

# Printing Onto Glass With UV-LED Inks

There are 2 major saving potentials when comparing with ceramic inks



ink quantity



energy consumption during drying process

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Quarterly Company  
Newsletter

# T.A.O. NEWSLETTER

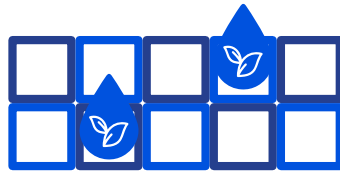


## Printing Process with UV-LED Technology



Compared with ceramic inks, the particle size of UV-LED inks is significantly smaller.

Therefore, when printing organic inks, fine polyester mesh are used instead of stainless steel mesh.



The Sustainable Development Goals are the blueprint to achieve a better and more sustainable future for all.

They address the global challenges we face, including those related to poverty, inequality, climate change, environmental degradation, peace and justice. The 17 Goals are all interconnected, and in order to leave no one behind, it is important that we achieve them all by 2030. The United Nations has divided all 17 Goals into 5 dimensions: People, Prosperity, Planet, Peace, Partnership.

T.A.O. Bangkok Corporation Ltd. There is awareness and attention to industrial development goals innovation that covers sustainability by developing environmental friendly products and reduce environmental pollution in the production process.



**Goals 9: Industry, Innovation and Infrastructure**

(9.4) Upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes



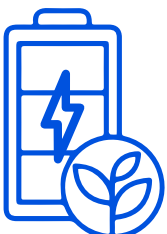
**Goals 12: Responsible Consumption and Production**

(12.4) Reduce the release of toxic chemicals and waste into nature and manage them properly.  
(12.5) Reduce waste through reuse and recycle processes



CONSEQUENTLY, THE INK LAYER AND INK QUANTITY IS REDUCED BY 40%

According to a famous lamp manufacturer, UV-LED inks consume only 3 kW per drying unit during the drying process. However, ceramic inks are burnt in in an oven applying high temperatures. At least 140 kW are consumed in this case.

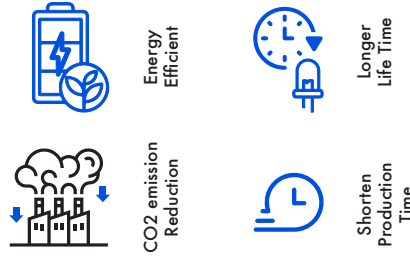


THE ENERGY SAVINGS FOR UV-LED INKS AMOUNT TO OVER 90%

## UV-LED hardening technology : the economic alternative

The UV-LED curing ink system is an effective and energy-efficient alternative to Ceramic glass printing inks which use Gas and Electric power in drying process. Moreover, UV-LED curing ink is reduction of the CO2 emission.

UV-LED lamps don't need a warming-up time, as it is the case with currently usual UV-lamps. This offers a high printing speed and cost reduction at the same time, because the stand-by mode (e.g. during machine stops or printing job change) is not needed anymore.



UV-LED lamps are more expensive but exhibit a significantly longer life time. The energy need for the ink curing is significantly lower compared to traditional UV curing process.

UV-LED units don't comprise mercury. Moreover, there is no need for the usual device of sucking out ozone. This makes the UV-LED hardening technology to an interesting and sustainable alternative. Moreover, the printed glass can be recycled after use.

## How the printing and drying process works with LED



Glass



Pre-treated Flame



Printing Process



Expose Ink to UV-LED



Resistant Printing with Adhesion

First, the glass is pre-treated in a flame. This process increases the surface energy through which the ink adheres optimally. Many Glass containers are cold end coated (CEC) usually has very low surface energy. A gas flame pre-treatment clean of surface and to burst open a cold-end coating. It breaks the molecule chain on the glass surface. the surface is more roughly, it provide good adhesion level of UV-LED ink. The inks are formulated for LED bulbs (irradiance: minimum 8W/cm<sup>2</sup>) of wavelength of 395 nm.

To reach the best ink adhesion, good the scratch resistance and obtain a transport protection. It should do a pre-treatment with silan. Silan is a special gas that produces a higher surface tension. In dependence of different hot and cold end coatings a special product suitability test is recommended prior to production.

The ink is mixed with the adhesion promoter. After this, the printing process starts. Depending on the type of the printing machine, the ink is exposed to the UV-LED lamps immediately after the printing step. The drying procedure is done in a split second. Result : a chemical-proof and scratch resistant printing image with a strong adhesion. Water and dishwasher resistance and ice water or frost resistance (up to -20 °C) will be achieved only after approximately 72 hours.

