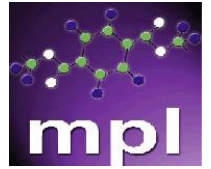

Autodesk®

www.autodesk.com



Material Testing Report

MAT4408

ISOFIL HK 10 TVHM

Prepared for:

Sirmax spa

via dell'artigianato, 42

Cittadella, 35010

Italy

Prepared by:

Autodesk Moldflow Plastics Labs

259-261 Colchester Road

Kilsyth, Victoria 3137

Australia

Prepared on:

19 May, 2009

Report Authorized By:

Juliah Lai

19 May, 2009

© Autodesk 2009. This report may not be reproduced.

Test results relate only to the item tested. Autodesk disclaims all warranties express or implied, including warranties of merchantability and fitness for a particular purpose. Autodesk expressly disclaims all incidental and consequential damages that may arise from the use of this information.

Contents

Summary	4
Viscosity	9
Thermal conductivity	15
Specific heat	17
Pressure-Volume-Temperature	19
Shrinkage	22
Mechanical	28
Elastic modulus and Poissons ratio	28
Shear modulus	29
Coefficient of linear thermal expansion	30
Mold verification	31
Contact details	35

Summary

Description

Family name	POLYPROPYLENES (PP)
Trade name	ISOFIL HK 10 TVHM
Manufacturer	Sirmax SpA
Family abbreviation	PP
Material structure	Crystalline
Data source	Autodesk Moldflow Plastics Labs: pvT-Measured: mech-Measured
Date last modified	19-MAY-09
Date tested	19-MAY-09
Data status	Non-Confidential
Material ID	22699
Grade code	MAT4408
Supplier code	SIRMAX
Fibers/fillers	10% Talc Filled

Recommended Processing

Mold surface temperature	35	°C
Melt temperature	228	°C

Mold temperature range (recommended)		
Minimum	20	°C
Maximum	50	°C

Melt temperature range (recommended)		
Minimum	210	°C
Maximum	245	°C

Absolute maximum melt temperature	285	°C
-----------------------------------	-----	----

Ejection temperature	120	°C
----------------------	-----	----

Maximum shear stress	0.25	MPa
Maximum shear rate	100000	1/s

Maximum shear stress and maximum shear rate values have been supplemented with generic estimates.

Rheological Properties

Cross WLF Viscosity Model		
n	0.2895	
Tau	37623.5	Pa
D1	2.17218e+014	Pa-s
D2	263.15	K
D3	0	K/Pa
A1	32.463	
A2	51.600	K

Juncture loss method coefficients		
C1	1.0e-005	Pa ^(1-c2)
C2	2.15	

Transition temperature		
Ttrans	127	°C

Moldflow Viscosity Index	VI(240)65	
--------------------------	-----------	--

Melt mass-flow rate (MFR)		
Temperature	230	°C
Load	2.16	Kg
Measured MFR	20.0	g/10min

Thermal Properties

Specific heat data		
Temperature (T) °C	Specific heat (Cp) J/Kg-°C	Heating/Cooling rate °C/s
245	2971.0	-0.33
190	2822.0	-0.33
135	2638.0	-0.33
129	3167.0	-0.33
128	4162.0	-0.33
127	6910.0	-0.33
124	20259.0	-0.33
122	12978.0	-0.33
119	5352.0	-0.33
115	3218.0	-0.33
108	2738.0	-0.33
70	2167.0	-0.33
32	1835.0	-0.33

Thermal conductivity data		
Temperature (T) °C	Thermal conductivity (k) W/m-°C	Heating/Cooling rate °C/s
254.2	0.207	0.0
236	0.207	0.0
217.4	0.200	0.0
180	0.205	0.0
161.6	0.210	0.0
144.1	0.270	0.0
124.3	0.275	0.0
105.1	0.280	0.0
86	0.285	0.0
66.9	0.285	0.0
47.8	0.293	0.0
26.8	0.292	0.0

PVT Properties

Melt density	0.7867	g/cm ³
Solid density	0.9705	g/cm ³

2-domain Tait PVT model coefficients

b5	437.15	K
b6	8.351e-008	K/Pa
b1m	0.001213	m ³ /Kg
b2m	9.106e-007	m ³ /Kg-K
b3m	9.76779e+007	Pa
b4m	0.005362	1/K
b1s	0.001086	m ³ /Kg
b2s	3.966e-007	m ³ /Kg-K
b3s	2.43066e+008	Pa
b4s	0.004818	1/K
b7	0.000127	m ³ /Kg
b8	0.08836	1/K
b9	1.178e-008	1/Pa

Mechanical Properties

Mechanical properties data

Elastic modulus, 1 st principal direction [E1]	2726.50	MPa
Elastic modulus, 2 nd principal direction [E2]	2607.88	MPa
Poissons ratio [v12]	0.3880	
Poissons ratio [v23]	0.4280	
Shear modulus [G12]	838	MPa

Transversely isotropic coefficient of thermal expansion [CTE] data

Alpha1	7.750e-005	1/°C
Alpha2	7.910e-005	1/°C

Shrinkage Properties

Corrected residual in-mold stress (CRIMS) model coefficients	
A1	0.993257
A2	0.161013
A3	0.005092
A4	1.542354
A5	-0.5000
A6	0.006903

Residual strain model coefficients		
	Parallel	Perpendicular
A1	0.13406	0.2296
A2	-0.006404	-0.003457
A3	-0.000596	-0.000359
A4	1.8368e-007	6.7598e-007
A5	0.014753	0.011004

These shrinkage models are valid for Autodesk Moldflow Plastics Insight 2010. Shrinkage models for previous software versions are available upon request.

Filler Properties

Filler data	
Description	Weight %
Talc	10

Viscosity

Method:

MPL Viscosity Test Method (QOP-14-M)

Instrument:

Arburg Allrounder 270S Injection Molding Machine

Test Specifications:

Sample Form:	Granules
Pre-Processing:	Dried at 70°C for 1 hours in a hopper dryer
Capillary A: Length:	32.0097 mm
L/D:	16.00485
Die Entry Angle:	90 degrees
Capillary B: Length:	7.9688 mm
L/D:	3.9844
Die Entry Angle:	90 degrees
Barrel Diameter:	30 mm
Plastication Time:	20 sec
Dwell Time:	20 sec
Corrections:	Bagley, Rabinowitsch and shear heating
Date Tested:	07-MAY-09

Operator's Notes:

Testing was performed per standard testing procedures.
No anomalies were noted during the course of testing.

