



Quality Control for Thermoplastics

- Production issues??
- No laboratory?
- Limited test facilities??

Have you ever experienced any of these situations?

"That lug broke off the moulding as it ejected again"

"We got short shots with this new batch and it took ages to reset the machine conditions"

"The finish on these parts isn't as good as before"

"These mouldings are badly distorted compared to those from the last batch of material we used"

"Our customer has rejected the whole batch of mouldings because impact strength was too low"

"I'm sure this isn't the same grade polymer we had last month....guess we will just have to believe the supplier"

If ONLY there was a SIMPLE TO USE device that gave a RAPID quality check on both incoming raw thermoplastic material and finished goods.

Additionally it should be INEXPENSIVE too.

Well now there is such a product .. The



- Set-up is fast and most users are measuring samples within half an hour.
- No complicated data to interpret, just a single numerical value showing how close the new is to the old.
- The high speed thermal analysis principal behind this technology means that the tests are **not affected by strong colours or fillers** such as carbon black that have affected results from other devices in the past.



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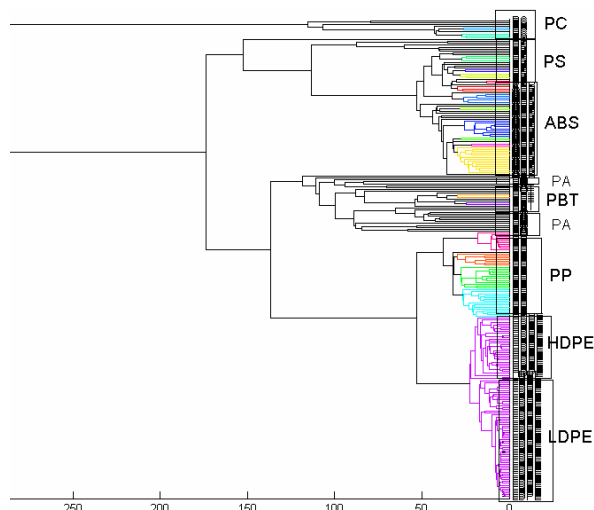
How does it work?

The principle behind this technology is a variant method based on well founded thermal analysis procedures.

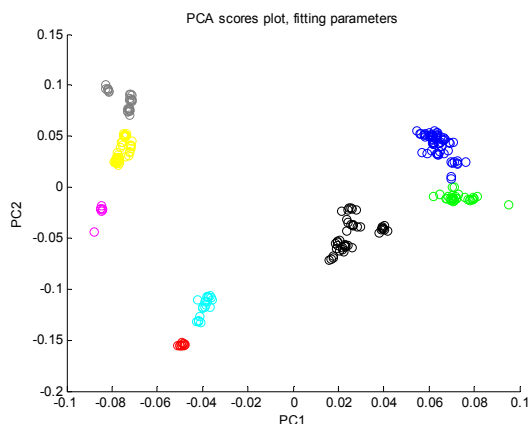
The success of this unit depends very much on the novel Pat. Pending sample holder and preparation procedure. This allows material in pellet or other forms to be moulded consistently whilst at the same time provides a heat transfer lattice throughout the prepared sample enabling very rapid heat transfer. This in turn allows for very rapid analysis of the material. As this methodology is not based on optical analytical methodology, no issues arise from using filled materials including carbon black. The result is not affected by these additions.

A full thermal profile which includes relaxation, crystallisations and melts is reduced by mathematical means to a simple statistical probability. These procedures were developed jointly by the Chemometrics Department at Bristol University in the UK and Triton Technology Limited.

The raw data can be presented as dendrograms:-



Alternatively, the data can be presented as cluster diagrams. Each colour represents a different polymer in a multidimensional matrix. The diagram below is shown only in 2 dimensions but clearly illustrates the groupings:-



Both methods show very well how polymer types can be grouped effectively using this technique.

Taking each set of data for a particular thermoplastic material, a learning set can rapidly be produced by

running known material of acceptable quality. Subsequent samples can be compared against this set. A statistical probability judges how close the unknown sample is to the learning set and it is this value that is the normal output from the identiPol unit.

For many polymers, a rapid thermal scan (typically taking 2 or 3 minutes), from ambient is suffice to give good QA data. However, some polymers can benefit by starting at sub ambient temperatures. This is achieved by connecting a cryo cartridge to the unit. This contains a cryogenic liquid based on tetrafluoroethane, a non ozone depleting gas. These are disposable and economic to use.

The unit contains both the sample preparation station and the analytical station combined for ease of use. The unit should be connected to a PC and the simple software takes the user, either novice or experienced, through the simple test. A result is then displayed. This is automatically compared to previous data and samples.

Future Products

It is envisaged that the identiPol **QA** version can be upgraded to the planned identiPol **PRO**, due to be released autumn 2008. This version will have advanced identification routines for unknown thermoplastic materials and additionally will reveal key thermal events such as softening points and melts.

As part of the ongoing development of this product, certain potential users may be eligible for free upgrade in return for library information necessary as part of the identiPol **PRO**'s operation. To determine if your company may be a suitable partner, please contact Dr John Duncan at Triton Technology Ltd. email address johnnd@triton-technology.co.uk

Other Triton Technology Ltd. Products

- **Humidity Control and Generation**

Triton Technology Ltd. produces Humidity Control and Generation units designed for small volume chambers. For very high performance, volumes up to 200ml can be controlled to 85°C and 85% humidity with a suitably designed chamber (this must have no 'cold spots' and very even heat distribution). Volumes up to 2 litres can also be controlled to a lesser specification.

- **Dielectric Thermal Analysis**

Triton Technology Ltd. also produces a Dielectric Thermal Analyser. This unit is ideal for characterising many polymeric thin films and sheet material. Relaxation information such as the glass transition (T_g) is readily obtained using this system.

- **Shimadzu Thermal Analyser systems**

Triton Technology Ltd. is the official importer into Europe for the Shimadzu Thermal instrumentation line. This is retailed primarily via Trilogica GmbH throughout Europe either directly or via the local sub agent. In the UK, Shimadzu Thermal instruments can be obtained directly from Triton Technology Ltd.

- **Contract materials characterisation service**

Triton Technology Ltd. operates an extensive contract and analytical laboratory for characterisation of polymeric materials.

Enquiries can be made via the web site for any of the above products or services: www.tritont.com