Plastic Finishes and Textures

Welcome to Plastic Plus Technology's Guide to ***Understanding Plastic Finishes and Textures***

While the idea of finishes and textures are not unique to plastic materials, it is important to understand them in context to what you and your product team need. This guide was created to help you and your product team understand the basic terminology behind plastic texture and finish while giving you examples of how they were used in previous projects. Furthermore, this guide will provide insight into the different processes used to obtain your desired finishes and textures, without diving too far into the technical jargon.

What you'll gain to learn:

- Terms
- Surface finish categories
- How a finish is created through different methods
- How price and lead-time is affected through stages of polishes
- Understanding gloss and explaining your expectations

Terminology

First, we'll start with defining the vocabulary:

Understanding the vocabulary is essential for a few reasons: it gives you the ability to articulate what your product team is looking for and help set expectations. Second, it will help you understand the process needed to achieve the result you want and provide insight into the challenges and costs associated.

SPI

SPI, now known as PLASTICS, is the plastics industry association, and the only association, that supports the entire plastics supply chain. The information gathered for this resource comes from PLASTICS (SPI) established standards for polishes and textures.

Mold-Tech

Mold- Tech is an engineering and metal engraving company that produces textures in the US. Textures are created inside the tool (or mold) that reflect the plastics surface texture. Mold-tech creates textures and reference guides to be used by those in the mold-making industry.

Characterization

Textures are described using 3 qualities:

- **Lay**- the direction of the surface pattern
- **Roughness**- the average vertical deviation
- **Waviness**- surface irregularities

Surface Finish

The surface finish references the three-dimensional quality of the surface of the part. Surface finish, and surface "texture", is often used interchangably.

Gloss vs. Texture

The surface of a finished plastic part can range from a high- gloss (smooth and shiny) to a rough-textured finish. The way of achieving these finishes are incremental, meaning that the toolmaker must polish their way through each step until the desired finish is acheived.

Surface Roughness (RA)

Surface roughness (uRA) is the average roughness of a surface, measured in microns. A rougher surface means that more friction will occur when the part is ejected out of the mold. Because of this, there will need to be larger **draft angles** for ejection.

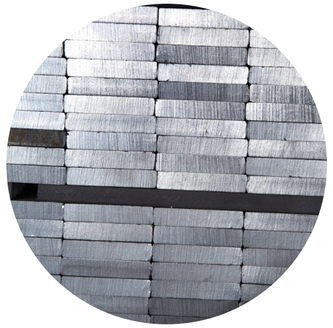
Draft Angles

Draft is defined as the amount of taper for a molded part perpendicular to the parting line. This factors into designing parts for manufacturability and should be considered before a part goes into production to eliminate costly redesign. Draft is measured in degrees.

Polishes

SPI Standard Categorization:

Surface finishes are broken up into 4 SPI standardized divisions (shown below) that characterize how the part's surface will look once it is produced.



High- Gloss

Best for lenses and mirror-like finishes. Smoothest surface for function or cosmetic purposes

A-1 A-2 A-3

Semi-Gloss

Best for when visual appearance is needed, but doesn't require a high gloss

B-1 B-2 B-3

Matte

Best for low visual requirements, but cannot show machining imperfections.

C-1 C-2 C-3

Textured

Best for when a satin or dull finish is required.

D-1 D-2 D-3

Glossy

Textured

Polishes - Cont.

Finish	SPI Class	Description	Cost/ Lead-Time
Glossy Finish	A-1 A-2 A-3	A mirror-like finish. The mold is smoothed using processes below, and finished with a diamond buff (1200-6000 grit diamond buff).	Highest
Semi Glossy Finish	B-1 B-2 B-3	A fine, smooth glossy finish. The mold is polished using a fine-grit sandpaper (320- 600 grit paper)	High
Matte Finish	C-1 C-2 C-3	For a matte finish, the mold is polished using fine stone powder (320-600 grit stone. This removes machine markings.	Medium
Textured Finish	D-1 D-2 D-3	The mold is smoothed with stone powder and then sandblasted using glass bead or aluminum oxide sandblasting.	Low
Machined	NA	The mold is finished at the mold maker's discretion.	Lowest

