Digital thread dyeing

Twine Solutions, founded by Alon and Erez Moshe, both veterans of Israel's digital print industry, says that it is on a mission to transform the textile fabric industry one thread at a time. One might say that this is a bold claim but, then again, it has developed what it says is a unique concept, an eco-friendly, on-demand digital thread dyeing system for all sewing, knitting and embroidery applications. Called Twine TS-1800 , it is a highly innovative system that the company says revolutionises the way thread is dyed through increased production efficiency achieved by enabling threads to be custom dyed in short runs and producing samples on-demand. While its primary market lies in apparel, it does however have real attractions for sections of the footwear industry.

The concept is quite revolutionary compared to the traditional system whereby it was a case of finding the closest match a supplier had to offer. For men's shoes that has never been a problem as the colour range tends to be limited to black and a few shade of brown. Trainers are also easy as the vast majority use white thread. Ladies shoes, however, have a wider colour palette and this is where problems can arise. If large production runs are involved, thread can be dyed to match as the quantity involved may justify it. However, as production runs have became shorter due to accelerating changes in fashion, this has become increasingly uneconomic. Twine's digital dyeing system would therefore appear to be a welcome solution.

Digital Selective System

The company has developed what it says is a unique process called Digital Selective Treatment (DST) that refers to how the dyeing ink is digitally and selectively applied to the ink thread in a five stage process using the company's TS-1800 dyeing unit. Firstly, Twine Digital Inks (TDIs) are mixed to match the colour required. This is done automatically based on the company's advanced algorithms. The thread then passes through a treatment chamber to ensure that the mixed ink is applied evenly and penetrates right into the thread after which it moves on to a drying chamber to allow fixation of the dye to take place.

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No additional curing is necessary. The thread is then lubricated if required with the amount of lubricant fine-tuned according to the type of thread and the end product. The finished thread is then wound on to bobbins ready for use.

TS-1800

The TS-1800 digital thread dyeing unit itself measures 1.45m high by 2m wide and 0.75m in depth, so it is relatively compact and, at that size, can be installed in almost any type of production environment. It is apparently also simple to operate as it has been designed for operators of all levels and with no prior knowledge of ink dyeing. Its software system, industrial-grade touch screen and control panel are again said to be extremely easy to use so that the unit can be ready for a dye run with just a few clicks. The system can in fact dye even when the operator is defining new jobs, each one of which is automatically saved in the system's archive and can be loaded at any time. With an output of up to 1,800m of thread per hour, Twine says it is ideal for short runs as, for example, during product development and testing. The system is Industry 4.0 and Textile 4.0 compliant, and TS-1800 dyed threads and yarns are certified by both OEKO-TEX (Standard 100, class I) and Intertek.

Colour selection

The TS-1800's digital interface gives a choice of literally thousands of colours simply by selecting from the systems display. It is also possible to create one's own unique colours using digital colour measurement tools such as colorimeters or spectrophotometers and load them directly to the TS-1800 simply by connecting the system to one's network. The TS-1800 accepts both RGB and L*a*b* colour values and converts them to dyeing parameters using Twine's proprietary colour algorithm. A third-party SW such as textile design SW, Textile MIS and even an Embroidery design SW which all hold the colour parameters, can also send it to the TS-1800, reducing user involvement and making it even simpler to select a colour. On top of these options, the company has also developed a colour capturing technology named True Color Capture (TCC) for apps installed on a smart phone and allows the colour of an object to be captured. Unfortunately, Twine's SnapMatch app using TCC technology is currently only available in Beta format, but this may well change going forward.

No water

The ink used has been especially developed to meet the unique requirements of the digital dyeing process while maintaining the high quality standards that are demanded today. Ink cartridges are said to be easy to replace once empty while the fact that the entire process is water-free speeds up the whole operation. From an environmental point of view, this is a further plus as textile dyeing is the second largest pollutant of water globally. Twine says that an average-sized textile mill consumes 256,000 litres of water per day or the equivalent of 26,000 people's annual consumption of drinking water. Twine, in common with so many companies today, has sustainability as one of its guiding principles and emphasises the fact that unlike other thread dyeing methods, its process uses no water at all.

It also stresses the fact that its digital system reduces the amount of chemicals used in the dyeing process as it uses only nanolitre amounts of dye compared with tens of litres in conventional dyeing, thereby creating negligible amounts of waste. "With our TS-1800 digital dyeing machine, we substantially reduce the amount of waste and pollution that is created and the by-products caused by the supply chain. By making smarter purchasing decisions, aligning expectations early in the process and complying with standards, it's easier to reuse waste in the first place," the company states.

Applications

There are major advantages to be had for producers of limited runs of high quality ladies high fashion shoes where a perfect colour match of thread to upper material is important. The potential savings in terms of excessive inventory and wastage let alone manufacturing time are clear. Only neutral or white thread needs to be stocked and the exact colour produced in-house. Twine's system also offers an opportunity for designers of knitted footwear to explore an unlimited range of colours as samples can be quickly produced in any colour at all and at minimum cost and material wastage as only a neutral or white thread needs to be kept in stock. Bulk production will then use thread dyed to match the chosen colour and purchased in the normal way. With casual footwear increasingly using this type of manufacture, this is clearly very useful. All in all, this is indeed extremely clever technology. ■