identiPol

Application Note

Checking PP batch suitability prior to manufacturing

The identiPol QA2

The Confirmation mode of the identiPol QA2 system can be used to confirm that a fresh batch or delivery of material from your supplier can be processed without issue. This article sets out how the Confirmation mode may be used for the rapid assessment of Polypropylene (PP) material in a quality assurance procedure.
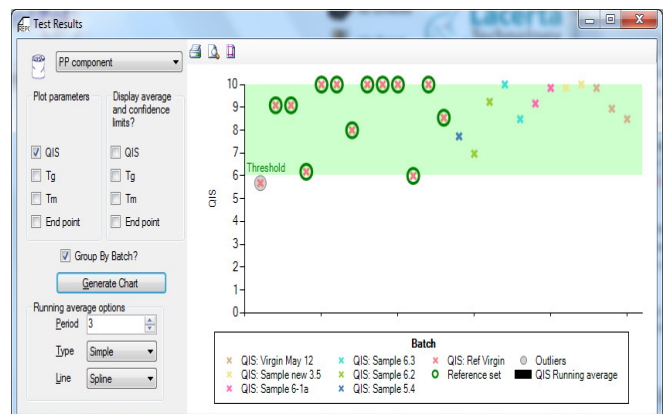
First the system "learns" the properties of good material - in this case PP - by measuring 10 to 20 batches of good material that have previously been processed without problems. These measurements are used to build a reference set against which future batches can be compared against.

The identiPol system uses the QIS as a measure of similarity between in-coming material and the reference set. A QIS of 10 would indicate that the samples are totally identical and a value of 0 would mean they are completely different. In practice, values between 7 and 10 are perfectly acceptable in order to have confidence that the material may be put onto the production line with confidence. The simplicity of using the QIS value as a measure of PASS (7 or over) or FAIL (less than 7) cannot be over emphasised as it enables new, inexperienced or non-technical staff to quickly make a judgement prior to putting material into the manufacturing process.

Test samples are prepared by moulding a couple of plastic granules within the identiPol QA2 to give a consistent material for measurement. This is then followed by a second heating regime to measure the properties of the new batch of material.

A sample score between 4 and below 7, would usually indicate it is very similar, but a key property (e.g. a lower softening temperature) is different. Contamination is one reason why a QIS value could drop below 7. If there is contamination in sufficient quantity to affect the QIS, then it will almost certainly affect either processing or product properties.

In the example below the QIS value is shown for various samples of a PP component. Along the X-axis (horizontal axis) the various batch and / or reference material can be plotted. You can imagine this axis to be Time, with the most recent result on the left and the oldest on the right. Along the Y-axis (vertical axis) is plotted the QIS value for each sample measured. The green band at the top of the graph is the "Pass Region" and results falling in this zone are acceptable and the material can be processed. Any results falling in the white area below the green band fall in the "Fail Region" and this material should be rejected and not used in production.

QIS values for test batches (crosses) and reference data for known good batches (circles)
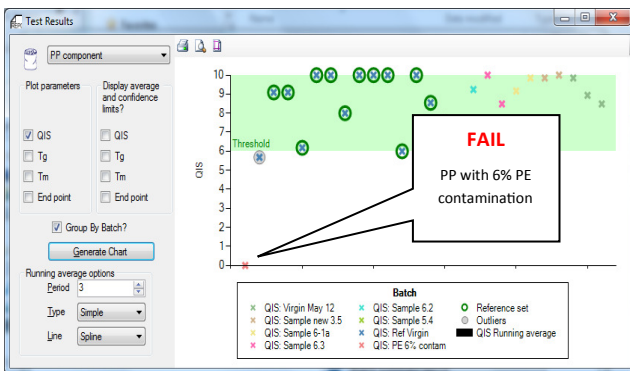
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For all the material analysed the consistency of these batches is clear, with the average for each batch scoring over 7.

Small levels of contamination can make a large difference to the processability of a material and of the properties of the final moulded part.

A fresh batch of material, contaminated with only 6% of PE (Polyethylene), was then evaluated using the QA2. The QIS value is seen to drop to zero with only a small amount of contamination, illustrating the sensitivity of the QA2 to detecting differences between batches of material

Loading a PP sample into the identiPol QA2

QIS values showing a FAIL due to contamination of PP

So, by using the identiPol QA2, within 10-15minutes of a new delivery, an operator can easily make a decision about the suitability of accepting and using the fresh material on the production line.

For most purposes, this simple PASS / FAIL approach of the Confirmation Mode of operating the identiPol QA2 is sufficient to justify the adoption of the system within the manufacturing environment. However, detailed reporting, statistical analysis and visualisation of the raw data are possible if further evaluation is required.

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