



DuPont Engineering Polymers



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Checklist

General

- Performance Requirements (Structural, Aesthetic, etc.)
- Combining Multiple Parts or Functions
- Structural Load (Static, Dynamic, Cycling, Impact, etc.)
- Environment (Temperature, Time, Chemical, etc.)
- Tolerance Requirements
- Life of Product
- Quantity of Product vs. Fabrication Process
- Secondary Operation
- Packaging and Shipping

Environment

- Temperature
- Time
- Load
- Other Environments (Chemical, Water, Humidity, etc.)

Engineering Design Facts

- Type of Load
- Frequency of Load
- Stress Rate (Compression, Tensile, Flexural)
- Strain Amplitude
- Load Deformation (Tensile, Compression, Shear, etc.)
- Apparent Modulus (Includes Strain Due to Creep)
- Direction of Load
- Correlating Test Data With End Use
- Safety Factor

Tests (ATIM, SAE, UL, Etc.)

- Tension
- Compression
- Creep
- Dynamic/Fatigue/Torsion
- Impact
- Poisson's Ratio
- Electrical
- Continuous Service Temp./U.L. Temp. Index

Material and Process

- Directional Flow
- Directional Layout of Reinforcements
- Regrinding
- Pre-drying
- Prototyping (Machining, Molding)

Appearance

- Style
- Shape
- Color
- Surface Finish/Weld Lines/Flow Lines/Parting Line/Gate Location
- Decoration

Economic Factors

- Cost of Present Part
- Cost Estimate of Part in DuPont Engineering Plastics
- Faster Assembly and Elimination of Finishing Operation
- Redesign Part to Simplify Product

Designing for Uniform Walls

WRONG	RIGHT	WRONG	RIGHT
<p>Central gate</p>	<p>Problem may be solved by proper web dimension. In some cases properly dimensioned ribs may be used to fill the exterior crown.</p>		
	<p>T</p> <p>0.75T</p> <p>0.5T</p> <p>Gate</p>		

Designing for Ribbed Walls

WRONG	RIGHT	WRONG	RIGHT

Adequate ribbing can counteract bending. However, ribs should not be used unless necessary (e.g., not for small modulus high precision gears.)

Designing without Stress Concentration

WRONG	RIGHT	WRONG	RIGHT


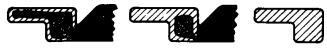

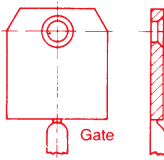
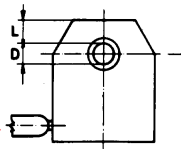
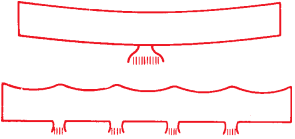
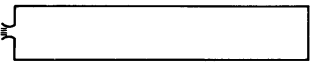
Stressed parts in a transparent material show, under polarized light, the stress concentration effect of sharp corners.

Here are two alternative solutions; their choice will depend on the torque to be transmitted.


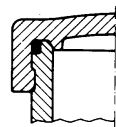
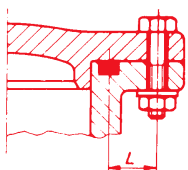
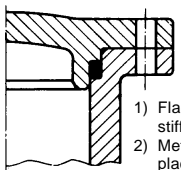
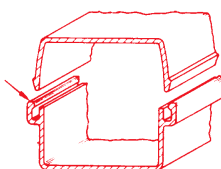
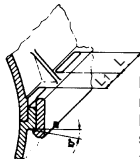
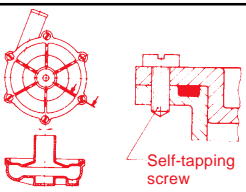
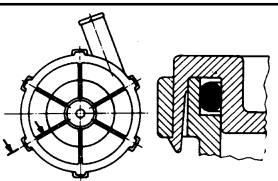
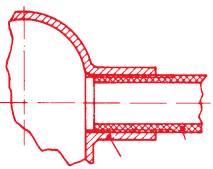
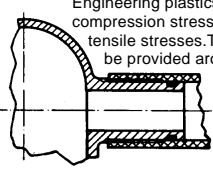
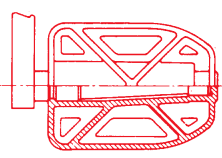
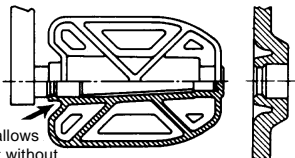
Redesign has reduced high stress concentration in snap-fit area.

Circular inserts with fine rounded knurling are preferred. They should not have sharp edges. Installing inserts after molding may also be a solution.

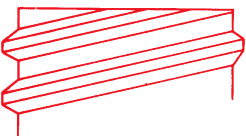
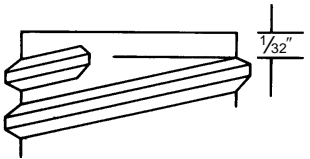
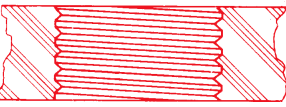
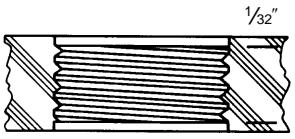
Gate Location

WRONG	RIGHT	WRONG	RIGHT
	<p>The two ways to solve this problem are:</p> <p>A) Locate the gate in the thicker section (a long cycle may however be necessary to pack the cavity properly).</p>  <p>B) Core out the part.</p> 		<p>"L" should be kept larger (at least = D), and a flat head screw would eliminate tangential stresses. A change in gate location could also help.</p> 
			

Designing for Assembly

WRONG	RIGHT	WRONG	RIGHT
	 <p>Redesigned exterior snap-fit cap and addition of "O" ring eliminate leakage.</p>		<p>The "O" ring is compressed radially. Additional ways to control creep could be:</p> <ol style="list-style-type: none"> 1) Flanges may be stiffened by ribs, or 2) Metal rings all around, placed under the bolts. 
	 <p>No undercut in the mold. If the ratio $L:L_1$ increases, some ribs can be added.</p>	 <p>Self-tapping screw</p>	
	 <p>Engineering plastics usually resist compression stresses better than tensile stresses. Threads should be provided around the exterior diameter of the plastic part. An "O" ring ensures tightness.</p>		<p>Relief allows snap-fit without breaking</p> 

Designing with Clearance on Threads

WRONG	RIGHT	WRONG	RIGHT
			

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