THE FUTURE OF PACKAGING

LASER SOLUTIONS FOR THE PACKAGING INDUSTRY
In today's consumer goods market the customers' buying decision is strongly influenced by shelf presentation and convenient product handling. Thus, converters are more and more often asked to deliver innovative packaging solutions, which are one step ahead of the crowd. As glossy high-end printing is very common nowadays, new USPs need to be found.

Laser-optimized packaging makes life easier
The modern customer expects more than just nice printing! Lasers are the key technology for smart packaging with an added value. Laser scribed easy-to-open lines and laser perforated monolayer films for enhanced shelf life of perishable fresh food are already widely used in the food industry.

From Easy Opening to Modified Atmosphere Packaging
Laser-optimized packaging is simply better. There is no need to explain the benefit of a laser scribed easy tear line on a dairy pack, not only for the growing elderly population. Various other aspects promote the use of micro-perforated pouches for salad and vegetables. Controlled oxygen exchange considerably enhances perishables' shelf life which also leads to less waste, reduces overall costs and helps to protect the environment.

Discover how ROFIN's laser technology smartens up your packaging!

With more than 49,000 systems installed worldwide, the ROFIN group is a market and innovation leader for lasers and laser-based solutions for industrial materials processing. No matter whether it is cutting, welding, marking or surface treatment; whether it is a CO₂, fiber, solid state, diode or ultra-short pulsed laser - ROFIN offers the optimal laser technology today for the applications of tomorrow.

ROFIN's CO₂ expert group in Starnberg near Munich is the market leader for laser-optimized flexible packaging and co-operates with the major packaging converters. The comprehensive knowledge about packaging material gained during many years of experience helps to design new laser sources tailored for this important market. ROFIN develops laser processes for the packaging industry on their own winding system and lab equipment. Customers are welcome to send material for free trials.

The comprehensive but straightforward product lineup. Each StarPack model provides the basis for a tailor-made solution.

StarPack® CW
Cross web applications and free form scribing

StarPack® WD
Web direction scribining and perforating within one process

StarPack® AP
Cross web and web direction in one system

StarPack® HP
High-power scribining and cutting of thick material

StarPack® Pouch
For integration in pouch making machines
Cross-web Applications and Free Form Scribing

StarPack® CW systems are designed for selective scribing of packaging layers in the cross-web direction. This corresponds to the typical manufacturing process of bags and pouches. Beyond that, StarPack CW systems can make arbitrarily shaped scribing lines, suitable for re-closable flaps or circular easy tear lines in the corners of packaging.

High-performance 3-axis scanner heads offer extremely fast beam positioning with an enormous working field. The goal is subtle, visually unobtrusive scribing lines. Depending on the application, web-width and other customer’s requirements, ROFIN mounts up to 9 laser sources on a StarPack CW system. Typically ROFIN’s laser solutions are integrated into the slitter winder.

ROFIN’s sophisticated controlling software assures precise laser beam positioning and complete web movement compensation. The selective weakening of packaging layers is achieved by precisely controlling the laser energy. Three different wavelengths facilitate optimum adjustment to the absorption properties of the selected packaging films.

Web-Direction Scribing and Perforating within One Process

With up to 32 processing heads, StarPack® WD systems handle almost any web direction application. The main application area is the perforation of packaging films for fresh food to obtain a controlled atmosphere within the packaging. Hole sizes for this type of application are in the range of 50 µm to 130 µm.

Thanks to its newly developed controlling software, scribing and perforating can be combined within one process. The software allows the mixing of hole sizes, scribing lengths and patterns all at the same time. This allows for straight-forward cost-efficient manufacturing of packaging with controlled atmosphere and easy opening functionality in web-direction.

The StarPack® WD is designed to accommodate up to 4 laser sources. As with all StarPack systems, scribing and perforating is being synchronized with the package print. For optimum processing of thick packaging films and demanding composite material, the system can be equipped with ROFIN’s web movement compensation.
The Universal Solution
The StarPack AP (all purpose) is the packaging allrounder, combining CW and WD functionality in one system. This makes it an ideal choice for complex manufacturing processes and for converters who want to be perfectly prepared for customers’ future requirements.

