SCREEN TIME

Mark Evans explains how screen-making can benefit from automation, in the form of CTS combined with a tailored modular inline solution

Automation: 'the use of machines or computers instead of people to do a job, especially in a factory or office' (definition of automation from the *Cambridge Business English Dictionary* © Cambridge University Press).

Traditional screen-printing is an ancient art form… dating back over 1,000 years to China around 950AD. As such, it has always been seen as an artistic endeavour, with the commercialisation of the process being a relatively recent development. In the early 20th century, the invention of photo-sensitive emulsions catapulted screen printing from an artisan-based cottage industry into the mainstream. The arrival of the first manual carousel presses for t-shirt printing in the late 1960s spawned an entire industry and represents an early example of how even a basic level of automation can facilitate rapid change and growth.

LABOUR SAVING

Today a modern day textile screen printing factory bears little resemblance to its forebears, even though the basic principles remain the same. Automation is everywhere – from the computer-based graphics software used to design complex t-shirt artwork to dedicated colour separation and RIP programs that facilitate the process of imaging the stencil on the coated screen. Automatic carousel presses arrived in the late 1980s allowing for complex multi-colour designs to be printed by a single print operator.

In the screen room itself, the physical process of making the screen stencil has lagged behind some of these other automation developments. While the process of imaging a film positive can be considered an automated 'digital' process – controlled by computer, the physical task of placing the film on the screen, exposing it to a UV light source and then washing out the unexposed emulsion (rinsing or developing) is, for most screen shops, a manual, labour-intensive process.

"Technology used in the screen wash systems for screen reclamation can be easily adapted for screen developing"

One innovation is automatic screen coating machines as an aid to coating the screen emulsion on the mesh but although these systems are gaining popularity, they are more about improving quality and consistency than about saving manpower.

COMPUTER-TO-SCREEN

The introduction of computer-to-screen (CTS) systems in the last decade has seen the textile screen room take its first major steps towards automation. CTS systems can take several forms but the most popular use a wax or water-based ink jet print system to print the stencil image directly onto a screen pre-coated with a conventional photo-sensitive emulsion. Exile's Spyder II & new Spyder III systems are good examples of this technology. CTS removes the need for using film positives and provides accurate digital placement of the image on screen, ensuring precise screen-to-screen registration and removing the possibility of human error, and saving labour costs. CTS has also been shown to deliver improved image quality compared to using film – partly because the direct application of the image helps with the UV exposure process as it removes the need for a vacuum and ensures that undercutting, whereby UV light 'creeps' under the stencil, is completely eliminated.

RECLAIMING SCREENS

CTS is now seeing widespread adoption rates. But for most shops the exposure and subsequent screen rinse or wash-out has remained a manual process. In particular, the most labour-intensive process that remains in the majority of screen rooms is the wash-out process to 'develop' the screen stencil. Typically, this involves an individual armed with a pressure washer standing in front of a wash-out booth, rinsing out the un-exposed emulsion by hand.

By contrast, the equally labour-intensive processes that are involved in screen reclamation have seen a number of manufacturers bringing out standalone and inline screen washing and de-coating machines that automatically remove the ink

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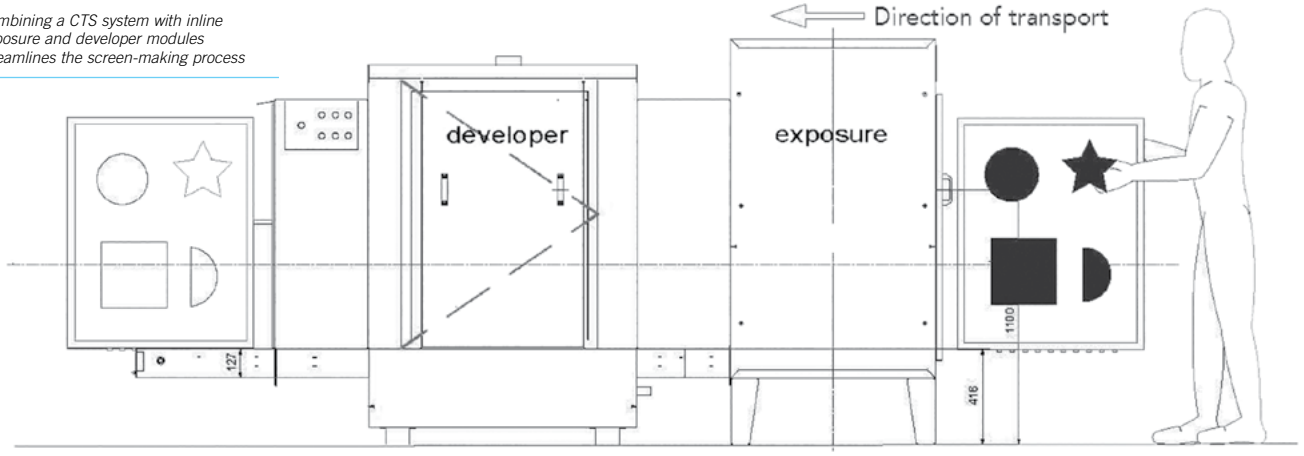
CTS systems such as Exile's Spyder III are helping textile screen rooms to embrace automation