Apparent Viscosity Data

Temperature (°C)	Apparent Shear Rate (sec ⁻¹)	Apparent Viscosity (Pa-s)	Die Diameter (mm)	Die L/D
191.8	248	302.36	2	16
191.8	363	233.78	2	16
191.8	814	138.56	2	16
191.9	1369	97.97	2	16
192.1	2609	63.13	2	16
192.8	6431	34.67	2	16
193.2	12641	21.85	2	16
193.3	25287	14.28	2	16
193.3	63351	9.39	2	16
221.1	250	216.01	2	16
221.1	363	172.92	2	16
221.3	814	105.19	2	16
221.4	1369	75.3	2	16
221.6	2609	49.33	2	16
221.9	6430	27.33	2	16
222.1	62980	6.02	2	16
222.2	12632	17.63	2	16
222.2	25290	10.76	2	16
250.3	250	165.18	2	16
250.6	1369	61.8	2	16
250.7	363	135.38	2	16
250.7	814	85.19	2	16
250.8	2608	41.11	2	16
251.1	6431	22.96	2	16
251.1	63050	5.01	2	16
251.4	25284	9.36	2	16
251.5	12617	14.8	2	16
280.2	250	121.99	2	16
280.4	363	101.98	2	16
280.4	814	67.47	2	16
280.7	1367	50.04	2	16
280.7	63033	4.38	2	16
281.2	2609	33.55	2	16
281.4	6430	19.14	2	16
281.4	25264	8.08	2	16
281.5	12637	12.4	2	16
190.3	363	250.55	2	3.98
190.4	248	300.48	2	3.98
190.5	814	163.88	2	3.98
191	1369	122.86	2	3.98
191.5	63351	15.02	2	3.98
191.6	2609	86.53	2	3.98
192.1	25287	24.83	2	3.98
192.4	6431	53.59	2	3.98
192.5	12641	36.44	2	3.98
221.7	250	198.38	2	3.98
221.8	363	169.97	2	3.98
222	814	116.22	2	3.98
222.3	1369	88.79	2	3.98
222.3	2609	62.84	2	3.98
222.6	62980	11.37	2	3.98

Temperature (°C)	Apparent Shear Rate (sec ⁻¹)	Apparent Viscosity (Pa-s)	Die Diameter (mm)	Die L/D
223	25290	18.7	2	3.98
223.1	6430	39.59	2	3.98
223.5	12632	28.38	2	3.98
253.2	250	141.55	2	3.98
253.2	363	122.77	2	3.98
253.3	814	87.53	2	3.98
253.5	1369	67.94	2	3.98
254	2608	48.87	2	3.98
254.1	63050	9.14	2	3.98
254.2	6431	30.55	2	3.98
254.3	12617	21.89	2	3.98
254.3	25284	15.39	2	3.98
285	250	93.28	2	3.98
285.2	363	82.82	2	3.98
285.2	1367	50.2	2	3.98
285.3	2609	37.33	2	3.98
285.3	63033	7.62	2	3.98
285.4	814	62.62	2	3.98
285.5	25264	12.21	2	3.98
285.6	6430	23.75	2	3.98
285.7	12637	16.84	2	3.98

Calculated Viscosity Data

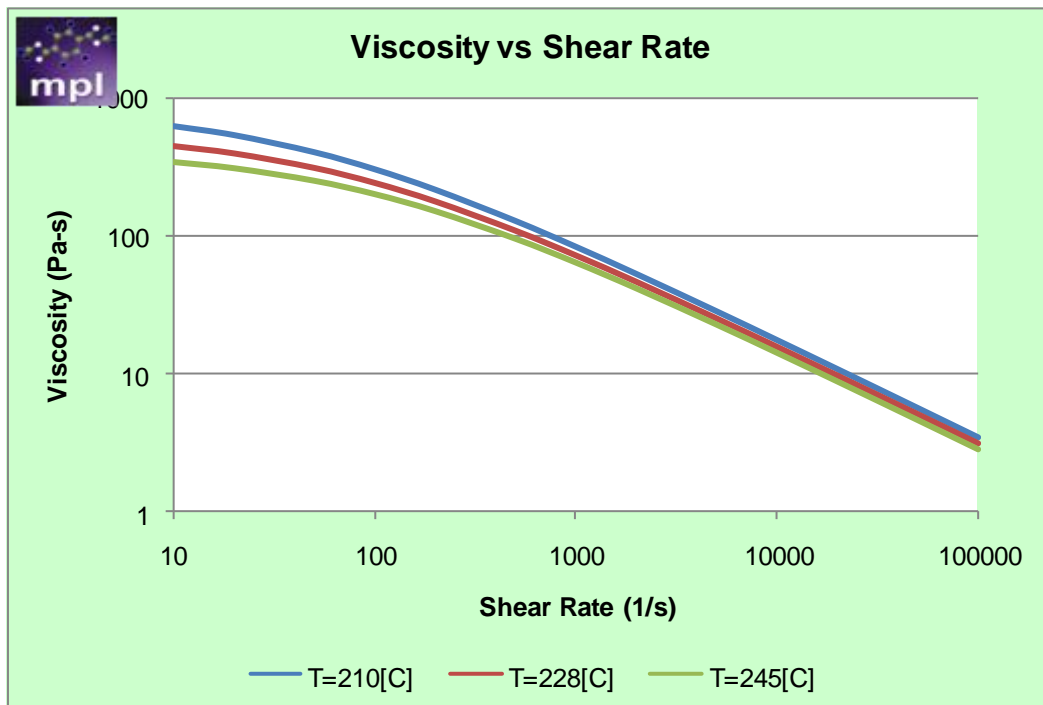
Temperature (°C)	Shear Rate (sec ⁻¹)	Calculated Viscosity (Pa-s)
190.3	363	186.96
190.4	248	234.62
190.5	814	111.97
191	1369	79.11
191.5	63351	5.48
191.6	2609	50.91
191.8	363	184.11
191.8	248	231.07
191.8	814	110.65
191.9	1369	78.49
192.1	25287	10.43
192.1	2609	50.7
192.4	6431	27.15
192.5	12641	16.93
192.8	6431	27.07
193.2	12641	16.83
193.3	25287	10.33
193.3	63351	5.4
221.1	250	169.59
221.1	363	138.55
221.3	814	85.96
221.4	1369	61.91
221.6	2609	40.53
221.7	250	168.58
221.8	363	137.66
221.9	6430	21.97
222	814	85.47
222.1	62980	4.46
222.2	25290	8.47
222.2	12632	13.75
222.3	2609	40.33
222.3	1369	61.5
222.6	62980	4.45
223	25290	8.43
223.1	6430	21.8
223.5	12632	13.64
250.3	250	128.22
250.6	1369	50.41
250.7	814	68.7
250.7	363	106.59
250.8	2608	33.53
251.1	6431	18.42
251.1	63050	3.79
251.4	25284	7.18
251.5	12617	11.61
253.2	250	124.86
253.2	363	104.36
253.3	814	67.43
253.5	1369	49.45
254	2608	32.89
254.1	63050	3.73

Temperature (°C)	Shear Rate (sec ⁻¹)	Calculated Viscosity (Pa-s)
254.2	6431	18.11
254.3	25284	7.07
254.3	12617	11.44
280.2	250	98.48
280.4	814	55.96
280.4	363	83.68
280.7	1367	41.75
280.7	63033	3.3
281.2	2609	28.18
281.4	6430	15.75
281.4	25264	6.22
281.5	12637	10
285	250	94.58
285.2	1367	40.65
285.2	363	80.62
285.3	63033	3.24
285.3	2609	27.57
285.4	814	54.15
285.5	25264	6.11
285.6	6430	15.43
285.7	12637	9.81

Rheological Data

Cross WLF Viscosity Model		
n	0.2895	
Tau	37623.5	Pa
D1	2.17218e+014	Pa-s
D2	263.15	K
D3	0	K/Pa
A1	32.463	
A2	51.600	K

Juncture loss method coefficients		
C1	1.0e-005	Pa ^(1-c2)
C2	2.15	



Thermal conductivity

Method:

ASTM D 5930, Standard Test Method for Thermal Conductivity of Plastics by Means of a Transient Line-Source Technique.

