

# FOILS in FOCUS

Lüneburg, August 2013 1<sup>st</sup> Edition

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## Foils - processing variety

NEWS, TIPS AND POSSIBILITIES

**P**lastic foils are produced for a range of branches and countless areas of application. The range of materials is consequently as great as the profiles of requirements which the market imposes on the material and its processing. Whether used for consumer electronics, household goods, the advertising or car industries - the range of possible applications is nowadays so comprehensive that to list them is almost an unending task. Yet another reason, then, to take a closer look at the huge growth market in plastic foils.

### Digital printing of membrane keyboards

The use of flat foil-based control panels has become standard for a range of products throughout the world. In addition to the requirements regarding durability and quality, the economic printing of foils remains a major topic of interest. High print quality combined with particular resistance to wear and environmental sustainability are typical demands which the print specialists have to meet.

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### Precision in cutting printed foils

The demand for quality and reliability in respect of the keyboard elements is high, and continues to increase. Keyboards must be permanently usable under a particular set of conditions and must overcome external influences such as humidity or soiling. Flexibility, ease of cleaning and a high level of resilience are decisive criteria, which are to be fulfilled. For this reason the precise cutting of contours is often a decisive factor, especially when dealing with printed foils.

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### What advantage does the laser cutting of foils offer?

The extensive range of products and ever shorter delivery times mean that calls for simpler production methods are getting louder all the time. Punching, knife cutting or laser cutting? Every procedure has its advantages and disadvantages. Here we compare the different methods.

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### Strong adhesion through high performance connection systems

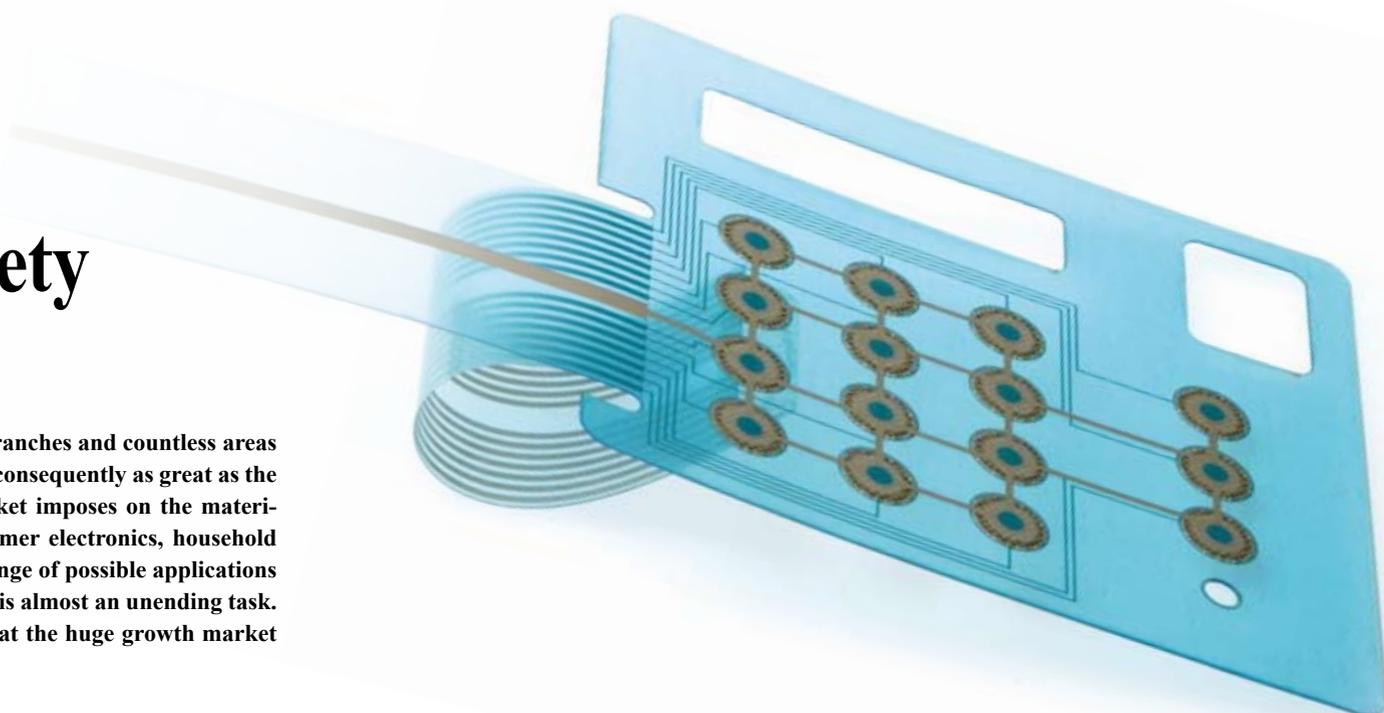
Foils are often also used where the end user does not even see them. We are, of course, talking about adhesive tapes. On the one hand, high-tech adhesive tapes excel thanks to high levels of adhesion, on the other, they offer unbeatable advantages over traditional fixing methods such as screws.

