

Inline Flexo Technology – the Key to Sustainability in Package Printing

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With sustainability becoming a high priority for consumers, retailers and brand owners are taking a more critical look at the carbon footprint of their packaging supply chains.

As brand owners increasingly choose paperboard instead of plastic, then inline flexo technology, with its reduced waste and emissions, offers the optimum combination of sustainability, quality and productivity, argues Ronni Nielsen, vice-president, TRESU Solutions.

As far as environmental perceptions are concerned, the shift towards sustainability is taking place right now. The scale of the damage to the climate from greenhouse gas emissions and plastic waste is becoming apparent, bringing with it a profound change in attitudes: consumers are shunning non-recyclable packaging.

Hardly a week goes by without being confronted by harrowing images or alarming studies: consider the marine life

choked by bags and netting, floating islands of rubbish and beaches strewn with decades-old litter, as well as reports of carcinogenic microplastics permeating the food chain. Plastic can take centuries to break down – scientists estimate that it will take up to 450 years¹ for plastic bottles to disappear- and yet every year, with no changes to the current production, consumption, or waste management almost 30 million metric tons of plastic will end up in the ocean per year². PET, the most commonly used material for plastic bottles, is being recycled at rate of only seven percent: brand owners generally do not consider the material in its recycled state to be clear enough, and there are simply not enough facilities to keep up with the dramatic surge in consumption.

Attention has also turned to the poor recycling of disposable paper cups, as a high proportion of them contain a polypropylene (PP) lining requiring a special handling process at waste handling facilities³, and according to the American Chemistry Council, then PP is one of the least recycled post-consumer plastics at a rate of 1 percent for post-consumer recovery – but one of the most popular packaging materials in the United States. Products of PP degrade slowly in landfills and take around 20-30 years to completely decompose.

There is an urgency to act at a global level to reduce carbon dioxide emissions due to the global warming and a rise of 1.5°C will have serious impacts: sea level rise, coastal flooding and erosion, freshwater stress, risks to marine ecosystems, droughts, precipitation. In fact, some people believe that an increase of 2°C is more likely and this will have even more serious consequences⁴.

Innovation offers growth opportunities for paperboard packaging.

Faced with a consumer backlash, brand owners and retailers are realizing that sustainability is not just a matter of saving

costs – reputations are at stake too. It is imperative, that market players look closely at materials and processes that minimize the environmental burden.

It is encouraging to see global market leaders investing heavily in finding eco-friendlier alternatives to plastic disposable cups, lids, and containers. Starbucks is investing in research to develop fully recyclable cups⁵, using biodegradable plastic, while Tetra Pak is developing paper straws and caps made from a polyethylene byproduct of sugarcane⁶. Water-based polymer coatings⁷ have already been developed that can safely dissolve, when the carton cup or plate is repulped, so it can be sorted with regular paper.

These developments make paper and carton packaging a practical and economically viable alternative to plastic for a variety of liquid food and dairy segments, as well as for secondary packaging.

Flexo for lower emissions and lower waste.

The shift to carton packaging makes it possible to use printing and converting processes that produce lower levels of emissions and waste. Gravure and offset processes tend to use inks with relatively high solvent contents and involve costly tooling and engraving processes with high carbon footprints.

Flexo offers significant sustainability advantages compared with other printing processes, with eco-friendlier water-based inks, recyclable polymer plates and sleeves, and emerging LED-UV curing technologies.

Thanks to advances in press and ancillary technologies, flexography is becoming a greener and 'leaner' process, requiring less energy and water, while generating less material waste and emissions.

Inline flexo is beneficial for fast water-based printing because a longer web path between printing stations is possible, making unit-to-unit drying possible, and thus cleaner color printing.

The European parliament voted overwhelmingly for a complete ban on various single-use plastic products such as cutlery, plates and straws, effective from 2021.

Air drying systems – hanging it out to dry!

The key to high-performance, sustainable drying of flexo inks lies with using air velocity at the lowest possible temperature, while recycling as much air and energy as possible. Reducing drying temperature in turn reduces energy requirements and also eliminates the need for chill rollers afterwards.

In fact, this is quite the same principle as a washing line – the velocity of the wind is the critical factor that enables fast drying.



Drying speeds and energy efficiency are optimised by situating the fan that applies the air and pressure inside the drying hood, shortening the distance from the fan to the air nozzle. This enables heat and noise to be contained within the head and provide better insulation.

