

GLASS
IS 100%
RECYCLABLE



SAFE
Choice



100% RECYCLABLE
and endlessly
recycled with no
loss of quality

The circular production of a food grade packaging solution with an endlessly recyclable, reusable and permanent material such as glass is inherently relevant to the Sustainable Consumption and Production Goal (SDG 12), while efforts made by the industry in efficiently managing resources and energy, and in reducing CO₂ emissions go on par with the Climate Action Goal (SDG 13).^[1]



Issue 15 :
January - March 2023
Quarterly Company
Newsletter

T.A.O. NEWSLETTER



"Glass" the sustainable packaging

The glass market packaging driven by the rising food and beverage industry.

Consumer behavior has a tendency to choose products that use glass packaging continuously increasing, with the following important factors:

1

Help elevate the product to be 'premium', giving the consumer a feeling that it is a good product that looks expensive.

4

Able to respond to modern consumer trends Because it is a packaging that is simple but looks classy.

2

Suitable for edible products because it does not react with food therefore does not affect the taste of the food to change.

5

A global trend that focuses on the use of environmentally friendly resources, and has a policy to focus on packaging that can be recycled.

3

There is transparency to see the product inside.

The Glass Recycling

1



sand

2



soda ash

3



limestone

Glass is made from
4 ingredients:

4

other additives for colour
or special treatments.

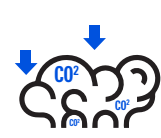
All these raw materials have to be quarried, using up natural resources and utilising energy for extraction and processing. Therefore by simply recycling our glass we can reduce non-renewable fossil fuel usage and reduce the emissions of process CO₂ from the carbonate raw materials such as limestone.



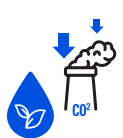
Each tonne of
recycled glass
added to the
furnace saves
1.2 TONNE
of raw materials



Each time one
tonne of glass
is recycled



about 580kg
CO₂ is saved
throughout the
supply chain



air pollution is
reduced by
↓20%
water pollution
cut by
↓50%

The glass recycling requires lower temperatures than new glass during its production. Thanks to this solution, melting factories consume much less energy to heat up. Recovered glass materials are also completely safe for the environment and do not release any harmful substances or objectionable odours.

[1] <https://sdgs.un.org/goals>
Image Source : unsplash.com / pexels.com

How is glass recycled?



Did You Know?

For bottles or glasses with pattern printing with ceramic ink. Glass cullet with ceramic inks cannot be recycled into clear flint glass, and must be "down-cycled" into colored glass. But for UV inks when melting the glass in recycle process, the UV inks will oxidizes without any traces and can be converted into clear flint glass.



Cost comparison between Ceramic inks and UV-Curable inks

Total Machine Running Costs (Euro)

	UV ink	Ceramic ink
Pre-Treatment	5.7	-
Curing : UV lamps	11.95	-
Drying : Lehr Gas	-	70.44
Electricity	10.5	9
Costs per hour	28.15 Euro	79.44 Euro

Total Running Costs 10 Million Bottles per Year

Printing speed 3,600 bottles / hour,
12h/day, 5 days/week,
48 weeks/year

	UV ink	Ceramic ink
Mesh	4,475	7,550
Ink	63,980	120,000
Energy	162,140	431,655
Total	230,595 Euro	559,205 Euro

Note: The information shown here It's an approximate calculation. Calculation results may different from according to various costs that change in factors at that time and various environmental factors of each factory.

MEMBRANE SWITCHES are a type of human- machine interface

Characterized by being constructed from several layers of plastic films or other flexible materials.

Membrane switches are extensively used in a variety of applications such as household appliances and industrial equipment interfaces, whether domestic, commercial, or industrial. Other types and forms of user interfaces include touchscreens, keyboards, switches, and selector knobs.



Issue 15 :
January - March 2023
Quarterly Company
Newsletter

T.A.O. NEWSLETTER

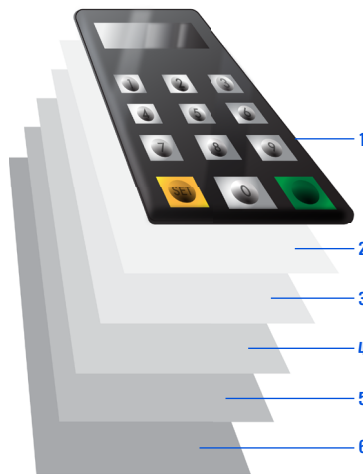


Membrane Switches Technology

Benefits of Membrane Switches

- 1 Thin and compact profile
- 2 Simple graphic interface construction
- 3 Resistance against external elements
- 4 Easy cleaning and maintenance
- 5 Sufficient tactile feedback
- 6 Shielding from electro-magnetic interference
- 7 Low cost

Membrane Switch Construction



Membrane Switch Overlay

Also known as top or graphic overlay. Graphics can be printed by screen or inkjet printing on the reverse side in general since it produces longer-lasting prints. While front side or top-surface printing various features such as selective texture and windows.