Even different types of lasers can be integrated within one system. The StarPack AP provides the basis for future all-round solutions that enable you to meet all customer needs.

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Complex contours
Up to 9 lasers and deflection units realize highly-complex scribing lines at high web speed.

Dual easy-tear line
Precise double-spot focusing lenses are used for splitting the laser beam, resulting in dual easy tear lines which help to optimize easy opening.

Simple shapes at utmost web speed
High-end scanner heads scribe commonly used semi- and quarter-circular opening lines at several hundred meters per minute.

Perforation of pressure valves for microwaveable packaging
Perforation of a row or a small area of micro holes enables a valve-like functionality for microwaveable packaging. The steam which develops during preparation escapes through the tiny holes.

Classic simple easy-tear line
Especially single-portion sachets, e.g. for instant coffee (3 in 1) require cross web scribing on the winder. Web speeds of up to 500 m/min are possible for this application.

Classical perforation of BOPP
The StarPack AP also handles the standard micro perforation e.g. of pouches for salads or vegetables. BOPP mono layer film is perforated with 3 - 8 micro holes. This enhances shelf life up to one week. Equipped with the innovative WMC module, perfect circular holes from 50 - 130 µm diameter can be perforated even at high web speed.

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Compact Solution for Pouch Making Machines

The space-saving, compact system, designed for integration in pouch making machines, complements the range of laser systems for easy opening. It provides a solution for food producers who are looking for a laser scribning system that can be used directly after pouch forming or within the form fill and seal unit.

As web speed in pouch making systems is considerably lower than in slitter winders, 100 W laser power is more than sufficient for optimum scribning results. StarPack Pouch is the cost-efficient alternative using low power laser sources and simultaneously offers easy integration.

High-Power Scribing and Cutting of Thick Packaging Material

Cutting and scribning of thick packaging material such as cardboard and thermo-forming films is a promising new application area for laser systems. Compared to a laser, mechanical cutting and punching techniques are prone to wear and tear and require cost-intensive modifications every time the package design changes.

With laser sources from 1000 W to 2500 W the StarPack HP cuts even thick packaging material on-the-fly at full web speed. A new high-end scanner system has been especially designed for this type of application and laser sources with a power of more than 2000 W. With an impressive working area of over 1 m² and at the same time very small spot sizes, the StarPack HP is a true alternative to a punch.

StarPack® Pouch

StarPack® HP

ROFIN – CO₂ Systems with own Developments for the Flexible Packaging Industry

The Right Wavelength Makes the Difference

The various polymers which are commonly used in the packaging industry show different absorption properties at 10.6 µm, which is the industrial standard wavelength of CO₂ laser sources. Especially Polypropylene can be processed considerably faster at shorter wavelengths. Consequently, lasers with 10.25 µm wavelength realize tremendous higher scribning and perforating speeds for PP-based polymers.

ROFIN is the only laser manufacturer who has the capability to drive its development of new laser sources towards the benefit of the flexible packaging companies. The result is a CO₂ laser range from 10.60 µm to 10.25 µm to 9.35 µm at various power levels.

ROFIN’s web movement compensation (WMC) system provides complete compensation of web movement and safeguards perfect circular holes of the desired size under all conditions. Thus production waste is reduced significantly and maximum web speed more than doubles. The solution encompasses a comprehensive speed range, from 0 m to more than 390 m per minute and can be fitted and retrofitted in all StarPack WD and AP systems.

StarPack® WD – Pulsed Laser Only

StarPack® WD – Pulsed Laser with WMC

Typical Transmission Spectrum for clear PP Film (24 µm)

Wavenumber (cm⁻¹) 4000 3200 2500 2000 1800 1600 1400 1200 1000 900
Transmission (%) 100 80 60 40 20 0

The packaging industry calls for perforation with perfect and consistent quality. The better the perforation the bigger the shelf life advantage. Multi-chamber trays require different perforation to optimize the storage life of the contents in all particular chambers.