Instrument:

Moldflow K-System II

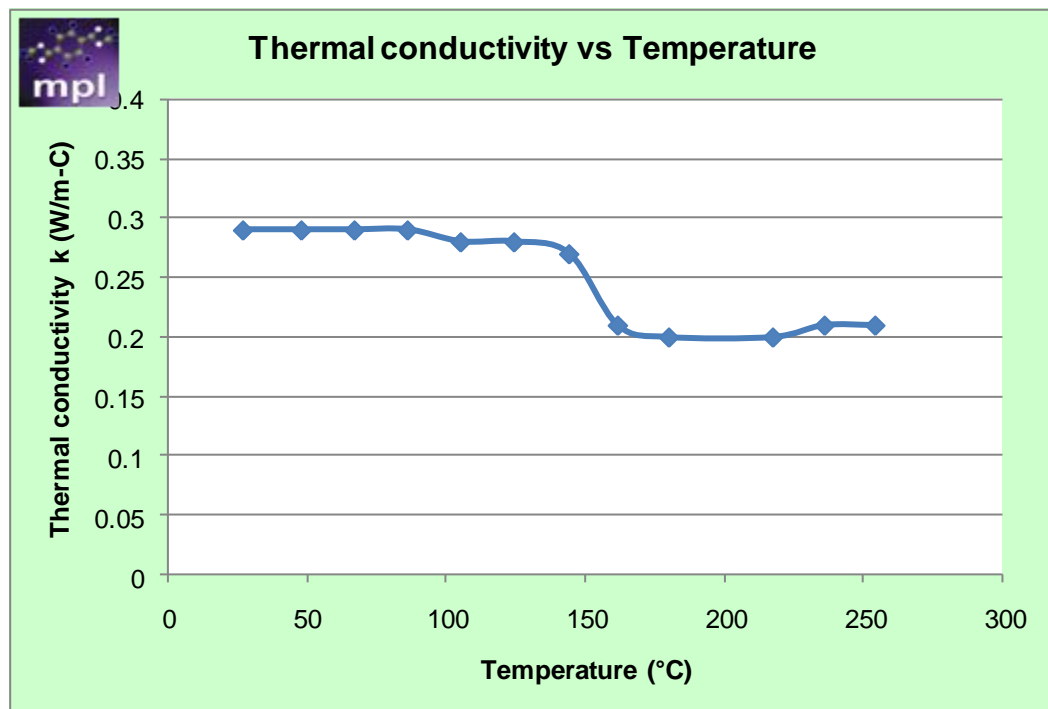
Test Specifications:

Sample Form:	Granules
Pre-Processing:	Dried at 70°C for 1 hours in a hopper dryer
Probe Constant:	0.804
Probe Length:	50 mm
Data acquisition time:	45 sec
Probe Voltage:	4.0 V
Date Tested:	07-MAY-09

Operator's Notes:

Testing was performed per standard testing procedures.
No anomalies were noted during the course of testing.

Thermal conductivity data		
Temperature (T) °C	Thermal conductivity (k) W/m-°C	Heating/Cooling rate °C/s
254.2	0.207	0.0
236	0.207	0.0
217.4	0.200	0.0
180	0.205	0.0
161.6	0.210	0.0
144.1	0.270	0.0
124.3	0.275	0.0
105.1	0.280	0.0
86	0.285	0.0
66.9	0.285	0.0
47.8	0.293	0.0
26.8	0.292	0.0



Specific heat

Method:

ASTM E 1269, Standard Test Method for Determining Specific Heat Capacity by Differential Scanning Calorimetry

ASTM D 3418, Standard Test Method for Transition Temperatures and Enthalpies of Fusion and Crystallization of Polymers by Differential Scanning Calorimetry

Instrument:

Perkin Elmer Pyris Diamond Differential Scanning Calorimeter

Test Specifications:

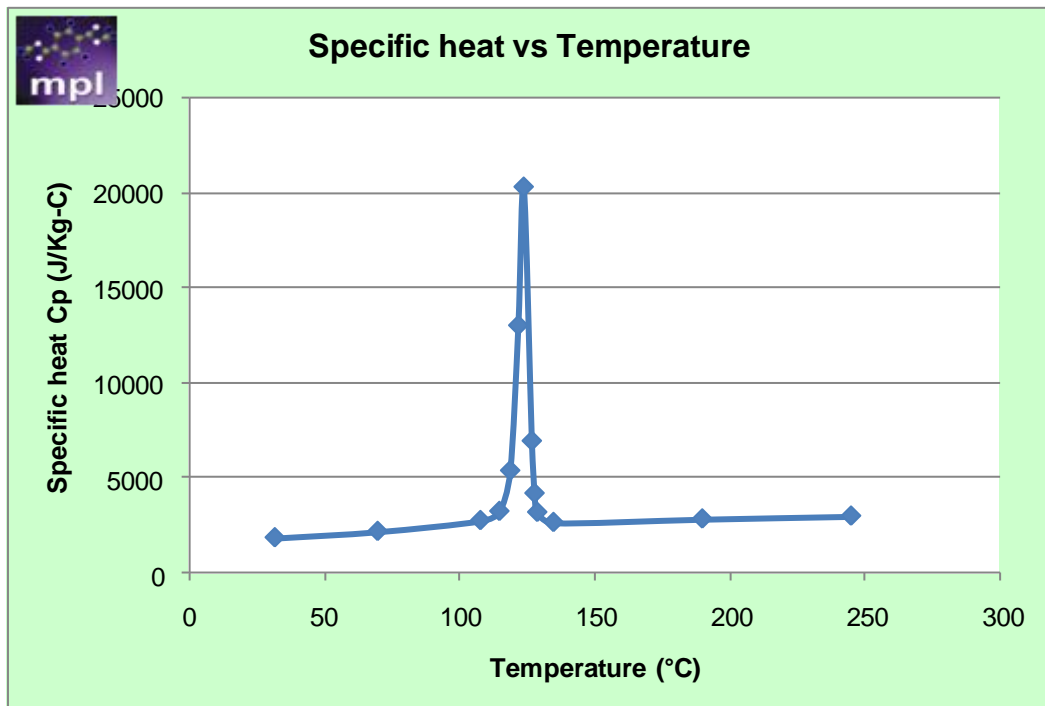
Sample Form:	Granules
Pre-Processing:	Dried at 70°C for 1 hours in a hopper dryer
Initial Temperature:	245°C
Final Temperature:	50°C
Cooling Rate:	20°C/min
Equilibrium Time:	2 min
Sample holder material:	Aluminium
Sample holder dimensions:	6.7 mm diameter, 1.6 mm tall
Sample holder mass:	25 mg (pan + lid)
Purge gas:	99.99% pure nitrogen
Purge gas flow rate:	30 cm ³ /sec
Date Tested:	07-MAY-09

Operator's Notes:

Testing was performed per standard testing procedures.
No anomalies were noted during the course of testing.

