



A SERVICE ORIENTATED ARCHITECTURE ENABLED WIRELESS SENSOR NETWORK APPROACH APPLIED TO MEASUREMENT AND CONTROL OF A MICRO INJECTION MOULDING PROCESS.

Umar Raza^{2*}, Y.F Hu.², B.R. Whiteside¹, P.D Coates¹

1IRC in Polymer Engineering, School of Engineering, Design and Technology, University of Bradford and 2Communication Systems Engineering, School of Engineering, Design and Technology, University of Bradford, Bradford United Kingdom-

Corresponding author: r.umar@bradford.ac.uk

The monitoring of the Micro Injection Moulding (μ IM) process has historically been limited to the μ IM machine level where the data from the process is only available through the machines LCD interface. New developments allow process information to be sent over wired network links, but the resolution of key process data is typically too low for adequate characterisation of micromoulding processes due to the small time scales involved (fill times are typically in the region of 1-5ms). In light of this, the availability of the high resolution process data in real-time over the internet would have huge benefits in terms of process monitoring, material and product quality, and integration with other business components of an enterprise. This paper presents a generalised methodology which takes advantage of the Service Orientated Architecture (SOA) (De-facto solution in Enterprise-IT systems) and applies it to a network of wireless sensor nodes installed in the μ IM machine and the industrial micromoulding environment. Process data is recorded at acquisition rates in excess of 1000Hz and transmitted wirelessly using a sensor node to a central gateway which converts and presents the data as a service through the use of Web Services. Using a remote server, this data is then integrated with other process information related to the specific product including material storage/handling/drying, quality inspection measurements and packaging. This data can also be linked with standard business processes such as stock control and shipping. Such a system has numerous benefits for production manufacturing systems including: Statistical Process Control (SPC), Failure Modes and Effects Analysis (FMEA), Intelligent Process Optimisation (IPO) alongside the usual benefits offered by Enterprise systems such as resource management, order tracking and billing.