POWERDROP – REVOLUTIONISING INDUSTRIAL COATING

Guy Newcombe, Archipelago's CEO, explains the story behind Powerdrop's invention, how it works and where it will make its initial impact

Guy Newcombe, CEO at Archipelago Technology

Archipelago Technology's Powerdrop is a new form of industrial inkjet technology. It has been designed from the ground up to address the needs of priority customers and growing markets. The team behind Archipelago has been embedded in the world of industrial inkjet since its inception in 1990. Traditional industrial inkjet has many strengths, but also has its limitations. Archipelago's founding team came together with a clear purpose – the creation of the "Next Big Thing" in inkjet, to overcome these limitations and open up new markets.

MARKET NEEDS

The Archipelago team visited some of the biggest international names in manufacturing – world class companies making furniture, personal care products and food packaging. Its question – what would you like to do that you cannot do today? What the team heard surprised them. Two needs kept coming up. Firstly, the ability to pattern glue on various products and secondly, the ability to find an alternative to spray painting to create a uniform, reliable coating.

"As the drum rotates, the patented Powerdrop filler fills the nozzles with a controlled amount of fluid"

Glue is used everywhere in manufacturing, but its inherent stickiness makes it difficult to work with. Because glue sticks to everything, it adheres to the gluing application equipment, as well as the product. The physical properties of glue also result in its "stringing", making patterning difficult. It is a big problem for manufacturing.

Spray painting of products during manufacturing, while different, causes similar problems. Paint sprays are high-energy, high-velocity drops which bounce off the product and go into the surrounding air and the application equipment. The result is that the airborne paint needs to be collected in a filter and incinerated. This is expensive and bad for the environment, and the equipment needs to be cleaned often, causing downtime which reduces productivity.

JETTING SOLUTIONS

Could these two problems be solved by a single, adaptable technology? The Archipelago team sat round a table and started to invent. The company reasoned that a large nozzle would be needed as well as a lot of energy behind the ejection process. Glue is very viscous and does not flow easily, which would mean making the fluid feed very short. To test this concept, Archipelago created the original Powerdrop jetter – a simple plastic syringe powered by pressurised gas. This was tested by filling the syringe nozzle with glue, activating the pressurised gas and "bang" – the glue drop shot out of the nozzle and flew across the room!

From here, the essential jetting technology rapidly developed. At the core of its methodology is the Powerdrop drum – a hollow cylinder containing precision nozzles. Archipelago invented two more sub-assemblies to feed fluid into the drum and to jet it out. As the drum rotates, the patented filler imbues the nozzles with a controlled amount of fluid and, as those nozzles pass under the Powerdrop blower, the blower jets the fluid out of the nozzles onto the product being coated.

"The Powerdrop technology uses pneumatic industrial inkjet"

PNEUMATIC TECHNOLOGY

The Powerdrop technology is pneumatic industrial inkjet. Other types of inkjet use heat, electrostatics or piezo-electric actuation to move the liquid drops, whereas Powerdrop uses compressed air. Compressed air is clean, scalable and controllable. The drum confers many advantages. As a result of loading one set of nozzles and jetting from a corresponding set further round the drum, there is no refill delay. Powerdrop, through its spinning

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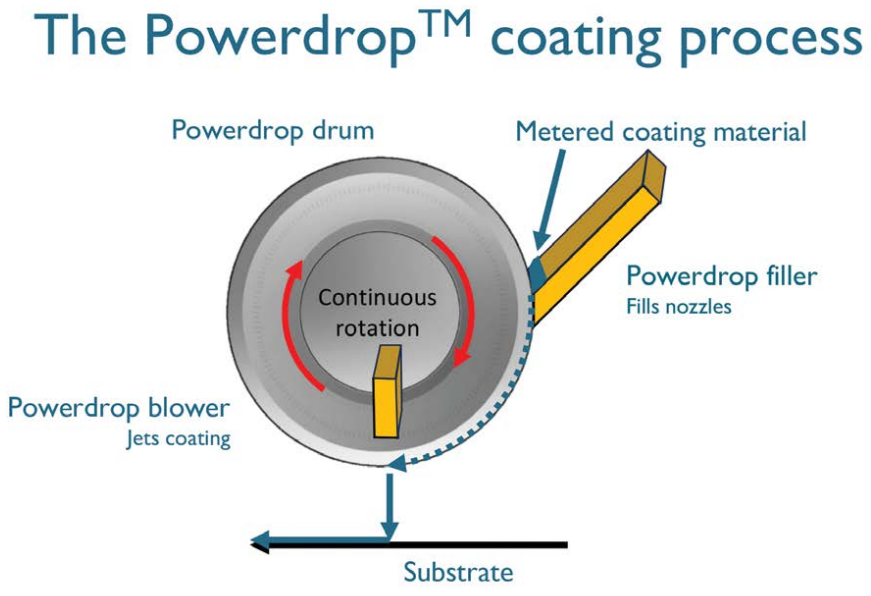

Powerdrop applies coatings with metered coating weight and high transfer efficiency

Saleem Azizuddin inspects paper plates on the 200mm Powerdrop coater

"Powerdrop enables shaped paper containers and paper bottles to be coated quickly, reliably and cost effectively"

drum, delivers a constant, controlled pattern of drops. The nozzle size can be varied for different applications from 100 microns up to two millimetres. Interestingly, the team found that most applications such as furniture, packaging and flooring, can be served using nozzle dimensions of between 0.5 –1.0mm.

CAPABILITIES AND USES

The Archipelago team carried out trials with over 100 different glues, paints and coating materials. Materials such as chocolate, tomato ketchup, hand cream, hot-melt glue, PVA "school" glue, primers, over varnish, ceramic glazes, micro-fibrillated cellulose and metallic inks were used. They have all gone into the Powerdrop nozzles and jetted out. The viscosities that the machinery can manage range from 1–2,000mPas, the solid content can be up to 60% by volume, with particle sizes up to 200 microns. The technology can also manage abrasive materials and those with high and low pH. The Powerdrop drum can be heated up to 180°C to jet hot-melt adhesives.

The materials Archipelago jetted give a good indication of the applications – coating paper to make food-grade packaging, putting down primers and over-varnishes for printing, applying protective layers onto flooring, painting furniture panels, flavouring food and precision agriculture. Remarkably, the same core Powerdrop coating technology can deliver functional coatings for all of these applications.

Paper containers come in all shapes and sizes. They usually need more than one protective coating on each surface

ECO-FRIENDLY PAPER COATING

The worldwide packaging market is worth €900 billion ($1,000 billion). This area of the industry is split between paper, plastic, metal and glass, with paper and plastic each being worth €270 billion ($300 billion). For environmental reasons, consumers and food brands would like to move food and drink packaging from plastic to paper. The problem is that plastic is waterproof and paper is water absorbing. This means that the paper containers need to be coated and, importantly, coated in order for them to be recyclable. Advantageously, Powerdrop enables shaped paper containers and paper bottles to be coated quickly, reliably and cost effectively. Today, no other technology can meet the needs of the industry for high throughput, cost-effective production.

CONCLUSION

Coating paper to enable it to replace plastic packaging will be an important and sizeable area for Powerdrop. The Archipelago Technology team are really focused on building Powerdrop paper-package coating machines and helping the shift to sustainable, low-carbon packaging. ■

Guy Newcombe is CEO of Archipelago Technology

Powerdrop is a registered trademark of Archipelago Technology.

Further information:
Archipelago Technology, Cambridge, UK
tel: +44 7870 990247
email: guy.newcombe@archipelagotechnology.com
web: www.archipelagotechnology.com