Average Surface Roughness

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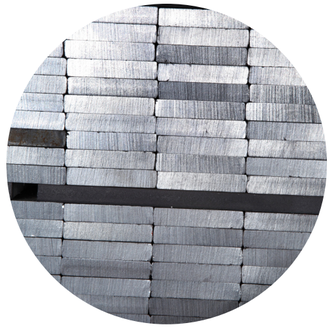


High- Gloss
0.012-0.1 uRA

Semi-Gloss
0.050.32 uRA

Matte
0.35- 0.7 uRA

Textured
3.2- 18.0 uRA

A-1 A-2 A-3 B-1 B-2 B-3 C-1 C-2 C-3 D-1 D-2 D-3

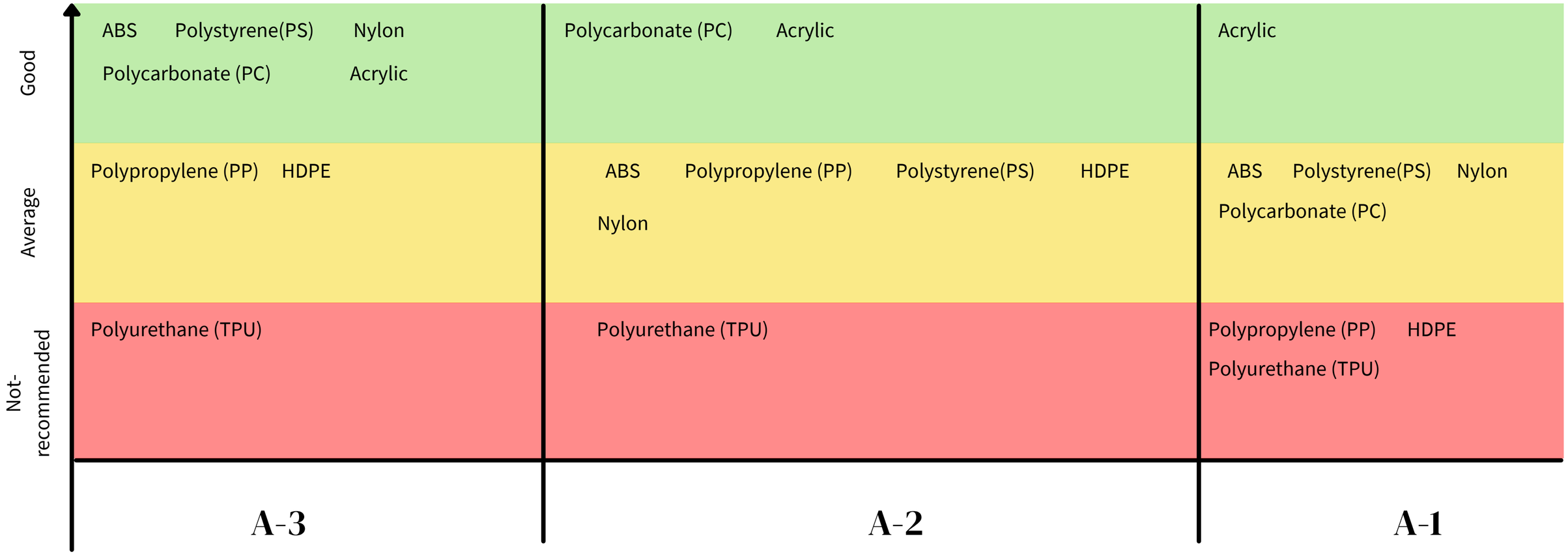
Increasing Surface Roughness (microns) μ