Specific heat data		
Temperature (T) °C	Specific heat (Cp) J/Kg-°C	Heating/Cooling rate °C/s
245	2971.0	-0.33
190	2822.0	-0.33
135	2638.0	-0.33
129	3167.0	-0.33
128	4162.0	-0.33
127	6910.0	-0.33
124	20259.0	-0.33
122	12978.0	-0.33
119	5352.0	-0.33
115	3218.0	-0.33
108	2738.0	-0.33
70	2167.0	-0.33
32	1835.0	-0.33

Ttrans	127	°C
Ejection temperature	120	°C



Pressure-Volume-Temperature

Method:

High Pressure Indirect Dilatometry

Instrument:

Gnomix pVT Apparatus

Test Specifications:

Sample Form:	Molded Plaque
Pre-Processing:	Not required
Scan type:	Isothermal Cooling
Date Tested:	14-MAY-09

Operator's Notes:

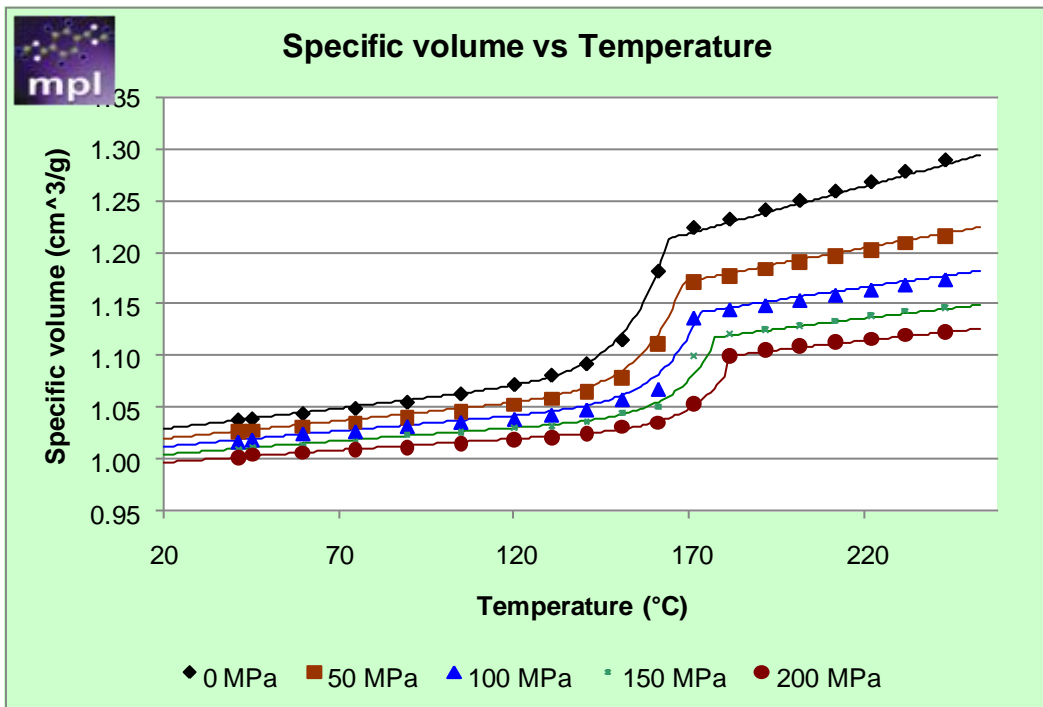
Testing was performed per standard testing procedures.
No anomalies were noted during the course of testing.

pvT Experimental Data

Temperature (°C)	Pressure (MPa)				
	0 MPa	50 MPa	100 MPa	150 MPa	200 MPa
41.1	1.0380	1.0270	1.0170	1.0090	1.0020
45.1	1.0390	1.0280	1.0190	1.0120	1.0050
59.6	1.0440	1.0320	1.0250	1.0140	1.0070
74.6	1.0490	1.0360	1.0270	1.0170	1.0100
89.4	1.0550	1.0410	1.0320	1.0240	1.0120
104.7	1.0630	1.0470	1.0360	1.0270	1.0160
120.	1.0720	1.0530	1.0390	1.0310	1.0200
130.6	1.0810	1.0590	1.0430	1.0320	1.0220
140.6	1.0920	1.0650	1.0480	1.0370	1.0250
150.8	1.1150	1.0790	1.0580	1.0450	1.0320
161.1	1.1810	1.1110	1.0680	1.0510	1.0360
171.2	1.2230	1.1710	1.1370	1.1000	1.0540
181.5	1.2310	1.1770	1.1450	1.1210	1.1000
191.7	1.2400	1.1830	1.1490	1.1260	1.1060
201.5	1.2490	1.1900	1.1540	1.1290	1.1100
211.7	1.2580	1.1960	1.1590	1.1340	1.1140
221.9	1.2670	1.2020	1.1640	1.1390	1.1170
231.6	1.2770	1.2080	1.1690	1.1440	1.1210
243.1	1.2880	1.2150	1.1740	1.1470	1.1240

Melt density	0.7867	g/cm ³
Solid density	0.9705	g/cm ³

2-domain Tait PVT model coefficients		
b5	437.15	K
b6	8.351e-008	K/Pa
b1m	0.001213	m ³ /Kg
b2m	9.106e-007	m ³ /Kg-K
b3m	9.76779e+007	Pa
b4m	0.005362	1/K
b1s	0.001086	m ³ /Kg
b2s	3.966e-007	m ³ /Kg-K
b3s	2.43066e+008	Pa
b4s	0.004818	1/K
b7	0.000127	m ³ /Kg
b8	0.08836	1/K
b9	1.178e-008	1/Pa



Shrinkage

Method:

MPL Shrinkage Test Method (QOP-17-M)

Instrument:

Battenfeld BK-T 1500/400 Injection molding machine
 Test mold inscribed with a fine grid pattern
 Thermoline TRH 460 Temperature-Humidity Cabinet
 OGP Smartscope Flash 400 metrology system

Test Specifications:

Sample Form:	Granules
Pre-Processing:	Dried at 70°C for 1 hours in a hopper dryer
Moisture Level:	0.0027 %
Date Molded:	12-MAY-09
Post-Processing:	Conditioned at 23°C / 50% relative humidity for 7 days
Date Measured:	19-MAY-09
Shrinkage Data Correlated With:	Autodesk Moldflow Plastics Insight 2010
Default Model:	Residual Stress (CRIMS)

Operator's Notes:

Testing was performed per standard testing procedures.
 No anomalies were noted during the course of testing.
 Shrinkage measurements have been corrected to account for mold thermal expansion.
 Data for some process conditions may have been removed in the determination of the favored model.

Shrinkage Experimental Data

Process Condition	Melt Temperature (°C)	Mold Temperature (°C)	Flow Rate (cc/sec)	Part Thickness (mm)	Packing Pressure (MPa)	Packing Time (sec)	Cooling Time (sec)
1	225.5	38.3	35.1	2	33.5	25.1	15
2	224.5	38.0	34.2	2	58.8	25.1	15
3	225.4	38.0	33.3	2	85.3	25.1	15
4	225.2	38.0	19.4	2	59.0	25.1	15
5	224.6	37.8	50.6	2	58.8	25.1	15
6	209.8	37.6	33.3	2	34.5	25.1	15
7	209.3	37.6	34.2	2	59.6	25.1	15
8	210.3	37.6	33.3	2	86.0	25.1	15
9	210.1	37.7	19.2	2	59.7	25.1	15
10	209.9	37.9	48.6	2	59.3	25.1	15
11	243.4	38.0	34.2	2	33.8	25.1	15
12	243.9	38.1	33.3	2	58.8	25.1	15
13	244.9	38.0	33.3	2	84.7	25.1	15
14	244.6	38.0	19.8	2	58.4	25.1	15
15	244.3	38.1	48.6	2	58.4	25.1	15
16	226.2	39.7	14.8	1.1	44.7	15.1	10
17	225.9	39.9	14.2	1.1	65.7	15.1	10
18	226.4	39.9	15.4	1.1	86.2	15.1	10
19	226.5	39.8	10.1	1.1	65.6	15.1	10
20	226.2	39.8	23.2	1.1	65.8	15.1	10
21	223.8	38.5	38.7	3	34.2	45.1	15
22	224.0	38.3	37.9	3	59.8	45.1	15
23	225.0	38.5	37.2	3	86.3	45.1	15
24	224.6	38.5	21.3	3	59.5	45.1	15
25	224.5	38.6	54.2	3	59.5	45.1	15