- | | |
|-------------------------------------|----------------------------------------|
| 1 Membrane Switch Overlay Layer | 5 Optional Second Circuit or PCB Layer |
| 2 Graphic Adhesive Layer | 6 Adhesive Layer |
| 3 Circuit or PCB Layer | |
| 4 Adhesive Separator or Space Layer | |

Graphic printing technology

UV screen printing

The increase in demand for UV curable ink in membrane switch applications, owing to superior characteristics as follows

- (1) Low volatile organic compound content (low VOC)
- (2) High productivity owing to reducing drying time/ times of mesh cleaning
- (3) Batch to batch consistency
- (4) Decrease the risk of color fading and bubble formation
- (5) Low energy usage
- (6) Optimizing the workplace

Digital printing

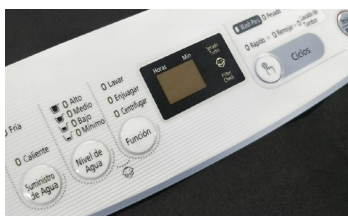
In the world of printing, digital printing is one of the services in every industry as well as printing graphic overlay printing owing to following advantages;

- (1) Great for very small production volume
- (2) Prints multiple colors at once rather than one at a time
- (3) Adding additional colors effects, the price minimally
- (4) Allows for design flexibility
- (5) Short set up time

Hybrid

Each technology also has advantages and disadvantages, such as UV screen/Digital print's inability to provide sufficient opacity when background printing is required, digital printing ink has poor resistance industrial chemicals and is expensive when large manufacturing is required.

From weak point of inkjet and UV screen printing above, combination of solvent-based ink is widely employed recently



Quality Standard Test

Common test procedure to test the quality of printed membrane switch overlay according to the European Keyboard Association, and Marabu, ink manufacturer experience is shown as follows

- 1 Good adhesion of the ink film according to DIN EN ISO 2409
- 2 Peel value of the printed film to the bonded base of > 10N
- 3 Operational life span: > 1 Mio switching cycles; testing acc. to DIN 42115, part 1
- 4 Sufficient flexibility of the ink film and structure for dome, flat and edge embossing
- 5 Good printability of the ink and high opacity of colour shades and blocking layers
- 6 Minor colour deviations per batch of < 1 dE
- 7 High light fastness of colour shades (blue wool scale 7-8), and non-yellowing whites
- 8 High cohesion of the multi-layered ink film
- 9 Compatibility with the most common films and adhesives
- 10 Climate change and temperature resistance



Directives & regulations

The manufacturing of membrane switches is governed by various standards and directives designed to ensure that they are both safe and able to function correctly in the industries in which they are used shown as follows

Screen Printing Inks

Mara®Star SR

Solvent-based represents the first generation of screen printing ink which is high gloss and best suited for printing onto high-quality membrane switches, labels, stickers, displays, industrial letterings of all kinds and scales.



Mara® Switch MSW

is solvent-based screen printing ink for membrane switches which was especially developed for polycarbonate and coated polyester foils. Satin gloss, good opacity, fast drying, flexible ink film, can be embossed and low odour.

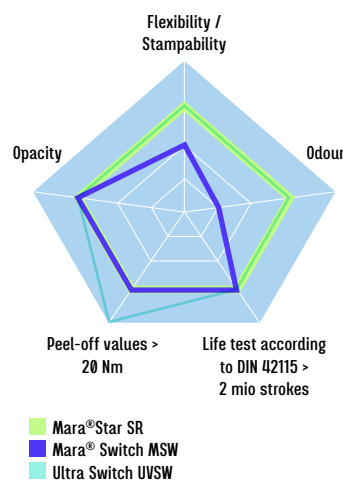


Ultra Switch UVSW

UV-curable screen-printing ink for membrane switches made of primed polyester foils and polycarbonate (PC). Glossy, medium opacity, fast curing, flexible ink film, can be embossed, special varnish available.



