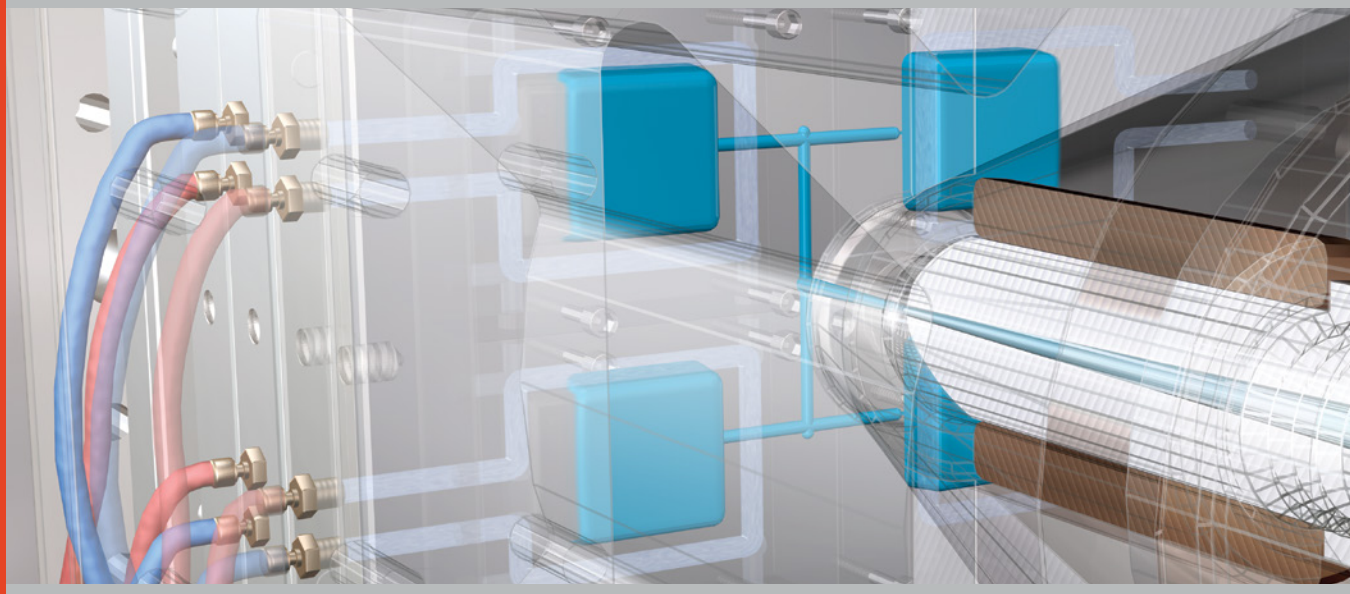
REFERENCE SERIES: PROCESSING

Scientific Troubleshooting: Poor Color Distribution



nexeo plastics

Created exclusively for **Nexeo Plastics** by Routsis Training, this free guide contains excerpts from Routsis's ***Scientific Molding Courses***.