Part Shrinkage

Process Condition	Average Measured Parallel	Average Measured Perpendicular	Maximum Predicted Volumetric
1	1.22%	1.62%	4.72%
2	1.07%	1.31%	3.08%
3	0.87%	1.00%	1.90%
4	1.09%	1.30%	3.08%
5	1.04%	1.18%	2.96%
6	1.22%	1.67%	4.69%
7	1.12%	1.35%	3.09%
8	0.90%	1.08%	1.88%
9	1.16%	1.32%	3.11%
10	1.09%	1.27%	2.97%
11	1.19%	1.54%	4.56%
12	1.05%	1.23%	3.00%
13	0.82%	0.98%	1.87%
14	1.07%	1.31%	2.96%
15	1.01%	1.24%	2.91%
16	1.39%	1.46%	8.25%
17	1.28%	1.22%	5.50%
18	1.18%	1.11%	3.98%
19	1.36%	1.25%	5.22%
20	1.22%	1.23%	6.31%
21	1.12%	1.54%	3.36%
22	0.95%	1.22%	2.33%
23	0.71%	0.89%	1.41%
24	0.95%	1.25%	2.34%
25	0.94%	1.18%	2.32%

Residual Stress Coefficients

Corrected residual in-mold stress (CRIMS) model coefficients	
A1	0.993257
A2	0.161013
A3	0.005092
A4	1.542354
A5	-0.5000
A6	0.006903

Residual Strain Coefficients

Parallel				
	Coefficient	Lower Limit	Upper Limit	Centroid
1	0.13406	0.010726	0.063137	0.02723
2	-0.006404	0.011788	0.7183	0.37798
3	-0.000596	8.8232	29.243	16.33
4	1.8368e-007	7564.60	55732.00	24537.00
5	0.014753	0	0	0

Perpendicular				
	Coefficient	Lower Limit	Upper Limit	Centroid
1	0.2296	0.010726	0.054999	0.026482
2	-0.003457	0.011788	0.7183	0.38558
3	-0.000359	8.8232	29.243	16.083
4	6.7598e-007	1981.60	6373.80	3951.80
5	0.011004	0	0	0

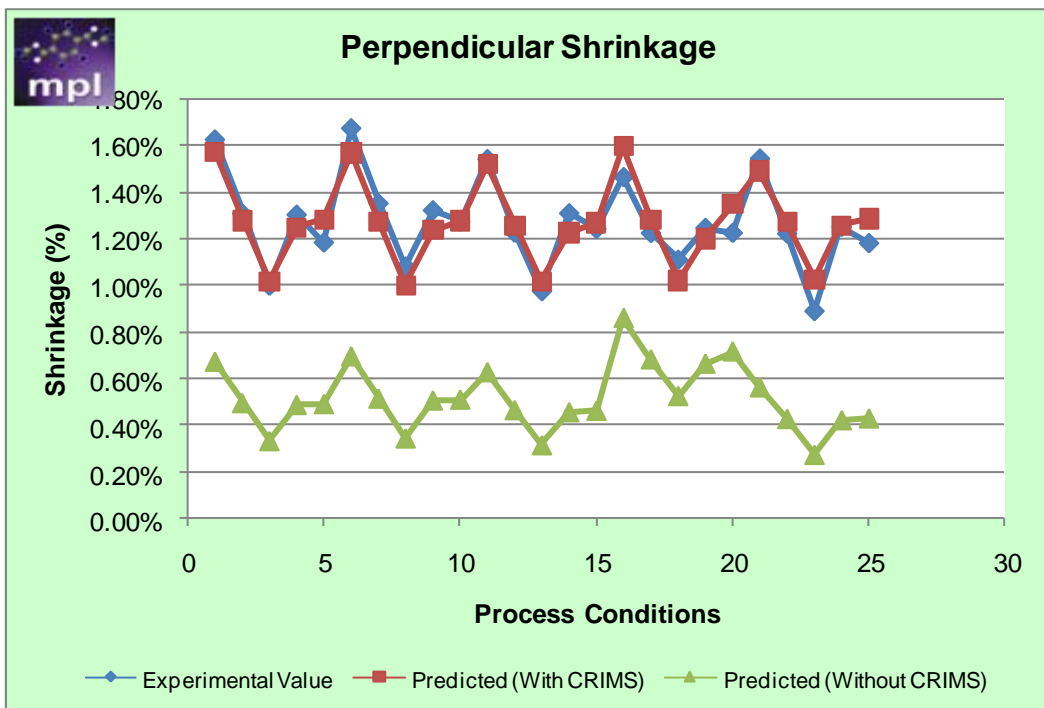
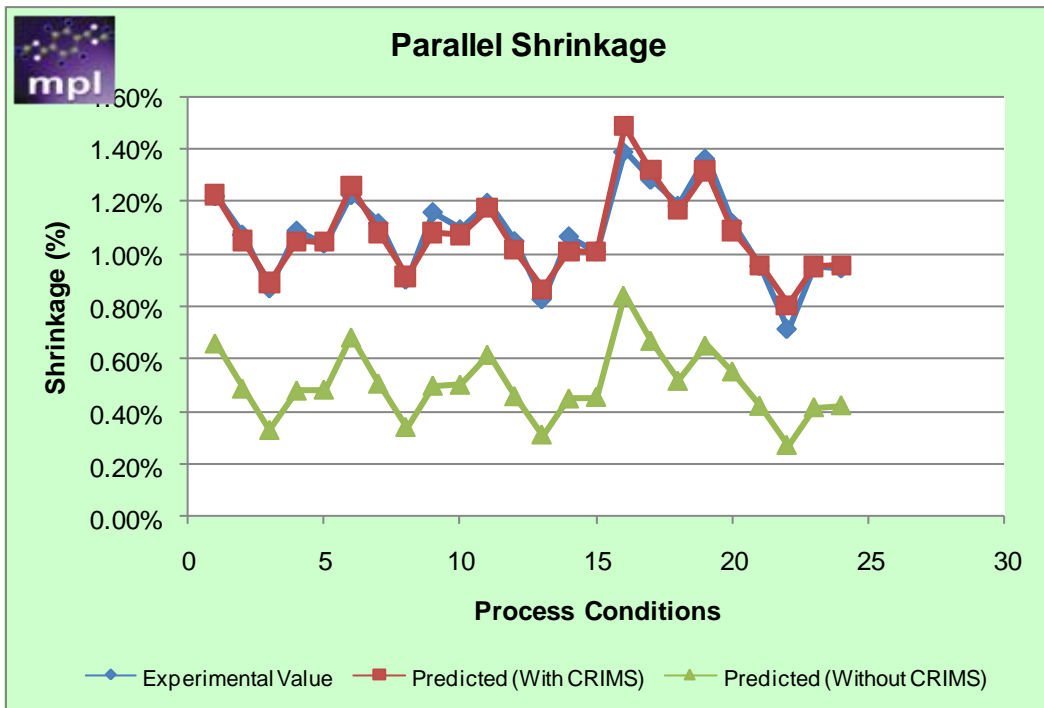
These shrinkage models are valid for Autodesk Moldflow Plastics Insight 2010. Shrinkage models for previous software versions are available upon request.

