

# Material Tips with APSX-PIM

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When utilizing the APSX-PIM injection molding machine to create plastic parts, it is essential to have a thorough understanding of the specifications provided by the manufacturers for the plastic materials. This article highlights key considerations to ensure optimal performance and high-quality results.

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## Getting Started?

We recommend beginning with PP or HDPE/LDPE. Once you gain experience, ABS is typically the next easiest option easy to mold, easy to dry, amorphous with very low and predictable shrinkage (~0.6%). Avoid POM (Delrin/Acetal) and PVC (Vinyl) unless absolutely necessary, both materials carry serious processing risks including explosive/flammable gases (POM) and highly corrosive emissions (PVC).

## Physical Properties

One critical specification is the Melt Flow Rate (MFR), measured in grams per 10 minutes using the ASTM D1238 (230°C / 2.16 kg) test procedure. APSX-PIM performs best with materials having an MFR higher than 3. A higher MFR value indicates better suitability for the machine.

For more detail on MFR, refer to: [Assess the Flowability of Polymers — omnexus.specialchem.com](https://omnexus.specialchem.com)

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## Injection Properties

Drying temperature & time: Certain materials require a drying process before use. Failing to dry the material adequately can result in poor part quality due to moisture content. Using a small dedicated oven for drying is strongly recommended.

Processing Temperature: Each plastic material has a designated temperature range. Do not exceed 310°C — the APSX-PIM barrel's maximum limit. Most common injection molding materials fall within this range. Exotic materials like PEEK or Ultem may require temperatures near 400°C and are not recommended.

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## End-Use Needs

When selecting a plastic material, consider both part design features and the specific requirements of the end-use application. This decision influences mold design — molds cannot be universally used for all plastics; each material requires a customized mold design based on its shrinkage ratio.

Material	Drying Required	Notes
PP (Polypropylene)	No	User-friendly; commonly recommended
PP-GF (Glass-filled)	No	Good ABS-like mechanical properties
HDPE / LDPE	No	User-friendly; great starting point
TPE / TPO	No	Flexible / rubbery parts
ABS	Yes (easy)	Amorphous; low shrinkage ~0.6%
PA (Nylon)	Yes (difficult)	Low viscosity; good for thin walls
<b>Delrin (POM/Acetal)</b>	Yes	! High risk — avoid unless necessary
<b>PVC (Vinyl)</b>	No	! High risk — avoid unless necessary
PC (Polycarbonate)	Yes	Clear parts; check chemical resistance

## Sourcing & Market Conditions

Market conditions — including oil prices, pandemics, labor shortages, and natural disasters — can significantly impact the cost and availability of raw materials. Choosing common materials provides flexibility and a wider range of sourcing options during shortages or market fluctuations.

## Surface Finish Requirements

Consider the desired surface finish when selecting a material. A rubbery texture may be essential for parts like handles to ensure a comfortable grip (consider TPE/TPO for these applications).

## Molecular Compatibility

When planning to paint, weld, or overmold a part, it is crucial to select a compatible material. Not all plastics can be painted or bonded effectively — verify compatibility with your supplier's data sheet.

## Environmental & Regulatory Requirements

For outdoor applications, consider UV protection requirements. For food-contact or medical parts, regulatory requirements such as FDA approval must be met. Always source materials with the appropriate compliance certifications.