WMC – Precision Perforation at all Times

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StarMAP
 Modified Atmosphere Packaging

At the time a consumer is in front of a supermarket shelf with fresh produce, the decision what to buy is rather simple. It has to be the salad or vegetable which appears to be the freshest! The one, the customer is thinking, this pack was just placed in the shelf. Yellowish, sallow looking produce is the loser in the shelf and will end up with a 50% discount sticker or even in the garbage bin. It is not new that perforation of pouches will lead to a longer shelf life. But what is the right amount of perforated holes for what fresh produce?

With StarMAP design and optimization of Modified Atmosphere Packaging films becomes a breeze. The new software solution uses a scientific approach and a USDA approved database for calculating the optimum number and size of micro-perforations for a certain product and pack geometry. To provide the best possible shelf life and product quality, StarMAP takes the following parameters into account:
- Product: fruits, vegetables, whole/fresh cut
- Product volume
- Storage temperature
- Type of packaging film
- Packaging geometry

Based on product respiration and package permeability rates, the software calculates the number and size of micro-holes, required to achieve the optimum O₂/CO₂ balance in the head space of the packaging. This prevents anaerobic conditions and minimizes product respiration.

StarMAP can be used with any ROFIN web-direction laser perforating solutions like StarPack WD and StarPack AP.

StarMAP brings numerous benefits to film and packaging suppliers and food processors:
- Reliable calculation of micro-perforation data
- Fast and flexible adaption to varying products and packagings
- Less costly and time consuming trial & error
- Reduced waste
- Streamlined production
- Easy and comfortable user interface
- Optional device for measurement of respiration rates on site
StarMap comes with an USDA approved database of more than 160 products (fruits, vegetables, whole / fresh cut). This database is a good point to start from. But there is still room for optimization and major converters are already addressing this point.

However, oxygen-transmission rates of fresh food vary, as growing area and harvest time have a certain influence. With the O₂-Check Kit, Rofin now opens the same possibilities for small and medium-sized converters. It comes with a sensor-equipped, airtight container, a highly temperature-stable climate cabinet and smart evaluation software.

With O₂-Check Kit adapting your micro-perforation pattern to varying circumstances is a breeze. Just put a sample in the sensor-equipped test box and place it in the climate cabinet. The software will record the oxygen-transmission rates over time and generate a new database record for this specific product. With this new solution every converter will be able to offer individually and seasonally optimized modified atmosphere packagings for fresh produce.

- All-in-one package, includes Hard- and Software
- Simple and user-friendly measurement process
- Automatic database update
- Individual and seasonal MAP-optimization

True, real-time monitoring of the perforation process to ensure consistent quality and diameter of the holes is a demanding task. Typically, perforation holes have diameters less than 120 microns while the packaging film moves with some 100 m/min. Consequently, there have been no ready-to-use solutions on the market up to now. Rofin is the first supplier to offer true real-time monitoring of perforation hole diameter and percentage roundness. Each laser perforation head will be fitted with a high-speed camera and the output of each camera is processed using pattern recognition software to record accurately the dimensions of each hole.

VisionPerfoControl allows for validation of the hole perforation process and eliminates the possibility of incorrect set up (e.g., focus error) from spoiling the output from the perforation system. Furthermore, the recorded data documents 100% perforation quality of the processed material.

- True, real-time monitoring of perforation quality
- Checking roundness and diameter
- No production waste due to incorrect set up
- 100% quality control documentation
### Specifications

<table>
<thead>
<tr>
<th>StarPack®</th>
<th>WD</th>
<th>CW</th>
<th>AP</th>
<th>Pouch</th>
<th>HP</th>
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<td>up to 1800 mm</td>
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<td>600 m/min</td>
<td>600 m/min</td>
<td>600 m/min</td>
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</tr>
</tbody>
</table>

*(*) Galvo mirrors can be switched to a fixed position to scribe in web direction.

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### Sample

**EASY OPENING - LASER SCORED**

Add value to your Packaging! For the convenience of consumers.

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