The vertical design of Exile's V-Lux exposure unit allows for easy loading and unloading of screens



Combining a CTS system with inline exposure and developer modules streamlines the screen-making process

and emulsion from a used screen. First the old ink is washed off the screen and then the old emulsion is removed using high-pressure jets and chemicals. The screen can then be re-used without requiring it to be re-meshed. Previously this process was a very time consuming and labour-intensive activity. An automatic screen reclaim system is a proven labour-saving investment.

These same manufacturers – companies such as Lotus Holland, Inpro, Zentner and Grünig are now turning their attention to the front end of the screen production process: screen making rather than screen reclaiming. The technology used in the screen wash systems for screen reclamation can be easily adapted for screen developing – in fact it is a simpler process, as no chemicals are required. M&R was one of the first companies to address this issue when it started marketing the standalone Eco-Rinse which automatically rinses or 'develops' the exposed screen using high pressure water jets. However, this process still requires an operator to manually load and unload the screens by hand, so its labour-saving credentials are somewhat limited.

INLINE APPROACH

Using the same inline approach as their reclaim systems, some companies are now adding a screen exposure cabinet to the front end of their developer systems to create an inline screen-making solution that can take a CTS-imaged screen stencil and automatically expose and develop using a two-stage modular process. These systems have been designed specifically to work with inkjet CTS systems – the UV exposure module can be designed vertically as it does not require a vacuum when used with computer-to-screen inkjet stencils.

"An inline screen-making solution can take a CTS-imaged screen stencil and automatically expose and develop it using a two-stage modular process"

In 2017 Lotus Holland released its Lumenator II system – an inline exposure and developing system that could process screens at a rate of up to 40–50 screens an hour.

Another European manufacturer, Inpro has adapted its TigerClean screen developer unit so that it can be converted into an inline system in conjunction with Exile's stand-alone V-LUX upright exposure cabinet.

With an inkjet-based CTS system and inline exposure and developer modules, a fully automated screen room workflow can now be achieved for an investment of less than $US 100,000 (£76,944).

AUTOMATED SCREEN-MAKING

The automated screen-making process can work as follows:

The screen room operator images a screen stencil on an inkjet CTS system with a typical imaging time of one minute or less.

The screen is then inserted into the inline system for exposure. Exposure times on an LED based UV exposure system can be from 10 seconds up to about a minute, depending on emulsion type and mesh count.

While waiting for the first screen to expose, the operator can be setting up a second job on the CTS system.

Then the second screen is inserted into the inline system and the first screen is automatically transported via a moving belt into the developer module.

High pressure water jets in the developer rinse the screen – removing both the water-soluble ink from the stencil and the unexposed emulsion underneath. Depending on the jet volume and water pressure, wash-out times as fast as one minute can be achieved.

While waiting for the first screen to finish developing, a third screen can be imaged on the CTS system.

The key point about this process is that each stage of screen production takes one minute or less. The first screen will take maybe three minutes to produce (one minute each to image, expose and develop). But once the assembly line is up and running, each additional screen will be ready 60 seconds later.

"A single screen room operator can feasibly produce 50–60 imaged screens per hour"

By combining a modern day CTS system with inline exposure and developer modules, nearly all the labour-intensive elements of screen-making are removed. The process becomes almost fully automated and a single screen room operator can feasibly produce 50–60 imaged screens per hour. ■

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Exile's V-Lux inline exposure and development system

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