Combination UV / Solvent-based



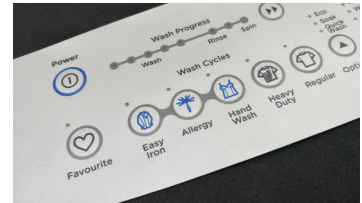
Interested in more information please contact
K. Jutiporn Boonsatit E-mail : jutipornb@taobangkok.co.th

T.A.O. product & solutions

T.A.O. provide screen printing ink, plastic film substrate, screen printing machine with screen printing accessories for Membrane Switch.

Plastic Film

T.A.O. supply PC film membrane switch for 2 categories as follows;



1 Makrofol®

Pure or coextruded PC film. Makrofol® films particular strengths include high heat resistance, impressive toughness and elasticity over a wide temperature range, good stiffness, excellent electrical insulation properties, as well as abrasion, weathering and chemical resistance

2 Bayfol®

Blended polycarbonate film. Outstanding properties Depends on which thermoplastic is blended with the polycarbonate, Bayfol® films include increased resistance to chemicals, greater elasticity and enhanced dynamic strength.

Polyester Film (PET)

T.A.O. Bangkok supply both sides treated PET film with marking film for use in membrane switch applications. There are several surface textures and hard coats available.

Roland Inkjet Printer

To serve our customer's printing needs, T.A.O. Bangkok also supplies a high-quality Roland UV printer to provide a rapid response to customer requests for graphic overlays and membrane switches.



Stencil/Mesh and Squeegee

T.A.O. Bangkok supplies high-end Frintrup's stencil and RKS's squeegee with providing technical consult for all applications to make customer satisfy and get the best printing quality.

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, VersaUV LEC2 S-Series and VersaUV LEF2-300D.



Issue 15 :
January - March 2023
Quarterly Company
Newsletter

T.A.O. NEWSLETTER



Digital printer exhibition for glassware by T.A.O. Bangkok Corporation



In addition, the company was also honored by Ocean Glass Company Limited (Thailand) to participate in this exhibition as well.

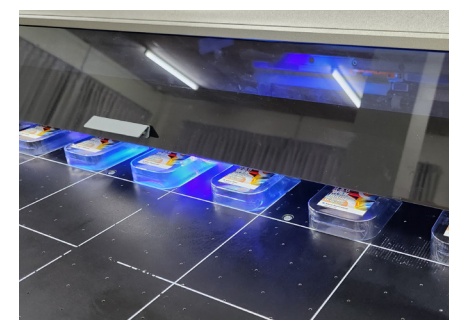
Roland Digital Printer, VersaUV LEC2 S-Series, and VersaUV LEF2-300D have a modern technology and software interface systems, with an easy-to-use

With the ability to print on various shapes of glass material, and bring customization closer to the customer, including, color management system, Roland Digital Printers also have a special function which called "Printing Variable Data". Variable data capabilities to customize the print content within print process. For example your are print and vary customized printing on your

name or printed image. The digital printer can reduce the preparation process which makes your life easier, produce as much as you want, and to satisfy customer needs in nowadays.

The exhibition was held on 18th January 2023 at T.A.O. Bangkok Corporation Company Limited.

The sample product which showed its printing efficiency in the exhibition.



Print testing from the exhibition is made by our lab's state of the art printer.



Corporate Social Responsibility activity and New Year's 2023 Celebration



On January 13 2023, T. A. O. Bangkok Corporation Co., Ltd. led a team of Senior Executive Offices and employees for corporate social responsibilities activity in 2023. To participate in mangrove reforestation activity by planting mangrove forests and removing garbage in the mangrove area at Phanthalai Norasing Mangrove Forest Nature Trail, Samut-Sakhon province.

Moreover, we were honored by Ajarn Prasarn Aiamwijarn, the Manager of Phanthalai Norasing Foundation as a lecturer on historical knowledge to educate about mangrove ecosystem. For example, living things and non-living things in the mangrove forests have a complicated relationship with each other in both of nutrient cycle and energy transformation. Mangrove forests provide important nursery habitat for many species of fishes and mangroves, roots also protect the coastline against wave-induced erosion as well.

In the evening, the company has organized a New Year party for all employees who have been working hard for a whole year, with party theme called "Favorite movie & Cartoon character". There were many activities in the party such as draw lots for New Year present, best dressed contest and, award ceremony for 5S, etc. The party was full for fun and happiness of all executives and employees.