Material Choice

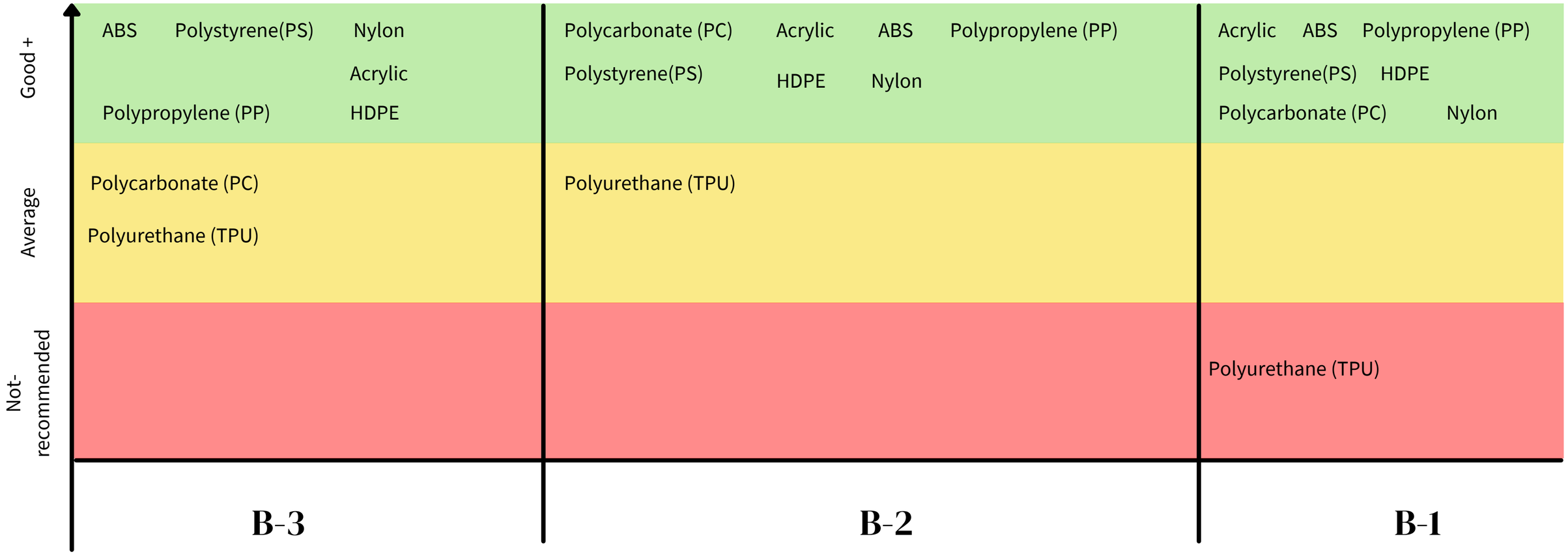
Not all plastic materials achieve the same finish...

In fact, the type of material you choose will be very important! Some plastic materials achieve a better quality finish at higher (and lower) grades than others. The next page will show you which materials to look out for, and which ones to avoid, depending on the type of finish you are looking for. (Disclaimer: the charts in this resource are to be used as a guideline. Whenever possible, contact your material provider and utilize any regulatory guidelines when selecting a material for your application.)

