

LAMPIRAN

1. Perhitungan diameter *gate*

The screenshot shows a software window titled "Thermoplastics material" with a close button (X) in the top right corner. The window contains a tabbed interface with the following tabs: Microcellular Properties, Optical Properties, Environmental Impact, Quality Indicators, Crystallization Morphology, Stress - Strain, Mechanical Models, Description, Recommended Processing, Rheological Properties, Thermal Properties, pvT Properties, Mechanical Properties, Shrinkage Properties, and Filler Properties. The "Recommended Processing" tab is active, displaying the following parameters:

Mold surface temperature	<input type="text" value="50"/>	C
Melt temperature	<input type="text" value="230"/>	C
Mold temperature range (recommended)		
Minimum	<input type="text" value="20"/>	C
Maximum	<input type="text" value="80"/>	C
Melt temperature range (recommended)		
Minimum	<input type="text" value="200"/>	C
Maximum	<input type="text" value="280"/>	C
Absolute maximum melt temperature	<input type="text" value="320"/>	C
Ejection temperature	<input type="text" value="93"/>	C
<input type="button" value="View test information for ejection temperature..."/>		
Maximum shear stress	<input type="text" value="0.26"/>	MPa
Maximum shear rate	<input type="text" value="24000"/>	1/s

Diketahui :

Tebal produk = 1 dan diameter gate asumsi = 0,9 mm = 0,09 cm

r = asumsi diameter gate < tebal produk

$r = 0,095$ cm

shot volume/ total volume = 16,42 cm³

fill time = 1 s

maximum shear rate material = 24000 1/s

Ditanya :

Shear rate diameter 0,9... ?

Jawab :

$$r = \sqrt[3]{\frac{4Q}{3,14 \cdot \text{shear rate}}}$$

$$\text{Share rate} = \frac{4 \cdot Q}{3,14 \cdot r^3}$$

$$Q = \frac{\text{shot volume}}{\text{injection time}}$$

$$Q = \frac{16,4 \text{ cm}^3}{1 \text{ s}} = 16,4 \text{ cm}^3/\text{s}$$

$$\text{Share rate} = \frac{4 \cdot 16,4 \text{ cm}^3/\text{s}}{3,14 \cdot 0,045 \text{ cm}^3/\text{s}} = 464,26 \text{ 1/s} < 240001/\text{s} \text{ dengan asumsi}$$

diameter paling mendekati tebal produk didapatkan shere rate maksimal pada diameter 0,9 mm adalah 464,26 1/s

2. Perhitungan diameter *runner*

Diketahui :

$$\rho \text{ material PP} = 0,905 \text{ gram/cm}^3$$

$$V = 13,044 \text{ cm}^3$$

L (panjang runner) = runner primer 40 mm & runner sekunder 8 mm

$$W = V \cdot \rho \text{ material PP} = 13,044 \text{ cm}^3 \cdot 0,905 \text{ gram/cm}^3 = 11,804 \text{ gram}$$

Ditanya :

Diameter runner primer ?

Diameter runner sekunder ?

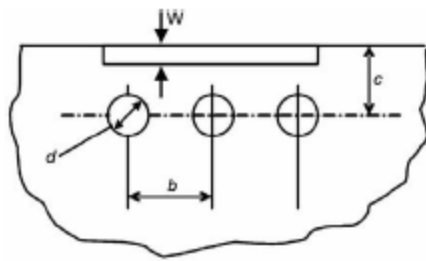
Jawab :

$$D = \frac{W^{\frac{1}{2}} \cdot L^{\frac{1}{4}}}{3,7}$$

$$D \text{ primer} = \frac{11,804^{\frac{1}{2}} \cdot 40 \text{ mm}^{\frac{1}{4}}}{3,7} = 2,3 \text{ mm diameter minimal}$$

$$D \text{ sekunder} = \frac{11,804^{\frac{1}{2}} \cdot 8 \text{ mm}^{\frac{1}{4}}}{3,7} = 1,6 \text{ mm diameter minimal}$$

3. Perhitungan diameter cooling



Part thickness W	Channel Diameter d
2 mm	8-10 mm
4 mm	10-12 mm
6 mm	12-15 mm
$c = 2d$ to $3d$	$b = 3d$ to $4d$

Diketahui :

$$d = 10 \text{ mm}$$

$$w = 2 \text{ mm}$$

Ditanya :

a (jarak cooling dengan produk) ?

b (jarak cooling dengan cooling)?