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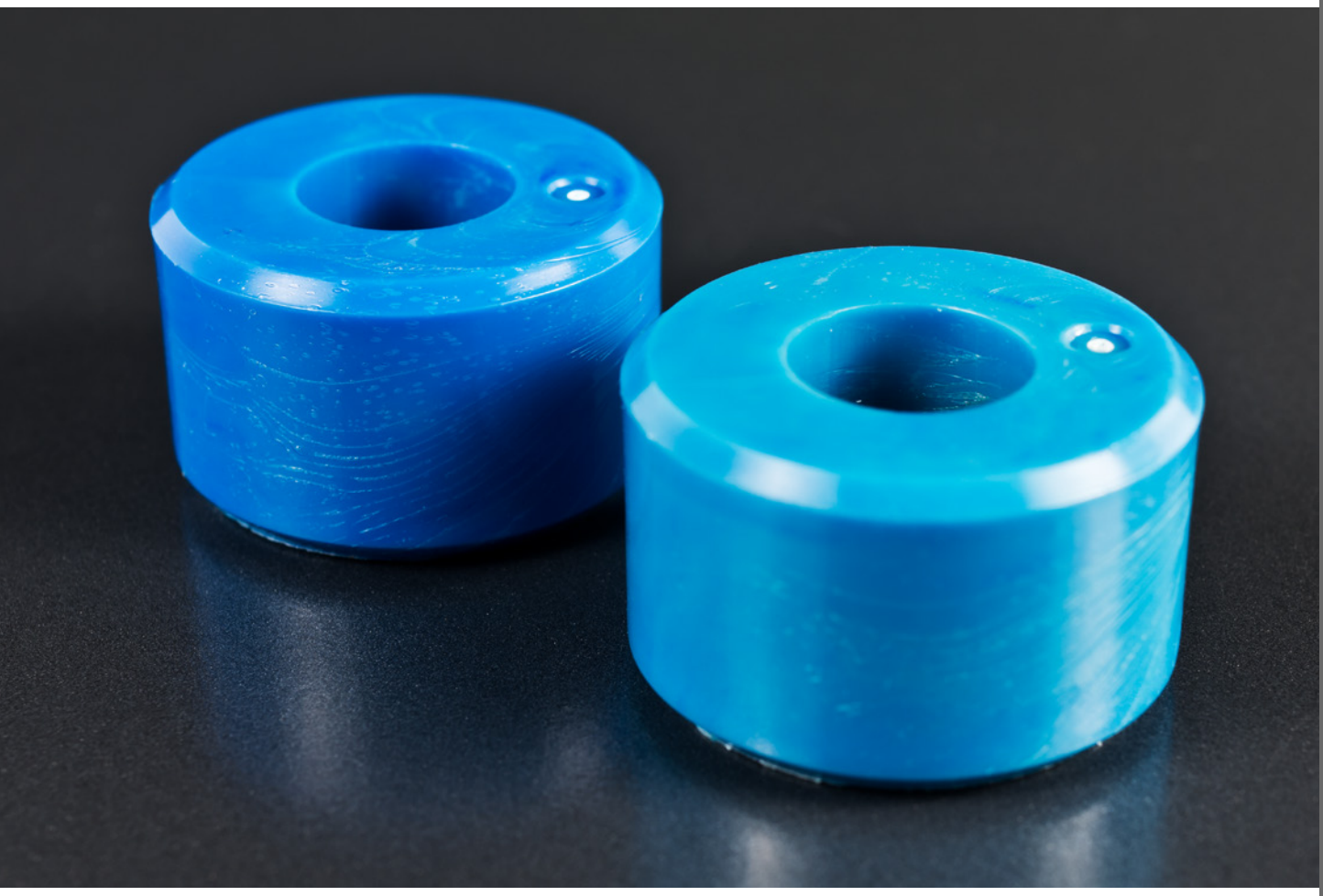
TROUBLESHOOTING
POOR COLOR DISTRIBUTION

Poor color distribution appears as inconsistent or varying coloration of the molded part. This is typically caused by an uneven distribution of colorants throughout the material. This can be caused by one of three major factors:

- Material Handling
- Material Temperature
- Screw Design

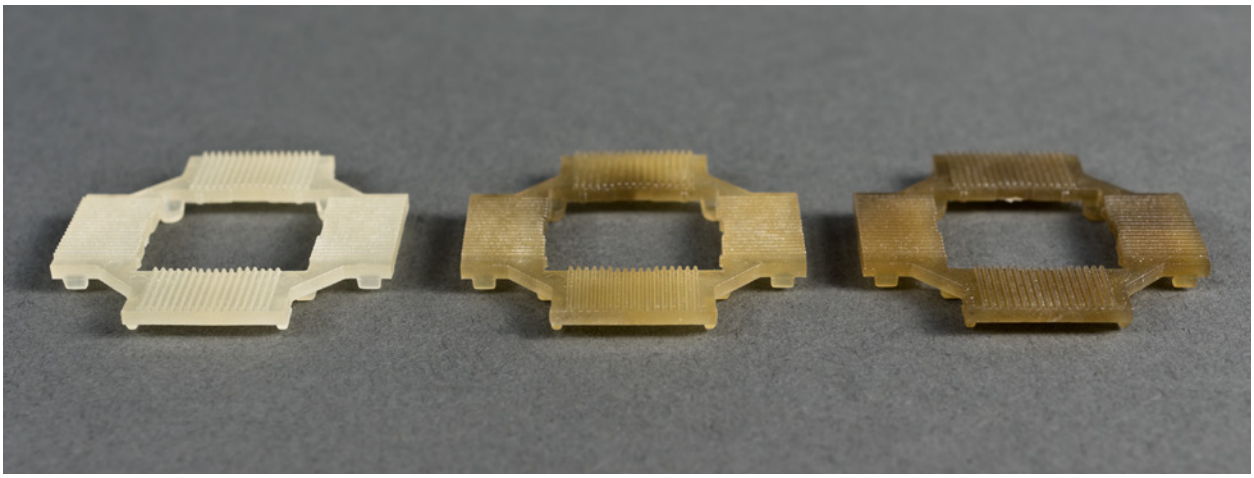


Material Handling

Poor **Material Mixing** is often the cause of Poor Color Distribution. Improperly mixed colorants will not distribute evenly when melted inside the barrel.

Hand-mixing is the least effective form of material mixing and should be avoided whenever possible. This introduces inconsistency from batch to batch as well as a possible source of contamination.

Always use continuous material mixers whenever possible. These systems mix the material as it is needed, and can be adjusted quickly if a ratio is incorrect. If continuous material mixers are unavailable at your plant, then batch mixers should be used. When using batch mixers, always ensure that there is a consistent procedure to ensure each batch of material is consistent.