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### Laser cutting of PVC foils?

PVC (Polyvinyl chloride) is one of the most frequently used plastics for the production of foils. How are PVC foils best processed, and what do you need to take into account if you want to use a laser to cut them?

[More on this on Page 4](#)



### Collaborating companies

**Canon**

**Canon Deutschland GmbH**  
Worldwide leading provider of imaging  
products and solutions

Canon is a worldwide leading provider of digital imaging solutions for the consumer and business sectors. The business sector includes numerous professional production systems and multi-purpose printing systems, document management systems, large format printers and software solutions in its product portfolio. In 2013 Océ Deutschland GmbH merged with Canon Deutschland GmbH. The company employs approx. 2,200 employees.

[www.canon.de](http://www.canon.de)

**3M**

**Multi-technology company with a tradition of  
innovative high-tech developments spanning  
more than a hundred years**

As a research-based multi-technology company, 3M produces thousands of innovative products for very different markets. Its particular strength is the varied and frequently combined use of 45 of its own technology platforms, from which it constantly creates new application solutions for its customers.

[www.3M.com](http://www.3M.com)

**eurolaser**

Partner for your success.

**Specialist in laser cutting, engraving and  
marking systems**

eurolaser designs, develops and produces innovative laser systems for material processing in industry and crafts. The company based in Lüneburg (Germany) has today assumed a pioneering position in new and established laser applications with its broad range of usage options.

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# Switching up to more sales

## DIGITAL PRINTING OF KEYPAD MEMBRANES



Customers today expect more than just quality and longevity from printed keypad membranes. They also want sophisticated, customised designs even in small quantities, produced in an environmentally sustainable manner, and delivered just in time. Screen printing alone cannot meet these demands. However, digital printing processes are making it economically viable to meet with these customer expectations. With the Océ Arizona series, Canon offers an excellent all-in-one solution for digital printing on film. The flatbed printing systems with UV inks and optional web-fed printing provide greater flexibility and creative freedom.

Whatever the sector, the use of membrane keypads is increasingly popular. The touch-sensitive and flexible films are used to activate electrical switches, and they form the interface between the user and the product. They are used almost everywhere: For household appliances, mobile phones, ATM machines, remote controls or industrial machinery. Demands on the flush-fitting switches are tough. The keypads must withstand up to

1,000,000 switch activations. They need to be environmentally friendly and easy to clean. It is also important that they are resistant to abrasion, sweat, detergents, chemicals and ultraviolet light.

The requirements for keypad membrane production are correspondingly high. This includes extreme positioning accuracy, flatness and line sharpness, which means that roll-to-roll

systems are simply not an option.

The required degree of precision can only be achieved with a true flatbed printing system, such as the Océ Arizona series from Canon. In combination with the UV-curable IJC256 ink, with its good adhesion and flexibility, the Arizona printers represent a highly productive solution for printing on film. The solution is rounded off by the ONYX workflow software from Canon.



Creative freedom courtesy of digital printing

### More freedom of design at a lower cost

With the digital printing systems of the Océ Arizona family, Canon offers an excellent tool not only for the print industry, but also for electronics manufacturers who wish to produce keypad membranes themselves. Digital printing systems are free of screen printing's limitations to five or six colours, so they can provide a wealth of colour combinations. Creative ideas from customers can be im-

plemented to great effect with more colours, better gradations, and the ability to integrate photos and logos. What's more, the production process is greatly simplified. Since there is no need to mix any inks or manufacture the screens, preproduction costs and working hours are reduced. These savings in time and costs in turn open up new opportunities for taking on orders for smaller quantities-

contracts which would not be viable with screen printing. Furthermore, prototypes can be produced in record time and orders delivered faster.

