



Plastics Topics – Design questions for plastics

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1. Introduction

The design requirements of a plastic part are rarely specified by the user to a sufficient degree. The design method for processing and polymer selection almost always varies with the application. The checklist below is designed for use in the initial selection of the method and base polymer. It is a series of questions to ask and does not provide a rigorous design methodology.

This is really a set of 'thinking points' that will hopefully enable you to capture the essentials of the requirements for the part.

2. Production

- Annual total of units
- weight
- necessary available quantity of material
- shape and size
- tolerances
- surface finish
- inserts
- undercuts
- holes
- machinable
- castable
- forgeable
- compression mouldable
- injection mouldable
- transfer mouldable
- blow mouldable
- rotation mouldable
- vacuum formable
- extrudable
- hot and cold workable

3. Mechanical

- tensile strength
- compressive strength
- yield strength
- flexural strength
- impact strength
- fatigue strength
- creep strength
- fracture toughness
- tear resistance

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- tensile modulus
- flexural modulus
- compressive modulus
- creep modulus
- elongation
- hardness
- compression set
- shear strength

4. Assembly

- welding
- brazing
- soldering
- solvent bonding
- adhesive bonding
- ultrasonic bonding
- ultrasonic staking
- heat sealing
- accept self-tapping screws
- snap fitting

5. Electrical

- conductivity
- volume resistivity
- dielectric constant
- loss factor
- loss angle
- tracking resistance
- arc resistance

6. Thermal

- maximum operating temperature*
- minimum operating temperature*

* NB: These temperatures should include production, storage and transportation conditions.

- continuous operating temperature
- thermal conductivity
- specific heat
- thermal diffusivity
- thermal expansion

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- heat deflection temperature
- softening point
- cold flex temperature

7. Chemical

- acid resistance
- alkali resistance
- organic resistance
- solvents resistance
- oil and grease resistance
- water absorption
- galvanic attack
- pitting
- stress corrosion

8. Optical

- refractive index
- clarity
- transmittance
- haze
- colourability
- appearance
- gloss

9. Environmental

- indoor use
- outdoor use
- sealed closure
- contact with other materials
- toxicity
- atmospheric attack
- environmental stress cracking
- weatherability
- sunlight resistance
- yellowing and fade
- fungus and bacteria
- humidity
- permeability

10. Magnetic

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- susceptibility
- permanence
- coercivity

11. Fire Resistance

- stability
- integrity
- insulation
- surface spread of flame
- non-combustibility
- limiting oxygen index
- smoke emission
- toxicity

12. Wear and Friction

- adhesive wear resistance
- abrasive wear resistance
- fatigue pitting resistance
- cavitation erosion resistance
- running in
- fretting
- PV characteristics+++
- friction coefficient

13. Acoustic

- vibration absorption
- coefficient of noise reduction
- damping capacity

14. Miscellaneous

- density