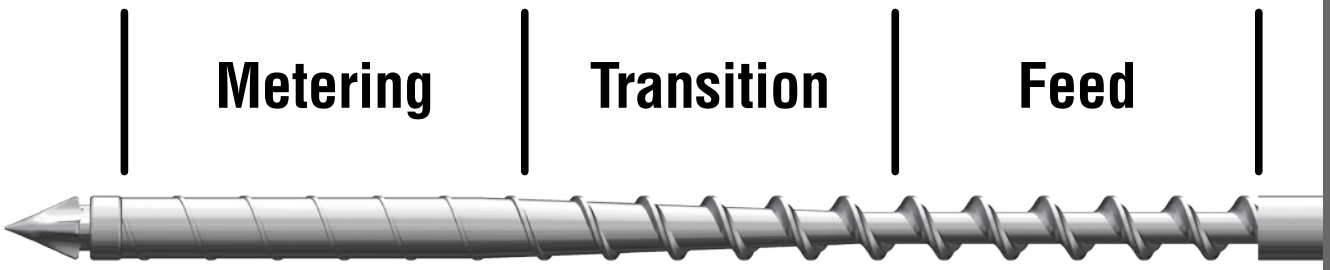
Material Temperature

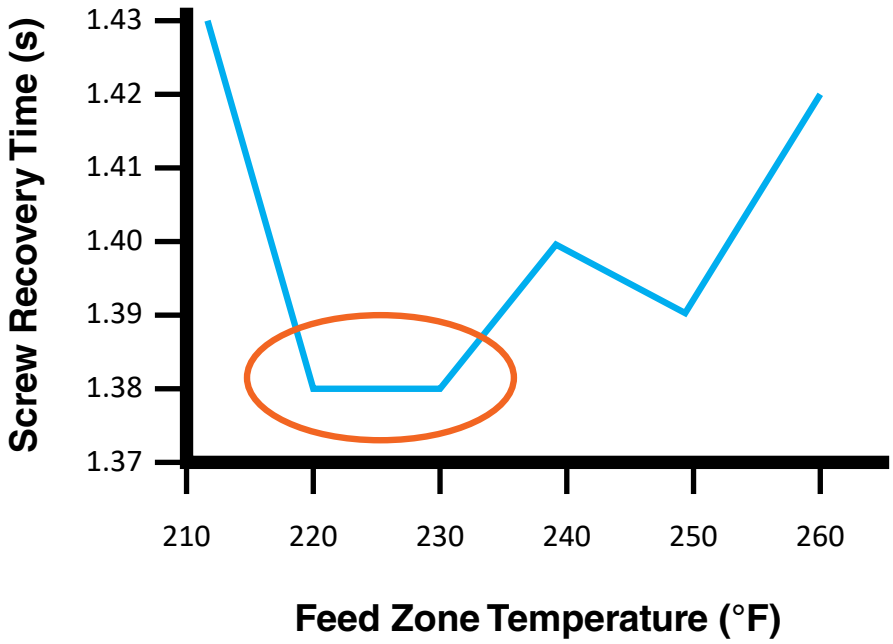
Poor Color Distribution can result from inadequate Back Pressure, excessive Screw Rotation Speed or an improper Feed Zone Temperature setting.

As the screw rotates, the melted polymer should have some backflow within the screw flights to ensure the material and additives are properly mixed. Inadequate **Back Pressure** can jeopardize the mixing of colorants during Screw Recovery.

If the screw rotates too quickly, un-melted pellets can be forced through the transition zone into the front metering zone of the screw before they become properly melted. As a result, the pellets finish melting in the metering zone and do not remain in the barrel long enough to properly mix.

The best melting occurs when the un-melted material is transferred from the feedthroat to the transition zone in a smooth and consistent manner. If the **Feed Zone Temperature** is too high or too low, the material will either stick to the screw or not feed properly — and may not melt, convey, or mix properly.





To determine the optimal feed zone temperature for your process, you should performa **Feed Zone Temperature Study** — also known as a Tact Temperature Study. This is accomplished by graphing Feed Zone Temperature vs. Screw Recovery Time.

The optimal Feed Zone Temperature yields the lowest Screw Recovery Time.

Once the optimal feed zone temperature is determined, you should adjust the **Screw Rotation Speed** so that Screw Recovery consumes 80% of the overall Cooling Time.

When mixing issues occur, it is always best to verify the **Melt Temperature** and the **Back Pressure** accord with the documented standard before making adjustments.

Screw Design

Most molding machines are equipped with a general purpose screw. These screws are designed to melt and process most materials, but are not optimized for the proper mixing of any particular material. As a result, many materials do not melt and mix well with these screws.

To optimize melting, you may need to consider using a screw that is better suited for the material that is being processed. Your machine or screw provider will be able to help you choose a screw specifically designed for your application.

If you must use a screw which is not optimized for the process, it is best to slow down the Screw Recovery to give the material more time to properly melt and mix.