#### Calculating Shrinkage of Curved Parts

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#### Agenda

- Why consider surface curvature?
- Capturing the data in Synergy
- Importing data in Excel
- Analyzing and manipulating the data
- Summary

### Why Consider Surface Curvature

- Moldflow insight is used to determine shrinkage used to cut a tool
- Examine tool calculates shrinkage between nodes
  - Assumes distance between nodes is on a surface
  - Uses deflections to calculate shrinkage



#### **Curved Surfaces**

- Examine evaluates a straight distance between nodes
  - It does not follow the contours of the part
  - In this case, there is an air gap between nodes
  - Calculated shrinkage is not correct



Roady

#### Use Examine Tool on Curved Surface



# Capturing the Data in Synergy

Need to collect shrinkage values at multiple locations on curved surface

- Examine compares two nodes to determine shrinkage
- Multiple pairs are collected for curved surfaces
- Use a path plot to capture node pairs
  - Can be any path plot
  - Typically a deflection plot is used

#### Collecting Shrinkage Data in Synergy



### Importing Data in Excel

- A spreadsheet is used to analyze the data
- Examine tool exports all values for all nodes queried
- Shrinkage Percent is used for this problem

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#### Importing Data into the Spreadsheet



# Analyzing and Manipulating the Data

- Once in Excel any statistical analysis tools can be used
  - Min
  - Max
  - Average
  - Standard Deviation
  - Median
  - Mode
  - Histogram
  - Scatter plot
  - Etc.
- Outlaying data can be removed



### Analyzing and Modifying the Data in the Spreadsheet



## Comparison of Examine vs Multiple Points

- Use of 1 pair of points will not work for curved parts
- Use multiple pairs of points on the surface to determine shrinkage between points across an open area



E Logs Thermoplastics Injection Molding

# Summary

- Examine tool does not have correct results for shrinkage between nodes with no part between the nodes
- Use
  - Path plot to identify multiple pairs of nodes on the part
  - Use Examine tool to create shrinkage data
  - Export Examine data
  - Import data into a spreadsheet
  - Use analysis tools in the spreadsheet to analyze data



Location 1: 2.826[mm]

# **Applying In Practice**



George Thompson – Lacks Trim Systems

- Is happy!
- Not because he is making beer
- George is happy because,
  - "The shrinkage values I get with this technique, match the shrinkage factors used to cut the tool, when CRIMS is used. I have tested most of the materials we mold."



#### **QUESTIONS?**



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