Jawab

$$a = 2 \cdot d = 2 \cdot 10 \text{ mm} = 20 \text{ mm}$$

$$b = 3 \cdot d = 3 \cdot 10 \text{ mm} = 30 \text{ mm}$$

4. Tabel *holding and cooling values*

Table 8.10 Holding and cooling values											
Mould temperature under 60 °C						Mould temperature above 60 °C					
d	t _{h1}	t _n	t _{n1}	t _{n2}	t _k	d	t _{h1}	t _n	t _{n1}	t _{n2}	t _k
1.0	3.0	0.9	0.6	0.3	2.1	1.0	3.9	1.2	0.8	0.4	2.7
1.1	3.6	1.1	0.7	0.4	2.5	1.1	4.6	1.4	1.0	0.4	3.2
1.2	4.1	1.3	0.9	0.4	2.8	1.2	5.3	1.6	1.1	0.5	3.7
1.3	4.7	1.4	1.0	0.4	3.3	1.3	6.1	1.9	1.3	0.6	4.2
1.4	5.4	1.7	1.1	0.6	3.7	1.4	7.0	2.1	1.4	0.7	4.9
1.5	6.0	1.8	1.2	0.6	4.2	1.5	7.8	2.4	1.6	0.8	5.4
1.6	6.8	2.1	1.4	0.7	4.7	1.6	8.8	2.7	1.8	0.9	6.1
1.7	7.5	2.3	1.6	0.7	5.2	1.7	9.8	3.0	2.1	0.9	6.8
1.8	8.3	2.5	1.7	0.8	5.8	1.8	10.8	3.3	2.3	1.0	7.5
1.9	9.2	2.8	2.0	0.8	6.4	1.9	11.9	3.6	2.5	1.1	8.3
2.0	10.0	3.0	2.1	0.9	7.0	2.0	13.0	3.9	2.7	1.2	9.1
2.1	11.0	3.3	2.3	1.0	7.7	2.1	14.2	4.2	3.0	1.3	10.0
2.2	11.9	3.6	2.5	1.1	8.3	2.2	15.5	4.7	3.3	1.4	10.8
2.3	12.9	3.9	2.7	1.2	9.0	2.3	16.8	5.1	3.5	1.6	11.7
2.4	14.0	4.2	3.0	1.2	9.8	2.4	18.1	5.5	3.8	1.7	12.6
2.5	15.0	4.5	3.1	1.4	10.5	2.5	19.5	5.9	4.1	1.8	13.6
2.6	16.2	4.9	3.4	1.5	11.3	2.6	21.0	6.3	4.4	1.9	14.7
2.7	17.3	5.2	3.6	1.6	12.1	2.7	22.5	6.8	4.7	2.1	15.7
2.8	18.5	5.5	4.0	1.6	13.0	2.8	24.1	7.3	5.1	2.2	16.8
2.9	19.8	6.0	4.2	1.8	13.8	2.9	25.7	7.7	5.4	2.4	18.0
3.0	21.0	6.3	4.4	1.9	14.7	3.0	27.3	8.2	5.7	2.5	19.1
3.1	22.4	6.8	4.7	2.1	15.6	3.1	29.1	8.8	6.1	2.7	20.3
3.2	23.7	7.2	5.0	2.2	16.5	3.2	30.8	9.3	6.5	2.8	21.5
3.3	25.1	7.6	5.3	2.3	17.5	3.3	32.6	9.8	6.8	3.0	22.8
3.4	26.6	8.0	5.6	2.4	18.6	3.4	34.5	10.4	7.2	3.2	24.1
3.5	28.0	8.4	5.8	2.6	19.6	3.5	36.4	11.0	7.7	3.3	25.4
3.6	29.6	8.9	6.2	2.7	20.7	3.6	38.4	11.6	8.1	3.5	26.8
3.7	31.1	9.4	6.5	2.9	21.7	3.7	40.4	12.2	8.5	3.7	28.2
3.8	32.7	9.9	6.9	3.0	22.8	3.8	42.5	12.8	9.0	3.8	29.7
3.9	34.4	10.4	7.2	3.2	24.0	3.9	44.7	13.5	9.4	4.1	31.2
4.0	36.0	10.8	7.5	3.3	25.2	4.0	46.8	14.1	9.8	4.3	32.7