Observed Shrinkage

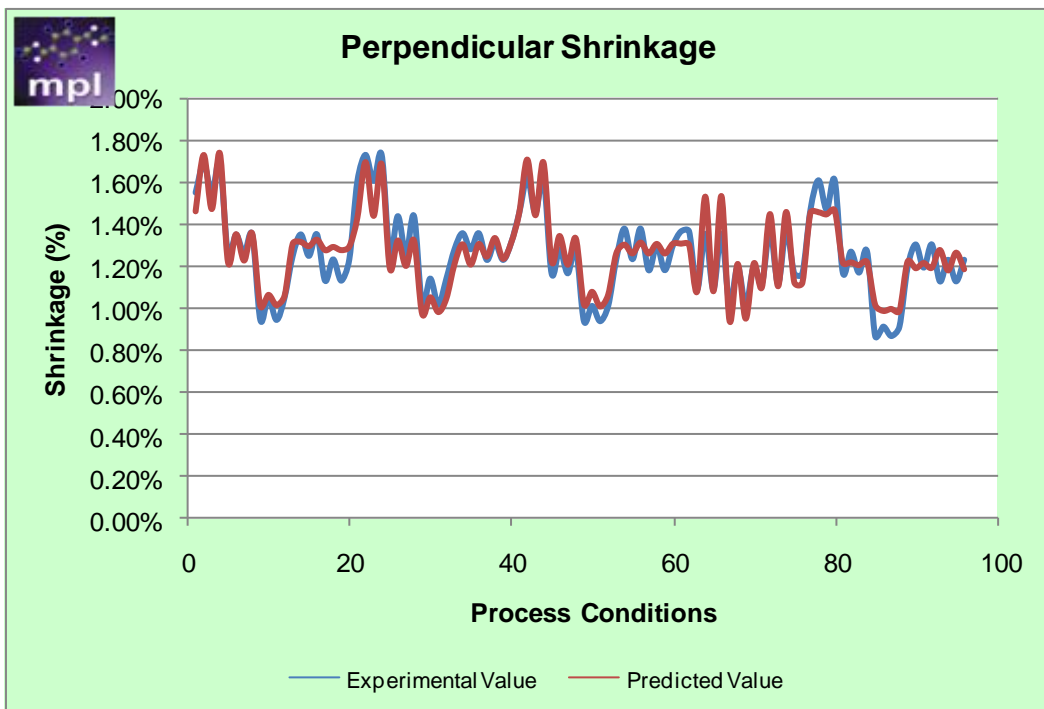
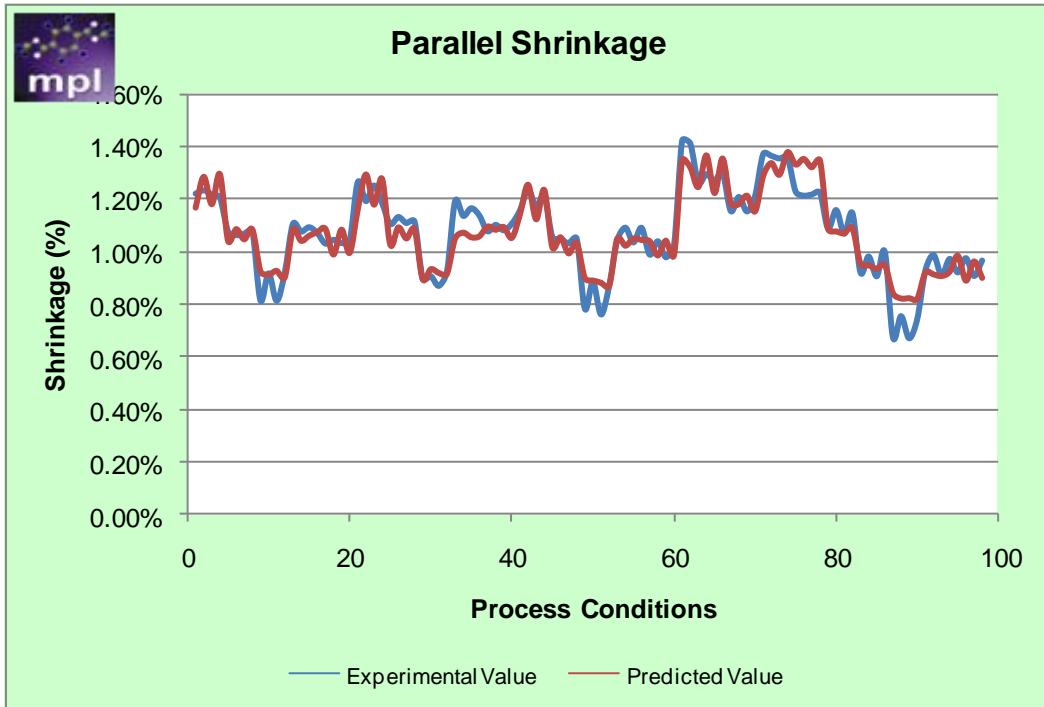
Observed nominal shrinkage	
Parallel	1.081%
Perpendicular	1.271%

Observed shrinkage	
Minimum Parallel	0.711%
Maximum Parallel	1.389%
Minimum Perpendicular	0.892%
Maximum Perpendicular	1.671%

Residual Stress Plots



Residual Strain Plots



Mechanical

Elastic modulus and Poissons ratio

Method:

ASTM D 638, Standard Test Method for Tensile Properties of Plastics

ASTM E 132, Standard Test Method for Poissons Ratio at Room Temperature

Instrument:

MTS Sintech 5/G Universal Testing Machine

Test Specifications:

Specimens tested:	8 specimens
Pre-Processing:	23°C +/-2°C at 50% +/-5% relative humidity for a minimum of 24 hours
Sample Form:	Machined from Molded Plaques
Date Tested:	11-May-09

Operator's Notes:

Testing was performed per standard testing procedures.

No anomalies were noted during testing.

Elastic modulus		
Elastic modulus, 1 st principal direction [E1]	2726.50	MPa
Elastic modulus, 2 nd principal direction [E2]	2607.88	MPa

Poissons ratio		
Poissons ratio [v12]	0.3880	
Poissons ratio [v23]	0.4280	

Shear modulus

Method:

ASTM D 638, Standard Test Method for Tensile Properties of Plastics

Instrument:

MTS Sintech 5/G Universal Testing Machine

Test Specifications:

Specimens tested:	8 specimens at 45 degrees
Pre-Processing:	23°C +/-2°C at 50% +/-5% relative humidity for a minimum of 24 hours
Sample Preparation:	High Speed Milling
Sample Form:	Machined from Molded Plaques
Test Speed:	5 mm/min
Date Tested:	11-May-09

Operator's Notes:

Shear modulus is calculated using orthotropic elasticity from the tensile modulus measured on a sample cut at an angle of 45° with the flow direction.

