DILUTION RATIO
One of the most important process variables in die casting is the dilution ratio. The dilution ratio is the ratio at which a die lubricant is diluted in water prior to being sprayed onto the die. Unfortunately, there is no one optimal dilution ratio, as this is something that must be established based on each unique application and die cast machine. Running too high of a ratio can result in solder and stuck parts, while running too low of a dilution ratio can result in excess build-up on the die; both of which will lead to down-time for maintenance. Ideally, the dilution ratio should provide just enough lubricant for an effective coating on the die within the shortest possible spray time. This allows for cost-savings on lubricant and shorter cycle times.

PROCEDURE
By following this procedure, an operator or process engineer can quickly construct a standard calibration curve and determine the dilution ratio of a sample. It must be noted that a separate standard calibration curve must be constructed for each die lubricant on a particular colorimeter; each die lubricant will show different absorbance values and results may vary across different colorimeters. For further instruction related to creating a graph, you may need to consult the manual for your specific spreadsheet software.

MATERIALS
- Handheld Colorimeter (i.e. LaMotte 1200)
- PC with spreadsheet software (i.e. Microsoft Excel)
- Laboratory Balance
- Glass Beaker (150 – 200 mL)
MONITORING DILUTION RATIO

CONSTRUCTING A STANDARD CALIBRATION CURVE

1. Determine ratio range for the chart data (i.e. a range of 50:1 to 90:1 in increments of 5 ratio points.)
2. Zero the colorimeter by placing a sample of tap water in a cuvette and place in colorimeter. Hold the “ZERO” button until instrument reads 0.00
3. Place a beaker on a scale and zero
4. Weigh 50 grams of tap water into beaker
5. Add 1 gram of die lubricant concentrate to the beaker
6. Mix solution until the concentrate is completely dispersed in the water. This is a 50:1 diluted sample
7. Place sample of diluted solution in a cuvette and place in colorimeter
8. Record the reading from the colorimeter in a table
9. Pour sample just used to measure from the colorimeter sample cuvette back into the original 50:1 diluted sample
10. Add an additional 5 grams of tap water to the 50:1 diluted sample and mix. You now have a 55:1 diluted sample
11. Repeat these steps making sure to always return the sample used to record a reading from the colorimeter before adding additional water
12. Use spreadsheet software to format this data table into a graph with a curve that displays absorbance (y-axis) as a function of ratio (x-axis.)

<table>
<thead>
<tr>
<th>RATIO</th>
<th>COLORIMETER</th>
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<tbody>
<tr>
<td>50</td>
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</tr>
<tr>
<td>55</td>
<td>1.73</td>
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<td>1.56</td>
</tr>
<tr>
<td>90</td>
<td>1.52</td>
</tr>
</tbody>
</table>
DETERMINE DILUTION RATIO OF A SAMPLE

1. Zero the colorimeter by placing a sample of tap water in a cuvette and place in colorimeter. Hold the “ZERO” button until instrument reads 0.00

2. Place sample of diluted solution in a clean, dry cuvette and place in colorimeter

3. Record the absorbance reading from the colorimeter

4. Compare this result (y-axis) against the standard calibration curve to determine the dilution ratio (x-axis.)

MONITORING DILUTION RATIO

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