This screen printing ink was particularly developed for energy-saving UV-LED lamps; this ink can also be hardened in the conventional (UV-) process if needed.

The ink is based on a 2-component system and is very resistant in the case of glass, ceramic, metals with outstanding adhesion.

Interested in more information please contact  
K. Rangsan Srivilai Email: [rangsans@taobangkok.co.th](mailto:rangsans@taobangkok.co.th)

## The Product Advantages



- 1 Environmentally-friendly alternative to ceramic inks



- 2 Significant time, energy and space savings



- 3 Good adhesion and scratch resistance immediately after UV-LED or UV curing



- 4 High dishwasher resistance (500-2,000 cycles in household/industrial dishwasher)



- 5 Good resistance chemicals (alkalines, solvents)



- 6 Ice water and frost resistance up to -20 °C

- 7 Production speed of up to 110 pcs./min.

- 8 Compliant with the current European standard EN 71-3 (exclusively for basic colour shades, white and black)

- 9 RoHS compliant (2015/863/EU) // (2011/65/EU)

- 10 High light fastness and weather resistance



**Sock-liner is one of application of footwear that T.A.O. have been developing for pad printing processes which are accepted for brands.**

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## Sock-Liner Pad Printing

### Advantages of Pad Printing Process for Sock-Liner

The advantages of pad printing for sock-liner compared to heat transfer

are lower cost, no plastic film waste, high durability, faster speed output, and lean process



### PAD PRINT vs HEAT TRANSFER

	01	02	03	04
	Working Principle	Cycle Time	Stress Resistance	Cost
Pad Printing	Ink > Plate > Pad > Substrate (1go)	3s	◆◆◆	◆◆◆ 0.0007\$/print
Heat Transfer	Ink > Film > Heat Transfer > Substrate	6s	◆	◆ 0.0113\$/pcs Small Print 0.08\$/pcs Large Print
Notice for Pad	Easier	Faster	Durable	Cheaper
	05	06	07	08
	Space Consuming	Electricity	Waste	Positions
Pad Printing	◆◆◆	◆◆◆	◆◆◆	Absorbent
Heat Transfer	◆	◆	◆	Place on top
Notice for Pad	Space Saving	Energy Saving	Environmental Saving	Substrates dependent

### Heat Transfer Label

PET Film  
180,000,000 pcs a year

72,900 KG

**Pad Printing**

Ink Waste  
830 KG

**WASTE REDUCE 87 TIMES!**

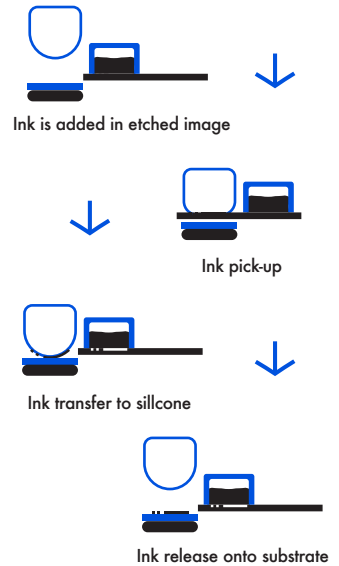
Especially in the environment, according to the production volume of sock-liner (global) about 90 million pairs per year, with the information for image size 80x30mm. Pad printing has a waste ink consumption of around 830 kg, while heat transfer has a consumption of PET film around 830 kg. 180,000,000 pieces per year or equivalent to 72,900 kg. The above data shows that the consumption of heat transfer process is 87 times more than pad printing process.

Image Source : [www.pexels.com](http://www.pexels.com)

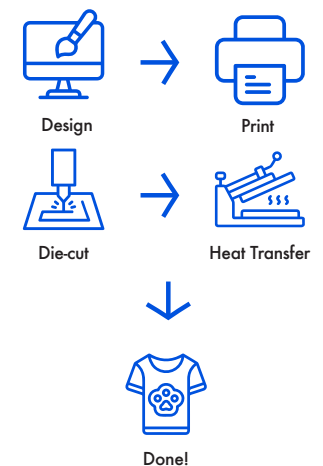


## Comparison of Pad Printing and Heat Transfer Printing Procedures

### The Pad Printing Process Has the Following Steps:



### The Heat Transfer Process Has the Following Steps:



## Important Factors for Pad Printing on Sock-Liner

01

### Ink

Material of the sock-liner that is often printed on is fabric or synthetic rubber. It is important to consider choosing the right ink for good adhesion properties on a variety of materials. T.A.O. has inks that are compatible with such materials such as TPX, TPSP which makes pad printing on sock-liner resistant to washing and abrasion well.

