>
</tr>
<tr>
<td><strong>Ram Position</strong></td>
<td>Specifies the change of state based on ram displacement. Additional changes of states based on ram displacements can be entered.</td>
</tr>
</tbody>
</table>
## Valve Gates Parameters

<table>
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<tr>
<th>Control Type</th>
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</tr>
</thead>
<tbody>
<tr>
<td><strong>Initial State - Open</strong></td>
<td>Select this option if the valve gate is initially open and the first event you will specify is the closing of the valve gate.</td>
</tr>
<tr>
<td><strong>Initial State - Closed</strong></td>
<td>Select this option if the valve gate is initially closed and the first event you will specify is the opening of the valve gate.</td>
</tr>
<tr>
<td><strong>Trigger location - Gate</strong></td>
<td>Select this option if you want the initial opening/closing of the valve gate to be triggered by an event at the gate node associated with the selected valve gate.</td>
</tr>
<tr>
<td><strong>Trigger location - Specified</strong></td>
<td>Select this option if you want the initial opening/closing of the valve gate to be triggered by an event at a specified node in the model.</td>
</tr>
<tr>
<td><strong>Node No</strong></td>
<td>Specifies the node for the Trigger location.</td>
</tr>
<tr>
<td><strong>Delay time</strong></td>
<td>Specifies that the valve gate will be opened at the required time, in seconds, after the flow front has reached the trigger location. If you do not want a delay time to apply, enter 0.</td>
</tr>
</tbody>
</table>
Practice

- Tub model
  - Design criteria: use valve gates to eliminate weld lines
- Manual runner modeling
- Simulate
  - All open
  - Instantaneous open
  - Velocity open
Runner and Gate Details
Results