



Optiject

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ABSTRACT:

Injection moulding is a complex process and is dependent on the relationship between the supplied material and the processing conditions. The properties of the plastic materials are directly dependent on the temperature, time and environment. Any change in the injection moulding variables, such as temperature, pressure and speed, the mould temperature, the mould cooling temperature, the backpressure and the cycle time, to mention but a few, can change the process stability, affecting the subsequent consistency and quality of the manufactured parts.

The simultaneous control and adjustment of the injection moulding parameters and properties of the material poses a major challenge for plastics manufacturers and the subsequent manufacture of quality parts that are of a consistent high quality and free from defects proves difficult. Defect detection and quality improvements are mostly carried out on the basis of quality control of finished parts, using visual inspection, weighing the moulded parts or using off-line analytical and mechanical measurements. To date, the optimisation of certain parameters of the injection moulding has been carried out using off-line analysis of the finished products.

This project will build on the results of past research that has demonstrated the feasibility of using near infrared spectroscopy as a quality control tool in an injection-moulding machine. The optical fibre probes allowed in-line process monitoring of the material passing through the injection moulder. Preliminary results showed that the near infrared system can detect several types of materials, can identify colour changes and moisture in materials. Access to a technology that would enable injection moulders to monitor and control their injection moulding processes in real time, would hold significant benefits for higher throughput and increased productivity, cost reductions, improved quality control, health and safety.

KEYWORDS: Injection Moulding, (thermo) plastics processing, polymers, NIR/UV-vis spectroscopy, in-line monitoring, real time control

A novel spectroscopic instrument for in-line monitoring during injection moulding

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