In addition, TAO's pad printing ink for sock-liner covers EU legal standards RoHS, Reach, as well as chemical standards such as Afirm RSL, A01, Ecopassport, and specifically ZDHC MRSL, which is collaboration with the big brands. All standards serve their policy to reduce and eliminate the use of hazardous chemicals in the production process.

02

### Equipment for Pad Printing

Selection of pad printing equipment on sock-liner, such as cliché, silicone pad are the technique that will help in printing with good results. Either choose thick steel cliché 10mm. for solid artwork with a depth of 40-50 µm for good ink thickness. Or a silicone pad with the right quality and hardness allows the ink to be fully transferred onto the sock-liner. These are all essential factors to make sock-liner print beautifully.

T.A.O. is well equipped to support products and printing techniques throughout the process.



03

### Pad Printing Machine

In addition to inks and printing equipment, TAO also supports pad printing machine suitable for printing sock-liners. It is close cup machine with high chemical evaporation protection. Uses less ink for all-day printing. Also easy to clean and maintain as well.



Interested in more information please contact  
K. Kitiraj Sonso E-mail: [kitirajs@taobangkok.co.th](mailto:kitirajs@taobangkok.co.th)

**T.A.O. Bangkok Corporation Company Limited cooperated with Roland DG Company leading the wide-format digital printer innovation and organized an exhibition of digital printers, Versa UV LEC2-330/640 and Versa UV LEC2 S-Series.**

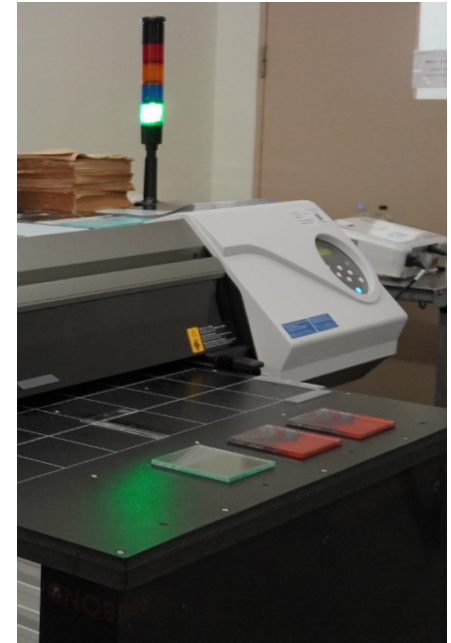


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## T.A.O. Open House Showcases The Latest Digital Printers



The up-to-date technologies which showed its printing efficiency in the exhibition.

**We were honored by the presence of A.Best Inter Products Co.,Ltd., Thai Techno Glass Group PCL., CCL Label (Thai) Co., Ltd. and Majorette (Thailand) Co., Ltd. to this event.**

The event presented up-to-date technologies and software operating systems with interfaces that are easy to use and are full of features for color management. This simplify the pre press process which make your life easier. Furthermore, the exhibition showed its printing efficiency on a variety of materials such as glass, aluminum, ABS plastic, metal, film, etc. Digital printing

can print patterns, colors, and amounts as desired with sharp colors on various shapes of materials to meet the current market demand.

The open house event was held on 12-16 September 2022 at T.A.O. Bangkok Corporation Company Limited.



The gift from the exhibition is made by our lab's state of the art printer.



## T.A.O. Celebrated the 28<sup>th</sup> Anniversary of the Founding of the Company



T.A.O. Bangkok Corporation Company Limited celebrated our 28th anniversary as a high quality provider of products & services in the Industrial Printing and Decoration Industry.

Our Senior Executive Offices and employees participated in merit making in the morning. This was followed by an award ceremony to show appreciation to our employees who have been working with us between 5-25 years.

Afterwards, we all gathered to listen to the Dharma talk. For this year, the Dharma talk was on the topic "Happiness in work, joy in life" by Phra Khru PaLad Sampipattanasilachan (Kanchit Khunwaro), assistant abbot of Yanavesakawan Temple. Later, all executives and employees had lunch together at T.A.O. Bangkok Corporation Ltd. On 7th October 2022.