Testing was performed per standard testing procedures.

No anomalies were noted during testing.

Shear modulus		
Shear modulus [G12]	838	MPa

Coefficient of linear thermal expansion

Method:

ASTM D 696, Coefficient of Linear Thermal Expansion of Plastics

Instrument:

Quartz tube dilatometer per ASTM

Test Specifications:

Specimens tested:	2 (per direction): test repeated 2 times per specimen
Pre-Processing:	23°C +/-2°C at 50% +/-5% relative humidity for a minimum of 24 hours
Sample Form:	Machined from Molded Plaques
Specimen Geometry:	rectangular, 8mm x approx. 50mm, full thickness
Temperature Range:	0°C to 60°C
Date Tested:	13-May-09

Operator's Notes:

Testing was performed per standard testing procedures.
No anomalies were noted during testing.

Transversely isotropic coefficient of thermal expansion [CTE] data		
Alpha 1	7.750e-005	1/C
Alpha 2	7.910e-005	1/C

Mold verification

Method:

MPL Mold Verification Test Method (QOP-16-M)

Instrument:

Battenfeld BK-T 1500/400 Injection Molding Machine

Test Specifications:

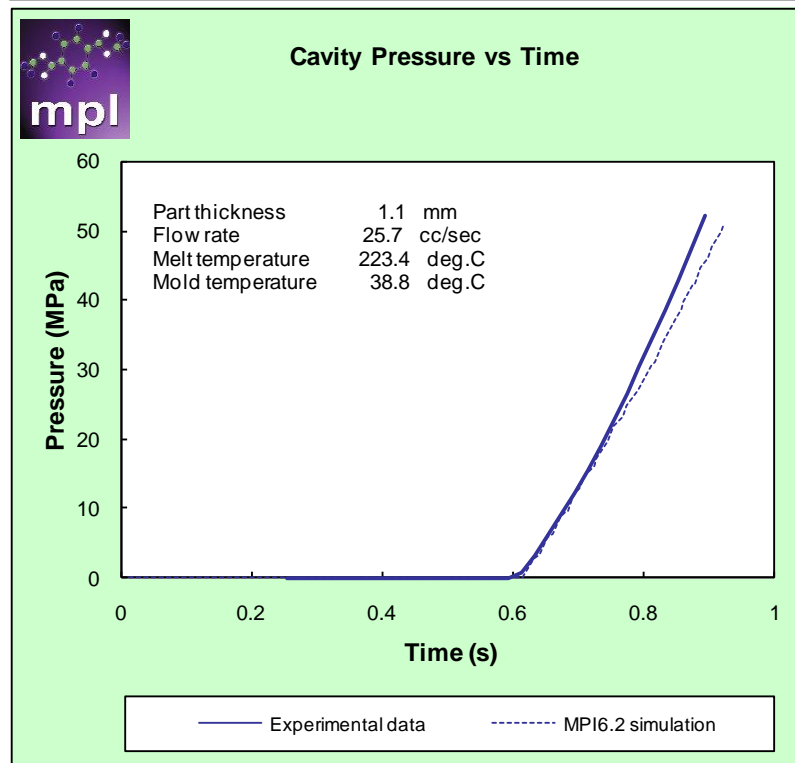
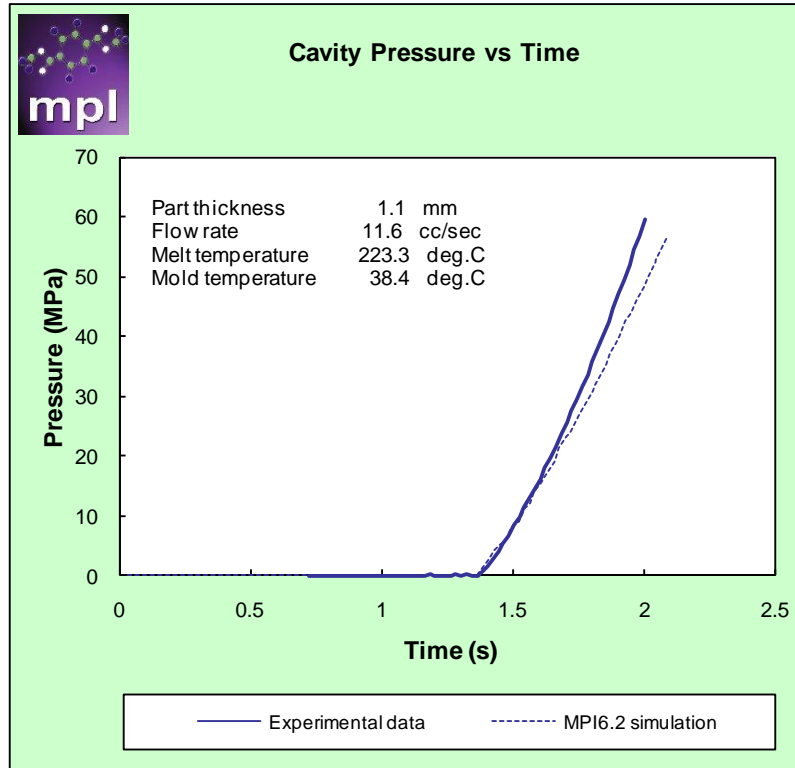
Sample Form:	Granules
Pre-Processing:	Dried at 70°C for 1 hours in a hopper dryer
Moisture Level:	0.0027 %
Date Tested:	12-MAY-09

Operator's Notes:

Testing was performed per standard testing procedures.
No anomalies were noted during the course of testing.