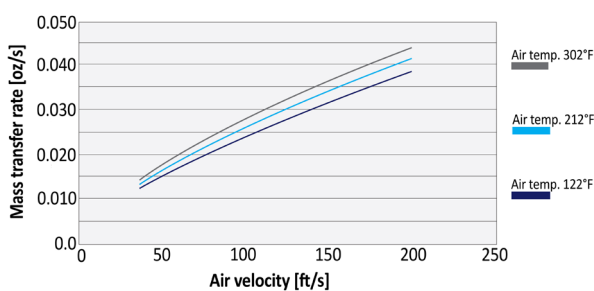
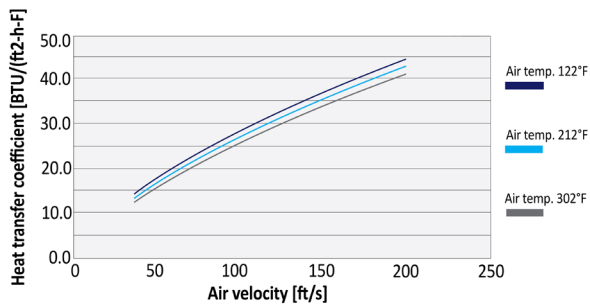
The optimum air velocity – temperature combination varies according to factors such as the thickness of the ink coverage, substrate type, web speed, and time spent in the drying unit.

TRESU's research and development specialists have worked to devise energy-conserving drying systems for numerous printing applications, often in partnership with leading substrate manufacturers.

VelociDryer™ by TRESU: Proven drying technology. Heat and speed are critical components when drying inks and coating - and the right drying can be the difference between outstanding results, good enough results – or simply waste. TRESU's hot-air drying technology optimizes process efficiency by applying a relatively high air velocity with a short distance between the nozzles and the substrate in combination with the right temperature.

In a multi-station printing press, air drying and/or UV curing units are included between each printing unit, with ample ventilation to ensure all moisture is extracted from the material before the next conversion.

Additionally, power consumption and CO2 emission levels from a hot-air drying system are only 25 percent as much as those associated with UV-curing.



Optimising energy efficiency

An important energy and emission-reducing factor is the ability to recycle energy. Efficient energy consumption is achieved with a gas-heating solution and a software design where servo motors run at relatively low power. Drying units recycle a high proportion of the air inside the dryer and, from the exhausted air, much of the energy is recycled by a central heat exchange module. In the case of TRESU drying systems, up to 80 per cent of the air inside the dryer can be recycled.

Temperature control

Chilling systems safely extract heat from the press to external condensers, which can return the energy to the incoming cold fresh air.

The chilling system's 'split system' design does not interfere with the printing process or place additional demands on the facility's existing heating, ventilation or air-conditioning systems. In this way, up to 60 per cent of the exhaust energy can be recycled.

Reducing material waste

Today's inline flexo machines feature advanced controls and ancillary equipment to ensure stable printing at faster speeds with minimal substrate or ink waste. Automated register controls and spectral colour measurement systems enable the press to meet tight targets at the beginning of the production run, limiting startup waste to within the length of the press. Web controls also reduce waste, by holding register as the press ramps up at the start,

and when it reduces speed at the end of the production run.

Stable systems make flexo viable for more jobs

By incorporating the drying, ancillary and automated control systems into an inline flexo press, therefore, stable printing is possible, at speed, with minimal defects or waste. This means flexo can achieve high definition up to at least 70 lines/cm with precision, not only faster, but at a lower unit cost.

With its lower emissions and the flexibility to include sophisticated converting processes, water-based flexo becomes the process of choice for numerous applications that were once only possible with gravure or offset. Examples include simulations of metallic foil to double sided coatings that protect the carton against moisture and grease.

Summary

A printing press should be an investment that brings returns for 20 years or more. There is a great responsibility to give careful consideration to the machine specification, because over such a long lifespan, this makes a big difference to the converter's overall environmental – and financial- performance.

Undoubtedly, there is also a financial incentive to implement sustainable processes and practices, because the reduced consumption of materials, logistics, manual input and energy they bring results in lower cost-to-print and, in turn, greater profitability.

Arguably though, there is a yet greater motivation for the packaging value chain to care about how they affect the environment, than the profitability of the production line – important though it is.

Brand owners increasingly recognize that their market success and relevance depends on a good reputation for sustainability, among more socially aware consumers. They also face increasing pressure from a growing number of 'ethical' investors⁸, as well as politicians, who see more stringent environmental legislation as a vote-winner. We can thus expect packaging buyers to look more closely at the environmental record of their suppliers.

With a modern inline flexo press, a packaging supplier is well-placed to show leadership in this area: it provides the flexibility to compete for short and long production runs, and the opportunity to contribute to a sustainable value chain as a "Green Technology Ambassador" environmentally friendly package.

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