Depending on the customer's requirements, keypad membranes can be produced fully digitally or with a hybrid process. In fully digital printing, two CMYK coats are supplemented by two to three flood coats (white/grey), to achieve the desired opacity. The high levels of ink application make the membranes suitable for applications with up to 50,000 key activations.

For demanding applications with up to a million key activations, the ideal solution is a combination of digital and screen printing in a hybrid process.

While the images and colour coats are printed digitally, the surface coat and flood coat are applied with screen printing. The ink coats are particularly well protected by the white flood coat.



Hybrid process, a combination of digital and screen printing



Océ Arizona® Familie

The Canon Service and Support Team members assist Océ Arizona users both before and after installation, and they carry out on-sites tests of the digital production. The printing experts are ready to offer help and advice with training and operation. Service contracts can be tailored to the customer's needs. Canon offers an all-round solution that allows the operators to concentrate fully on

developing the new fields of business that are opening up in digital film printing.

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# Precise cutting of printed foils

## AUTOMATIC PROCESSING BY MEANS OF A CAMERA SYSTEM

In recent years, the level of automation has also increased significantly. Printed foils for fronts or particular functions can also be precisely recognised and outlined by means of an interactive optical recognition system. In order to automate still further the production of high quality keyboards, laser systems are often stocked with foil by a robot. Here, too, the position of the foil sheet is identified by camera recognition and it is cut precisely. The keyboards are then collected by the automatic handling system and separated from the remainder of the foil sheet. This fully automated process means that production can continue around the clock and the full potential of the laser cutter be exploited. Human beings have a purely supervisory function.

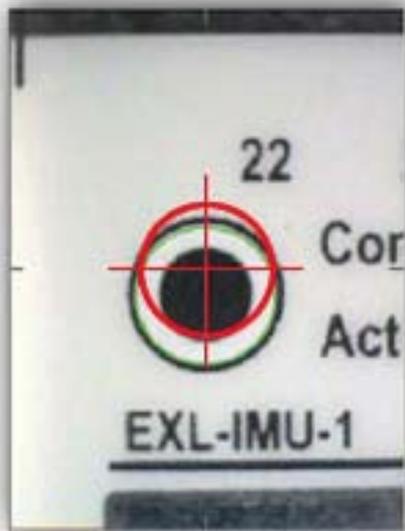
with large quantities. A very high level of precision and the almost maintenance-free 'laser' tool have now convinced many companies, who are daring to move towards this technology.

Anyone who wants to survive the pressure of competition nowadays must employ innovative planning processes and production methods. In practice, however, implementation is not always simple. Without flexible technologies and automation processes new innovations in the sector cannot be implemented in a viable manner. Laser technology makes many things economically viable - both today and in the future.

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Developments in recent years mean that laser technology has become a real competitor for conventional processing methods, even when dealing



The position of the foil sheet is identified through camera recognition and it is cut precisely

# What advantages does the laser cutting of foils offer?

## LASER TECHNOLOGY COMPARED WITH PUNCHING AND KNIFE CUTTING

Both the enormous variety of materials for synthetic films and increasingly demanding customer requirements are causing the market to look for flexible and efficient production methods. Innovative laser technology is becoming increasingly significant for these applications. High precision is opening up new opportunities, whereas alternative

processes are already up against their limits. As in industrial film machining, the advances in laser systems are very much in demand, so that, meanwhile, laser systems are frequently integrated into fully automatic production lines. A comparison of laser cutting with punching and knife cutting shows the following basic advantages:

