

Life Expectancy of a Rotomoulded Item

We know that several factors including the additive package such as the UV stabilisers, the geographical location, the quality of the selected pigments and the moulding conditions can influence the quality of a rotomoulded product and therefore the lifespan of a rotomoulded article. In this article some critical aspects are highlighted.

Additive Package

In terms of UV stability, the addition level and the type of additives used to protect polymers from the harmful action of UV are the major aspects we consider. Our standard rotational moulding grades are UV stabilised by adding HALS (hindered amine light stabilizers). They are extremely efficient against the degradation of the polymer caused by sunlight. HALS additives can reduce the formation of free radicals which destroy the PE chemical bonds. UV radiation is one of the major responsible factors for polymer degradation which can be seen as a loss of physical and mechanical properties. For example, resins such as Revolve N-332 are classified UV15 in accordance to ASTM G155 (G26). This means that after 15000 hours of exposure in a weather-o-meter (accelerated test) the material retains at least 50% of the original physical and mechanical performance. The elongation at break is the parameter measured during the execution of the test at specific intervals. UV protection, if required, can be enhanced by the addition of extra UV stabilisers in a compounding process.

Location

Geographic location, along with changes in climate and elevation, can affect the actual performance of a rotomoulded item. Sunshine variation is the key variable when correlating accelerated (weather-o-meter, WOM) and outdoor exposure data. For example, our UV15 natural grades can last more than 6 years in North/Middle Europe, but this would be 4 years in Florida or possibly less in a very harsh environment.

Rotomoulding Conditions

The moulding conditions have an important role since the material performance can be affected by them. Overcooking the material will drastically reduce the additive protection because of the oxidation process generated by long exposure to oxygen in a very hot environment (e.g. oven). This would reduce both the amount of antioxidant (needed for long term protection in warm environments) and the UV stabiliser as they are both sacrificial in action. Once they are gone, they're gone!

Pigments and colours

Light fastness, heat stability and weatherability

In colour compounded powders, pigments and colorants are chosen in accordance to the Blue Wool Scale and colour fastness criteria. The Blue Wool Scale measures and calibrates the permanence of colorants. Traditionally this test was developed for the textiles industry but it has now been adopted by the printing and plastic industry as measure of light-fastness of colorants.

A rating between 0 and 8 is awarded by identifying which one of the eight strips on the blue-wool standard card has faded to the same extent as the sample under test. Zero denotes extremely poor colour fastness whilst a rating of eight is deemed not to have altered from the original and thus credited as being lightfast and permanent.

We understand how harsh the rotational moulding process can be due to the prolonged contact of the polymer with a significant amount of Oxygen at high temperature in the oven. Therefore, the pigments should be very stable against thermal degradation. In general terms the pigments which can be suitable for the rotational moulding process have heat stability greater than 260 °C.

Another important property of pigments we assess is the resistance of the pigment against weather conditions such as humidity and rain. The scale is between 1 and 5 with 5 regarded as the maximum.

For industrial applications permanence and stability are desirable properties. But the pigments we use are not permanent and therefore called **fugitive**. Fugitive pigments fade over time, or with exposure to light. Whilst this process can be slowed and pigments chosen to minimise fading, it cannot be stopped.

Therefore, selecting pigments with high quality characteristics as described above being very stable against UV radiation and light exposure are less prone to fade but they will at some point.

It is important to note that the fading of colour does not necessarily indicate a significant loss of material performance. These actions are separate

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