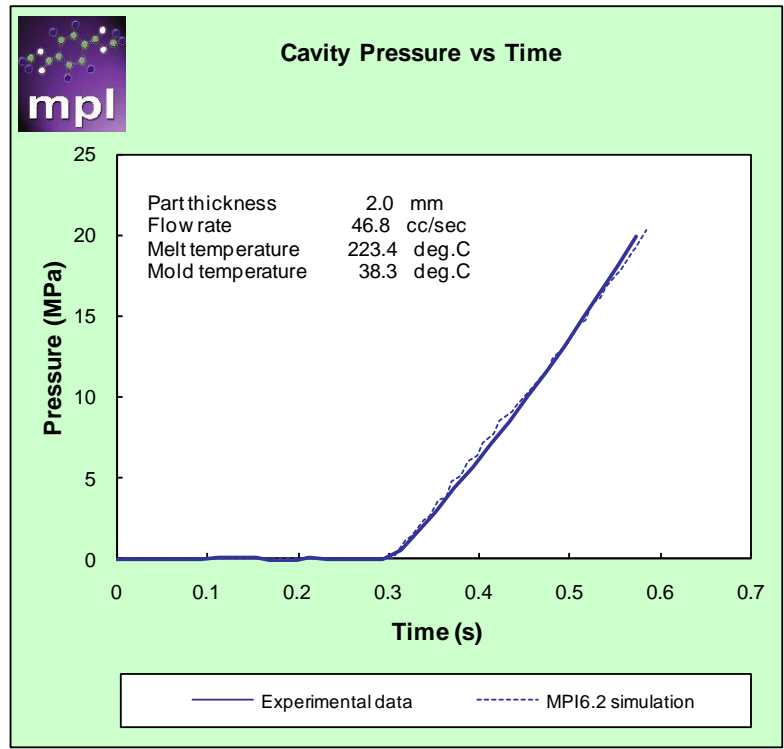
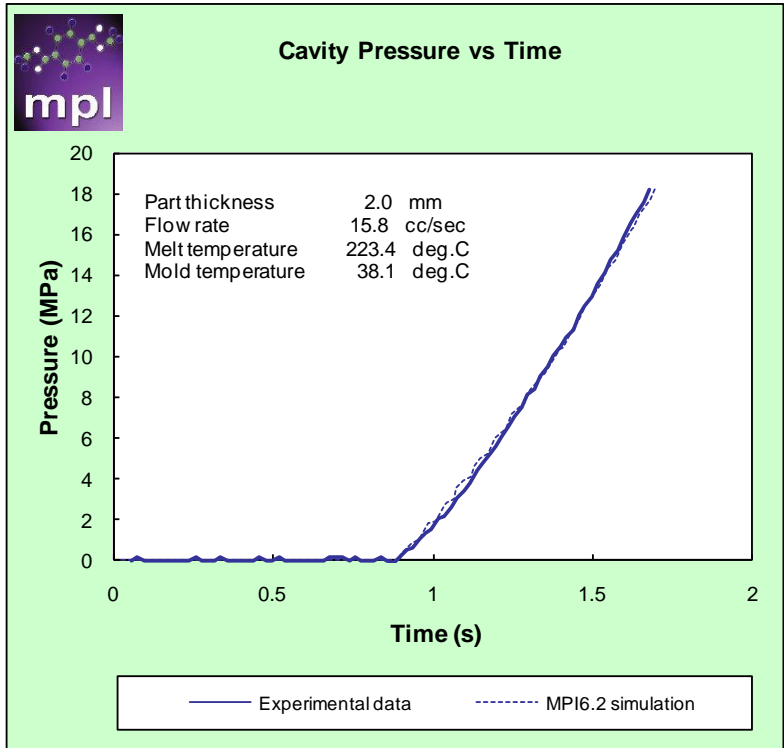
1.1mm tag die

Experiment Number	Flow Rate (cc/sec)	Melt Temperature	Mold Temperature
Cyc0163	11.6	223.3	38.4
Cyc0172	25.7	223.4	38.8



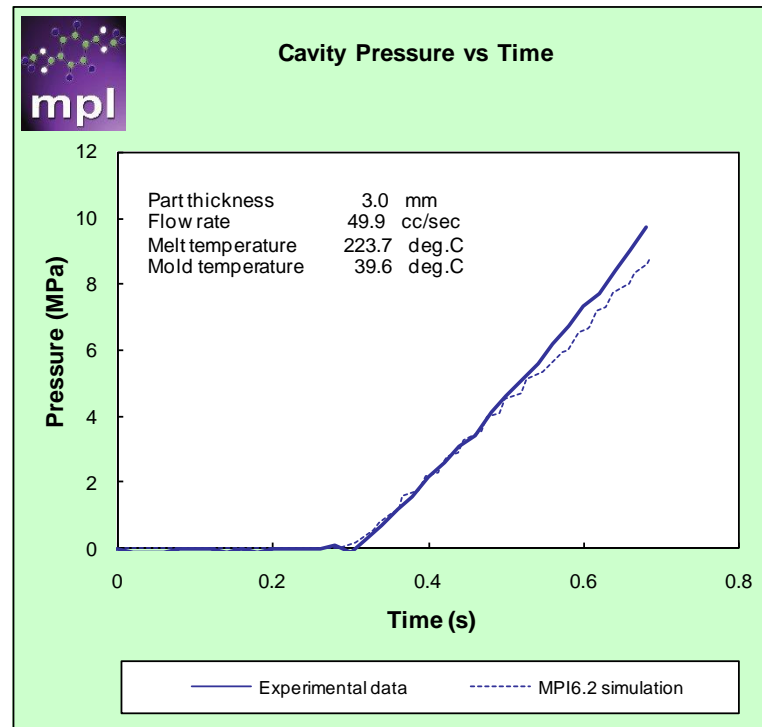
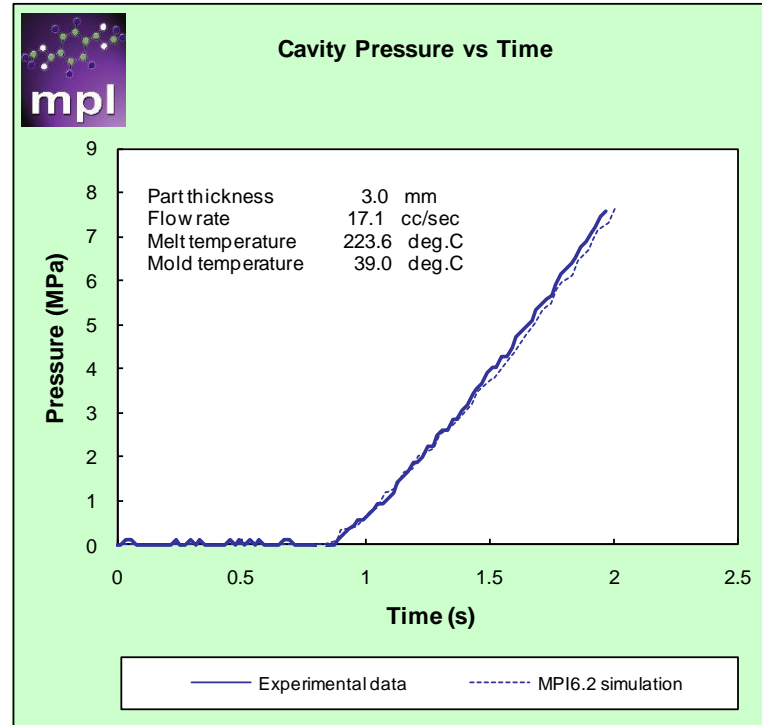
2mm tag die

Experiment Number	Flow Rate (cc/sec)	Melt Temperature	Mold Temperature
Cyc0027	15.8	223.4	38.1
Cyc0038	46.8	223.4	38.3



3mm tag die

Experiment Number	Flow Rate (cc/sec)	Melt Temperature	Mold Temperature
Cyc0234	17.1	223.6	39
Cyc0244	49.9	223.7	39.6



Contact details

USA

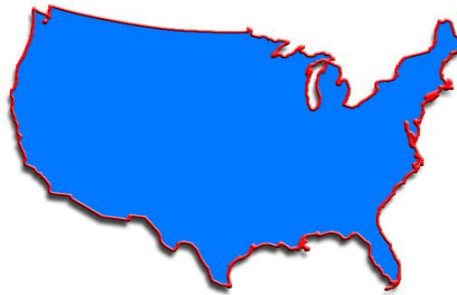
Autodesk Moldflow Plastics Labs
2353 North Triphammer Road
Ithaca, NY 14850

USA

Phone: +1-607- 257-4280

Fax: +1-607- 257- 6355

Email: mplmoldflow@autodesk.com



Australia

Autodesk Moldflow Plastics Labs
259-261 Colchester Road
Kilsyth, Victoria, 3137

Australia

Phone: +61-3-9720-2088

Fax: +61-3-9729-0433

Email: mplmoldflow@autodesk.com



For testing enquiries please email mplmoldflow@autodesk.com

For data fitting and database enquiries please email datafittingmoldflow@autodesk.com

Autodesk's corporate website: www.autodesk.com