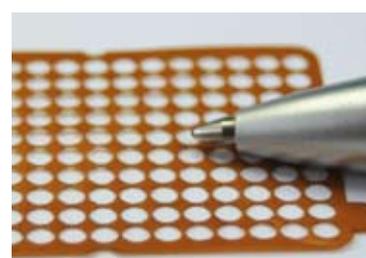


Kiss cut and laser inscription of thin foils

- 1 Cutting edge quality:**  
Particularly when dealing with multilayered foils, the higher force exerted by mechanical tools results in an offsetting of the individual layers at the cutting edge.
- 2 Cut quality in the cycle:**  
Over time the processing tools show signs of wear and tear. At any time knives and punches become blunt, which can affect both the quality of the products and production times.
- 3 Cutting accuracy:**  
With a laser you can cut any contours without limitation.
- 4 Fine details / small holes:**  
The laser beam is particularly suited to cutting fine details because of its thinness, meaning that the „tool“ diameter hardly needs to be taken into account.
- 5 Cut edge sealing:**  
Because of the heat it produces, the cut edges fuse during laser cutting. In multilayered foils this prevents dirt or moisture getting into the product.
- 6 Flexibility / Individuality:**  
Using a laser requires neither the production of tools (punch) or tool changes. As a result, changes to the cutting contours can be implemented quickly and flexibly.
- 7 Tool storage costs:**  
There is no need to store tools (e.g. dieboards).
- 8 Speed:**  
The laser works without contact, with the result that processing is fast. However, punches do enable working at even higher velocities.
- 9 Tool wear:**  
In contrast to mechanical tools, the laser is practically maintenance free and remains permanently sharp.

A COMPARISON OF FOIL MACHINING			
	LASER CUTTING	KNIFE CUTTING	PUNCHING
<b>Cutting edge quality <sup>*1</sup></b>	👍 no exfoliation	👎 exfoliation	👎 exfoliation
<b>Cut quality in the cycle <sup>*2</sup></b>	👍 constant	👎 decreasing	👎 decreasing
<b>Cutting accuracy <sup>*3</sup></b>	👍 good	👍 good	👎 average
<b>Fine details / small holes <sup>*4</sup></b>	👍 yes	👎 conditional	👎 no
<b>Cur edge sealing <sup>*5</sup></b>	👍 heat-sealed	👎 no sealing	👎 no sealing
<b>Flexibility / Individuality <sup>*6</sup></b>	👍 high	👎 conditional	👎 slight
<b>Tool storage costs <sup>*7</sup></b>	👍 no tool store	👎 low storage costs	👎 average storage costs
<b>Speed <sup>*8</sup></b>	👎 high speed	👎 average speed	👍 very high Speed
<b>Tool wear <sup>*9</sup></b>	👍 no wear	👎 easy exchange, if worn	👎 expensive exchange, if worn

COMPARISON OF THE WORK PROCESSES				
Laser:	Design	Process	Product	
Knife:	Design	Clamp knife	Process	Separate residual material from product
Die:	Design	Produce dieboard	Clamp	Process
				Separate residual material from product



Filigreed details

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# 3M VHB bonding tape

A STRONG BOND FOR 30 YEARS

Since its market launch at the start of the 1980s, 3M's VHB bonding tape has been an ongoing success story. As an innovative provider of high-quality connection systems, the company is offering a perfect alternative to mechanical fixing systems with this product. The secret of its success: Viscoelasticity and a high level of adhesion.

Worldwide, these high performance tapes (VHB stands for very high bond, meaning maximum adhesion) are used in countless buildings and innovative products. The range spreads from the first bonding of the coachwork to an ambulance, via the first waterproof camera to complex connections to the façades of high rise buildings. In addition to its durability, this extraordinary bonding system has functional properties that are essential for bonding metals, plastics, glass and painted or powder coated surfaces.

The past 30 years have shown that 3M's VHB bonding tapes offer significant advantages over mechanical connections. Unlike adhesive bonding, the use of rivets and screws imposes limitations on the design. Whilst these fastenings remain visible, adhesive tapes create invisible bonds.

Furthermore, they need no holes for fixing, thus minimising the risk of corrosion. What is more, the joining of surfaces by means of a continuous adhesive tape performs an additional sealing function, thereby providing much better protection against dirt or water seeping into cracks. The simple and fast fixing of the adhesive tapes contributes to an acceleration of production processes and reduces labour costs.

