FAILURES WITHIN ROTOMOULDING - Part 3

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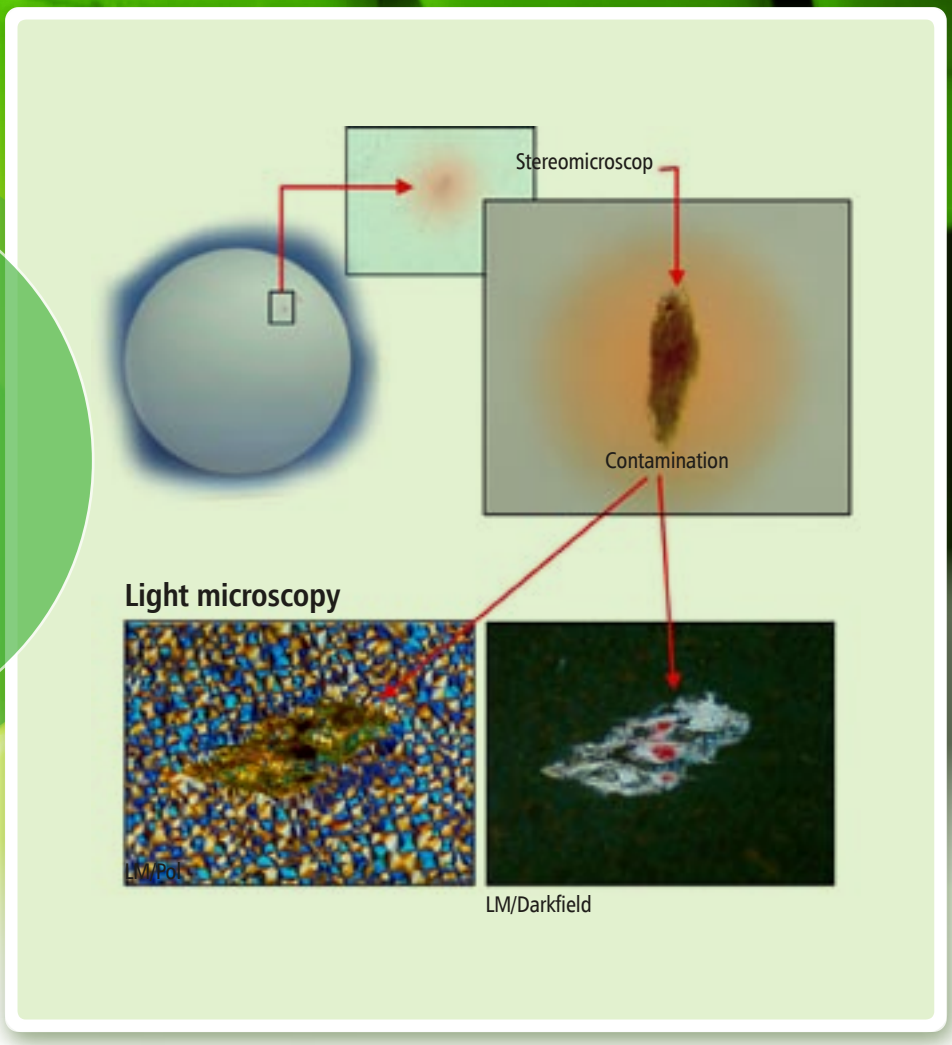
This is article number 3 in the series of top ten reasons for failures within rotomoulding. Previously we have discussed the areas as:

**concentration of pigment,
venting problems,
wrong material selection,
notch sensitivity,
design,
material distribution**



∧ Fig. 1

In this article we will focus on the problems number 3 and 4 and start with:

4. Contamination:

There are innumerable possibilities to get contamination in a material. Therefore it is important for all in the value chain to have good procedures to avoid this happening. The rotomoulding process itself has characteristics that contamination easily can be seen in the end product. During our investigation of failures, we have seen a lot of reasons why failures are happening. Here are some possibilities when contamination can take place:

- Silo at the producer
- Transport of the material
- Contamination at the grinder.
- Contamination when doing dry mixing
- Cleaning of the mould

As said, there are many possibilities for contamination, but the most important is to keep good tidiness and cleanliness in the factory.

The contamination is easy to see on the end product and by help of microscopy investigation also relatively easy to find the reason.

Attached images are illustrating such an investigation. See fig. 1.

The problem was that it was found particles with different color in the product. By help of a stereomicroscope and identification using FT-IR the discoloration was found to be a polyamide particle. The question was, where did it come from? The producer did not produce Polyamide. The customer did not use Polyamide. However, it was found the grinder used brushes during cleaning of the mill made of Polyamide. Parts of the brush loosened during cleaning and contaminated the material.

The next image is illustrating the same method to find the reason for contamination.

The microscopic picture shows the crystal structure in a material is strange, the material contains of two materials. When the particles are analyzed by FT-IR, the spectra will give different peaks than for PE. In this way the contamination can be identified. See fig. 2.

3. Inhomogenity:

Inhomogenity has a lot common to contamination. This is a problem which we feel has relatively low focus in rotomoulding.

Inhomogenity can occur in different ways, but the most common is occurring in black materials. When making a black compound, it is extremely important to achieve good distribution of the CB. If not, there will be difference in density from particle to particle. This will be seen as uneven inside surface.

Inhomogenity can also occur in pigmented materials. Uneven distribution of the pigment, due to bad mixing in the extruder will create density variations. In addition we can find inhomogenity in natural material. This will occur during production or during grinding where particles with different densities are mixed together.

Inhomogenity is easy visible in the end product. By inspecting the inside surface, we can easily demonstrate the inhomogenity.

