

Design for Manufacturability Checklist — Injection Molding

The following parameters should be evaluated for all projects when conducting a design for manufacturability evaluation in plastic injection molding:

- Maximum pressure: filling
- Maximum pressure: packing
- Fill pattern animation
- Inlet pressure curve
- Clamp force estimation
- Increase/decrease in temperature during filling
- Frozen skin results
- Shearing rate of the resin, measured in inverse seconds
- Flow tracer animation
- Air traps
- Venting temperature
- Weld lines
- Weld line tracer animation (with flow front)
- pvT chart analysis of weld lines, in order to plot where the material solidifies on the chart at a specified time
- Material solidification, shown at various stages of part cooling, including gate freeze
- Sink marks
- Hot spots
- Voids
- Part thickness concerns:
 - Check for thick areas of the part that could result in sinks and voids
 - Check for thin areas of the part that could result non-fill
 - Can the part be made to have a uniform thickness throughout?
- Material considerations:
 - Is this a resin that does not flow well, requiring long and/or thin flow lengths?
 - Will the material increase in temperature or have excessive shear because of thin part thicknesses?
- Gate location concerns:

- Will the gate seal too early, causing sink marks?
- Can the gate be located in a thick area of the part?
- Are multiple gates required for flatness, roundness, proper filling based on part geometry and/or material flow?
- Can gating be executed such that the flow of plastic is impinging on steel, to prevent splay?
- Part draft concerns:
 - If present, is it in the right direction and location for a good parting line?
 - If texture is being used, is there enough draft to release the texture without scuffing?
 - Does the draft need to be changed/eliminated/reversed in order to hold the part on the ejector side of the mold?
 - Depending on tooling split, draft may need to be a seal-off angle of 3-5°
- Is there part geometry that will create thin steel conditions in the tool?
- If there are undercuts on the part, can they be simplified (e.g. pass through coring instead of lifters or actions)?

In addition, the following items should be evaluated on a case-by-case basis, if they apply to the project at hand:

- Crystallization
- Fiber orientation
- Shrinkage and warpage



OEM's Guide to
DESIGN FOR MANUFACTURABILITY
In Plastic Injection Molding

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