In comparison between traditional foam mounting tapes and VHB bonding tapes, differences in the product structure immediately become clear. Whilst the former have only a thin layer of adhesive on the upper and lower surfaces, the 3M products are composed of adhesive material throughout. The viscose structure enables it to flow to the surface. This means that the adhesive tape does not harden,



3M's VHB bonding tape is characterised by its viscoelasticity and its high level of adhesion

but remains flexible, becoming wet throughout. Additional advantages are its extreme elasticity and its ability to absorb energy and compensate for stresses. Unlike foam mounting tapes it can be stretched vertically to 50 per cent of its thickness without tearing or peeling free.

Even now, 30 years after being introduced and thanks to constant improvements, 3M's VHB high performance bonding systems are characterised by their high levels of adhesion, durability and flexibility of applications.

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## Be careful when lasering PVC foils!

Which risks and options are there?

Polyvinyl chloride (PVC) is one of the most widely used plastics altogether and we regularly receive enquiries about whether it can be cut with laser. You can find out here where you have to pay attention and how you can cut PVC foils without worrying.



PVC has become a mass market plastic because it can be produced so cheaply and can be used in a diverse range of applications and in the meantime constitutes around ¼ of the whole plastics market.

It is available in two main forms, hard PVC-U (unplasticized) and soft PVC-P (plasticized) that is made more elastic by the addition of softeners. This plastic is found more and more frequently in the advertising industry where it is used for decorative and labelling foil. Although PVC can in fact be cut with laser, the thermal process produces hydrochloric acid and toxic fumes. For this reason, we advise you not to use laser for cutting PVC in order to prevent corrosion of your laser system and to ensure the safety of the machine operator. Instead make use of the high degree of flexibility offered by the eurolaser systems with their optional expansions including mechanical tool heads when processing PVC. These allow the use of various knives on your laser system.

eurolaser systems for cutting PVC foils

- Use of knife-cutters and laser on one system
- Optimum flexibility in production
- Ideal for the processing of different materials
- Perfectly accurate cutting of the foils, in particular printed materials thanks to an optical recognition system

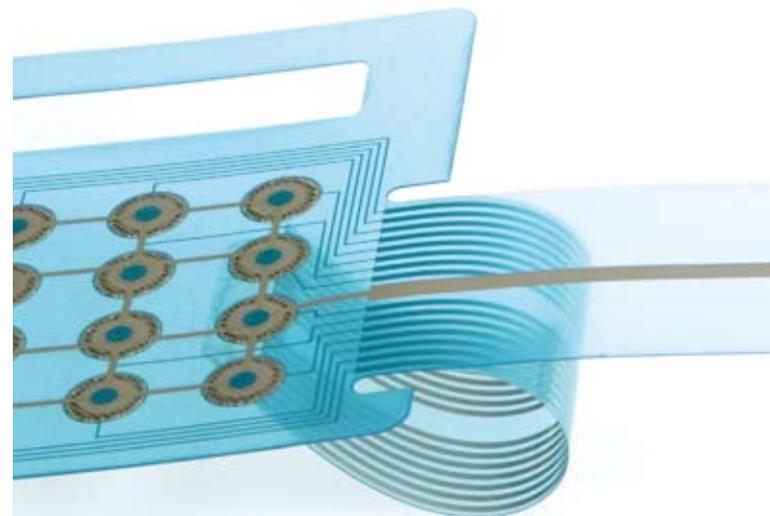
**Material information:**

PVC is flame-retardant and can be produced in both a transparent as well as a coloured form. PVC-U is characterised by its high mechanical strength and hardness. This form of PVC is often used in the building and electrical industries and in mechanical engineering. The addition of softeners gives PVC-P an almost rubber-like elasticity and therefore excellent damping properties. It is used mainly in advertising technology, the packaging industry, medical appliances and the photographic industry.

THE SPECIALIST MAGAZINE FOR FOILS PROCESSORS

## FOILS in FOCUS

### Trends and innovations in the processing of foils



The specialist magazine 'Foils in focus' deals with current topics on all aspects of the subject processing foils. It addresses market trends, examples of applications and innovative products and production techniques. In particular, it presents efficient solutions to processing - from the material to the printing to the final cutting.

[www.foilsinfoocus.com](http://www.foilsinfoocus.com)