

Welcome to the October 2025 edition of LPD Lab Services Newsletter

LPD Lab Services are the experts in materials, chemicals, technical engineering and scientific problem solving for products and manufacturing processes across all sectors within Quality Assessment, Facilities, Manufacturing, Engineering, Product and Process Development and Research. LPD Lab Services develop innovative and practical analytical solutions, as well as bespoke testing methods for in-process manufacturing, finished products and field failure, plus help develop new production processes, products and materials. Staff pride themselves resolving some fascinating and complex technical problems from across diverse product ranges and sectors of industry. The laboratory offers pragmatic scientific and engineering solutions, with timely response times and clear communications, which are all core to the company's business model.

This Edition at LPD Lab Services:

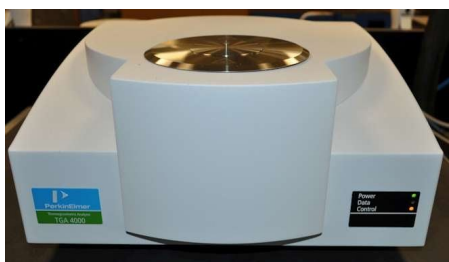
- **Analytical Method Development and Method Validation.**
- **TGA / DSC- Thermal Gravimetric Analysis and Differential Scanning Calorimetry.**
- **Pyrolysis-GC-MS: Introducing the new CDS 6200 system.**
- **Technical Spotlight: 3D Printing Filament Quality Under the Microscope.**

Analytical Method Development and Method Validation

LPD Lab Services draws on the wealth of experience from its research, qualified experts, Chartered Chemists, Six Sigma Black Belt and our consultants to assist in the development of bespoke analytical methods for its clients. These methods can then be validated by LPD's staff to the requirements of the customer.

Where official bodies, such as UKAS, require validation to be carried out using the client's equipment at their premises, the laboratory can partner with the client to define appropriate quality parameters. The additional results required for inter-laboratory comparison data can then be generated by LPD lab services to complete the validation. HPLC, GC, GC-MS Thermal Desorption GC and all of the other chemical analytical techniques on LPD Lab Services website are available for method development and validation activities.

Once methods are developed, qualified staff may deliver training in the method which has been developed and validated for the client; transferring over the methodology or keeping the tests in-house as required. In some cases, clients decide to keep the routine testing at the laboratory to benefit from their experience, rapid response times and professionalism which become particularly important when unusual results are generated that might indicate manufacturing failures: the laboratory can quickly respond to solve such problems from a point of knowledge.



TGA / DSC Thermal Gravimetric Analysis and Differential Scanning Calorimetry

Thermal analysis is a group of techniques with precision-controlled temperature programs that quantify how materials properties change with temperature. LPD Lab Services has two complementary techniques:

ThermoGravimetric Analysis (TGA) and Differential Scanning Calorimetry (DSC), both of which have recently been upgraded to a PerkinElmer 4000 series. The DSC also now has liquid nitrogen cooling technology, extending the temperature range from -100°C to 450°C.

- TGA measures the change in mass of a material as it is heated. This can be performed in inert or oxidising atmospheres to allow degradation temperatures to be explored in inert or oxidising conditions. Interpretation of the resulting thermogram can provide evidence of volatiles, polymer content, carbon black filler content and inorganics, as well as breakdown temperatures.
- DSC measures the amount of heat energy required to increase the temperature, allowing for determination of transition temperatures and phase changes, for example glass transitions in polymers, melting points, crystallisation temperatures, and degree of crystallinity and degree of cure.

DSC can also be used to measure onset degradation temperatures ODT and estimate polymer thermal lifetimes. Thermal analysis is typically used to analyse polymers and rubbers but can also be used on a variety of other solid and liquid samples.

Pyrolysis-GC-MS: Introducing LPD's the CDS 6200 system

LPD Lab Services has recently upgraded its pyrolysis capability to the new CDS Analytical 6200 pyrolysis system. This powerful system giving faster results, greater accuracy, and deeper insights into the materials being tested.

Pyrolysis GCMS is a technique that uses heat to "fingerprint" materials by breaking them down into their building blocks. Key uses include:

- Identify unknown polymers, rubbers and additives.
- Compare suppliers and formulations.
- Spot quality or performance issues early.

The lab combines Pyrolysis-GC/MS with other existing techniques to give a more complete picture of both chemistry and performance:

- FTIR - for quick polymer identification.
- SEM/EDX - for surface and elemental analysis.
- TGA/DSC - for thermal behaviour linked to mechanical properties and residual stress.
- Mechanical testing - for strength and durability.



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Technical Spotlight: 3D Printing Filament Quality Under the Microscope

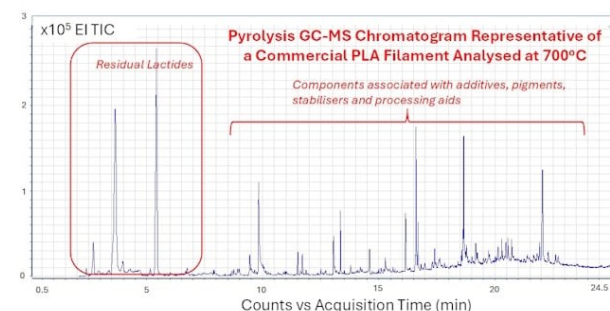
As 3D printing expands into prototyping, production, and education, the quality of filament feedstock (PLA, ABS, Nylon, PETG, ASA and others) directly affects performance, reliability, and even user experience.

At LPD Lab Services, Pyrolysis-GC/MS was used to investigate a selection of commercial PLA filaments, applying a two-stage heating profile to capture both low-temperature volatiles and high-temperature decomposition products.

Key findings:

200°C (thermal desorption): Revealed formulation differences between suppliers, including residual lactide, esters, fatty acids, and plasticisers such as di-n-octyl phthalate. Trace bromo-aldehydes and dye derivatives were also detected, which may contribute to odour or colour variations. 700 °C (pyrolysis): Showed the PLA backbone breakdown into lactide, cyclopentanone, hydrocarbons, and additional additives such as adipates, phthalates, stabilisers, and surfactant derivatives.

Why it matters:



- Confirms the identity and consistency of supplied polymers.
- Highlights differences in additive packages that may influence print performance, stability, or long-term reliability.
- Supports supplier comparisons and benchmarking, troubleshooting and quality assurance.