Large-Scale (1.4m wide) Roll-to-Roll Research Platform

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1. Introduction

The Centre’s objective is to create the next generation of production technology, processes and machines for ultra precision manufacturing. One of the research platforms developed for this purpose is the large-scale Roll-to-Roll (R2R) platform at Cranfield University. This platform will enable research into the technology and process developments required to realise truly large area film processing, for both passive (e.g. optical) and active (e.g. printed electronic) functionality.

2. Scale

While developed as a research platform, the roll-to-roll machine is capable of producing at real-world manufacturing scale. Hence the web-width is developed for 1.4m (48") width rolls. Flow rate of product will be in the metres-per-minute range, dependent on the subsequent processing stages. Targeted minimum resolvable feature size is in the sub-5μm range for layer-to-layer feature alignment in multi-layer laminated structures.

3. Process Stages

Current stages are an embossing system; imprinting 20μm x 20μm optical gratings for metrology purposes, a slot-die coating station for layer deposition, a UV curing station to harden and fix the coating and a metrology station. The platform includes roll-on and roll-off systems for the unprocessed and processed films.

A second process platform is in design for additional stages of metallisation and lamination and will utilise the control and motion technologies already developed for the first platform.