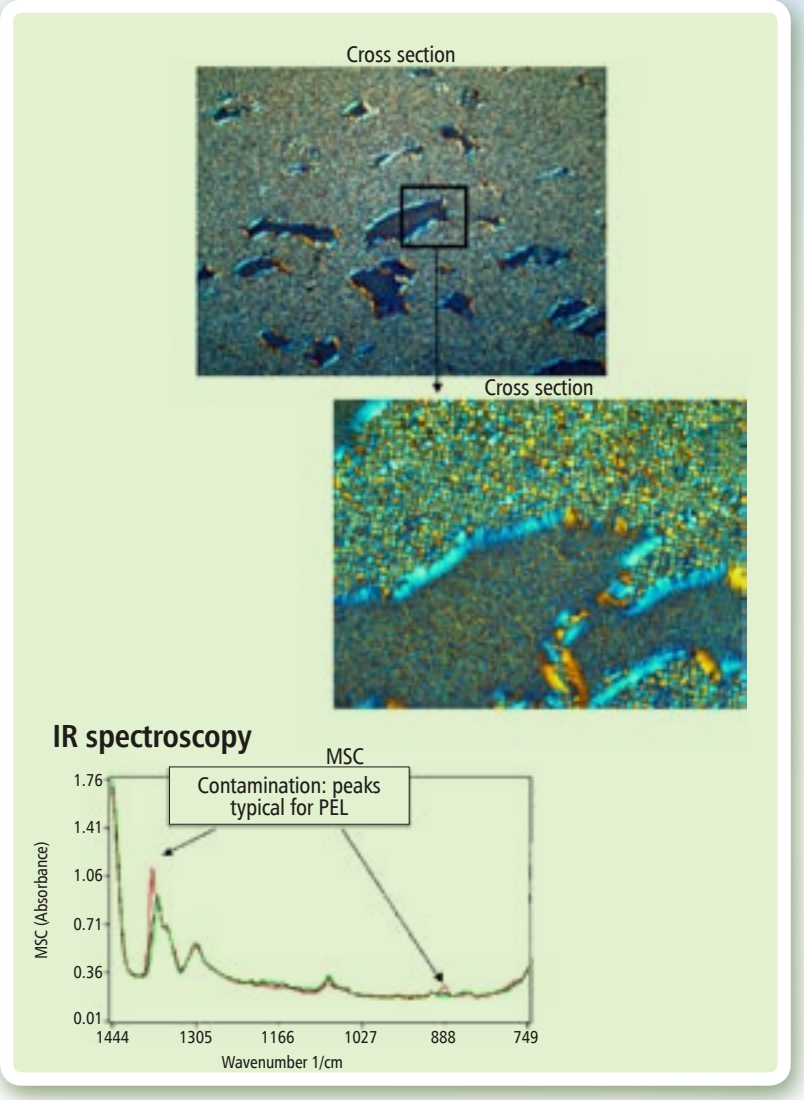
Attached you can see 3 different pictures of structures caused by inhomogenity.

1. Mix of two materials with different densities. **See fig. 3**.
2. Mix of natural and black material. **See fig. 4**.
3. Particles with different CB content. **See fig. 5**.

When you are experiencing this kind of surfaces, the materials should undergo a quality check.

Inhomogenity is mainly a visual problem. Still it should be avoided, because it can also influence the physical properties. It can also have influence on warpage, because materials with density variations will freeze out at different temperatures in the process.

Because the inhomgenity mainly is created during the production of the material, one should put high demands on the supplier. In addition keep good internal procedures.



^ Fig. 2

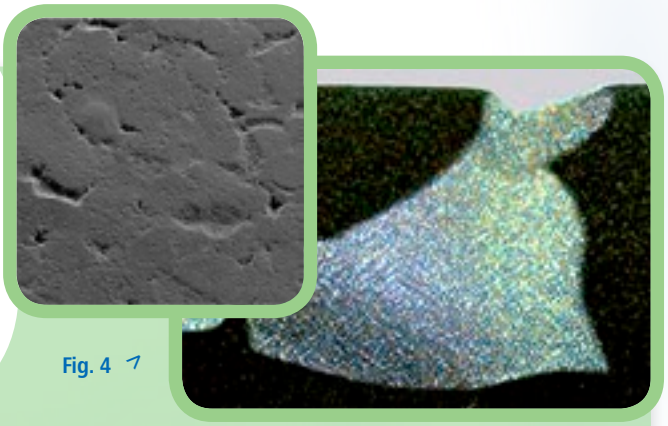
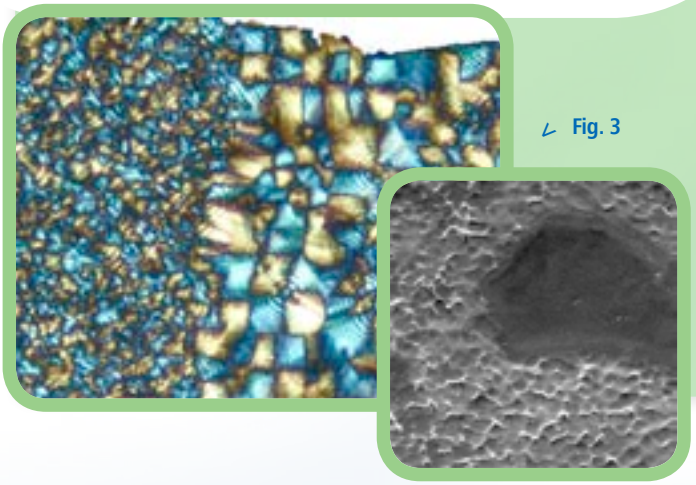


Fig. 4 ↗



↙ Fig. 3

Fig. 5 ↘