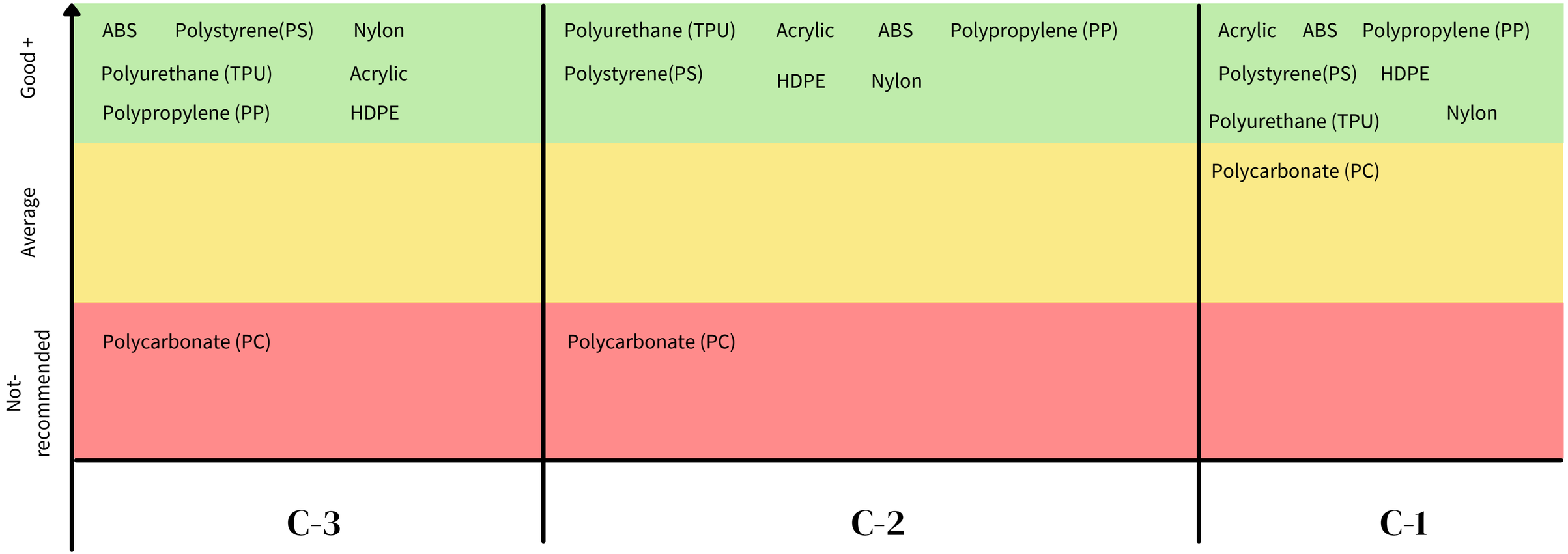
Material Choice: Glossy Chart



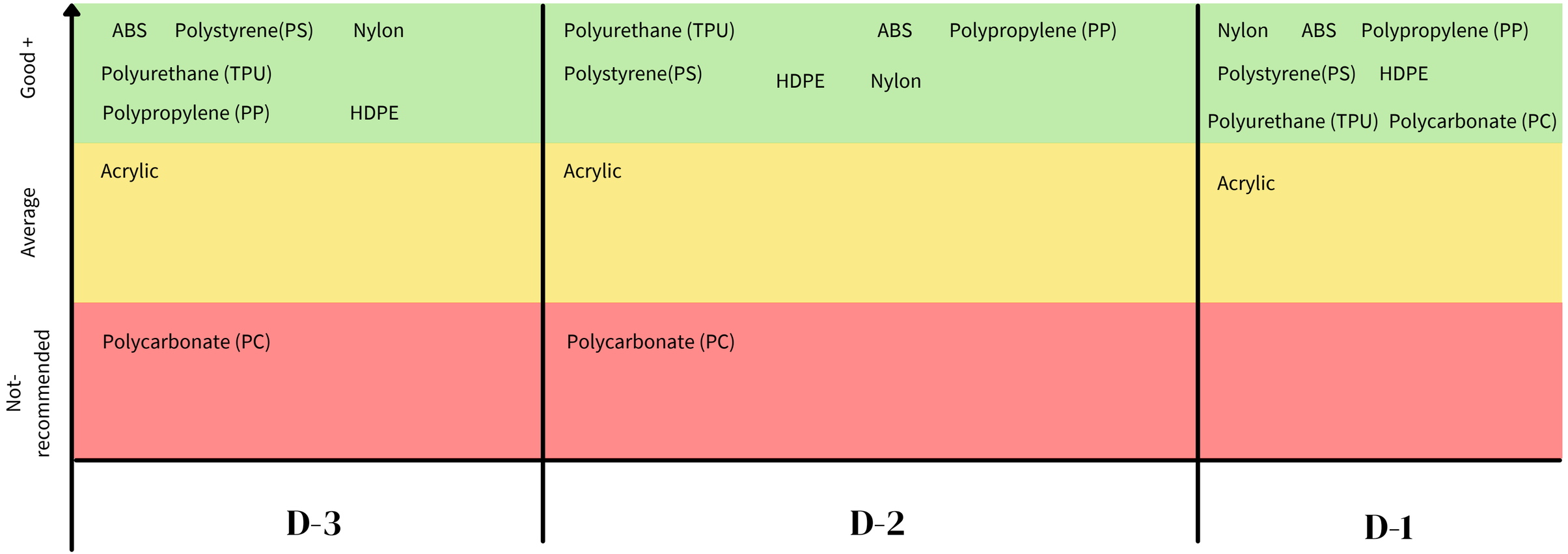
Material Choice: Semi-Glossy Chart



Material Choice: Matte Chart



Material Choice: Textured Chart



Conclusion

The plastics industry is vast and often saturated with information. While the information in this presentation is derived from industry knowledge and years of experience; it is always wise to check with your product team, vendors, suppliers, and customers to determine what is the best solution for you. Let this presentation serve as a guideline to any questions you have about plastics and your own product's needs.

Plastics Plus Technology, Inc is an injection molding company specializing in close-tolerance applications. While this presentation is meant to serve our customers, it is by no means an exhaustive list of our knowledge or capabilities. If you have further questions about this or any other topic of your interest, give us a call and we'll be happy to help.

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