Autodesk® Moldflow® Insight 2012

AMI Runner Balance Analysis Results

Autodesk®

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Runner Balance analysis results

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This topic explains the results generated for a Runner balance analysis on a thermoplastic material.

When you launch a Runner balance analysis, a new study is automatically created in the **Project View** pane. On completion of the Runner balance analysis, the results, including the balanced dimensions and a completed fill analysis, are associated with the newly created study.

Text based results

The following table lists the text results generated for a Runner Balance analysis.

Results
Runner balance analysis log on page 2
Results Summary
Analysis Check

Graphical results

The following table lists the graphical results that are created by a runner balance analysis and indicates whether each result is supported for the following analysis technologies:

- Midplane
- Dual Domain

For more information about a result, click on the result name.

Result	Available for analysis type
Volume change result on page 3	

Runner balance analysis log 2

The analysis log is a text report lists the analysis progress table, showing the iterations required to find a solution, where each iteration is a full Fill+Pack analysis.

The analysis log is generated by the Runner Balance analysis.

Using the Runner balance analysis log

The Runner balance analysis log begins with a list of the inputs that were set for the analysis, including the specified balance target pressure and mill tolerance.

The progress table beneath shows the Time, Pressure and Section Imbalance at each iteration during the analysis. Decreasing imbalance values indicate that the analysis is converging on a solution.

The runner balance is finished if the maximum iteration limit is reached, or if the time and pressure tolerance are met (as in the example below).

```
Balance Target Pressure        80.0000 MPa
Mill Tolerance                 0.0100 mm
Maximum Iteration Limit        20
Time Convergence Tolerance     5.0000 %
Pressure Convergence Tolerance 5.0000 MPa
Section Convergence Tolerance  0.7000

Iteration  Time Imbalance(%) Pressure Imbalance(MPa) Section
Imbalance
    0          22.4300             20.2100             3.9298
    1          48.5931             20.0000             0.9349
    2           0.1362             10.3760             1.3943
    3           0.1678              8.9830             1.1546
    4           0.1717              7.3230             0.9301
    5           2.3313              6.9010             0.8146
    6           2.6832              6.1550             0.6821
    7           3.5416              7.1310             0.5641
    8           3.4302              7.8440             0.2515
    9           2.5674              4.5630             0.4277
Ideal Balance Complete: Allowing for mill tolerance and pressure
 control
    10          2.5674              4.5630             0.4277
```

Volume change result 3

The Volume change result shows the change in runner volume from the original design to the optimized design.

The runner volume change is displayed as a percentage of the original runner volume.

Using this result

The main purpose of the Runner balance analysis is to minimize the size of the runners, while ensuring that the fill pattern is balanced and the packing pressure is uniform. This will minimize the runner volume and, therefore, the amount of material required to make each part.

The Runner balance analysis should indicate a negative change in shrinkage (%), which means the runner has gotten smaller.

Things to look for

Review the Fill time, Pressure, Pressure at injection location, and Pressure at end of fill results to confirm the following for your optimized part design:

- Ensure runners are balanced and the part will fill evenly.
- Ensure packing is uniform.
- Maintain an acceptable pressure magnitude.

Runner balancing—troubleshooting 4

The results of runner balancing can be flawed for several reasons. Listed here are some common error messages and their recommended solutions.

The initial runner system resulted in a short shot

Explanation It is impossible to fill the entire cavity or cavities under the constraints set that you have selected.

Solution It is a good practice to start your analysis with runners that are large enough to fill all the cavities. To do so, relax some of the constraints on your runners.

There were problems with the automatic runner balancing

Explanation The optimization algorithm sometimes fails to converge on the best value within the fixed number of iterations.

Solutions

- Balance the runners again, using the results of the previous balancing attempt as the starting values.
- Start the runner balancing with better initial dimensions.
- Fix some of the runner dimensions to reduce the optimization problem.

Cannot complete runner balance. Balancing is limited by:

Explanation The criterion function does not take into account other factors, such as cooling time or packing problems.

Solution Apply constraints on the runner dimensions for the balancing algorithm to use.

There is a runner that is thicker than the sprue or a feeding runner that has a smaller cross-section than the runners it feeds

Explanation The criterion function applies solutions to individual runner sections.

Solution The design probably provides a better answer to the criterion functions, resulting in a smaller overall volume of runners, a low imbalance of filling, and a limited shear rate, but you may

want to add a constraint on some runners before balancing the runners. See *runner sections* for more information.

Setting the target balancing pressure

There is no exact value of "balanced pressure" that you can set. The program can change the balanced pressure value to provide better cavity balancing, smaller volume of runners, lower shear heating, or other desirable molding characteristics. You can set a target pressure for the software to seek; however, in most cases, the pressure obtained will be in a range that the software sets proportional to the injection pressure.