

rofin

Rofin – Laser Systems for Flexible Packaging

The StarPack Product Line

Global Rofin Network - We are Where you are

- Sales:
FY 2012: \$540.1 million
FY 2013: \$ 597.8 million

- Worldwide > 2,200 Rofin employees

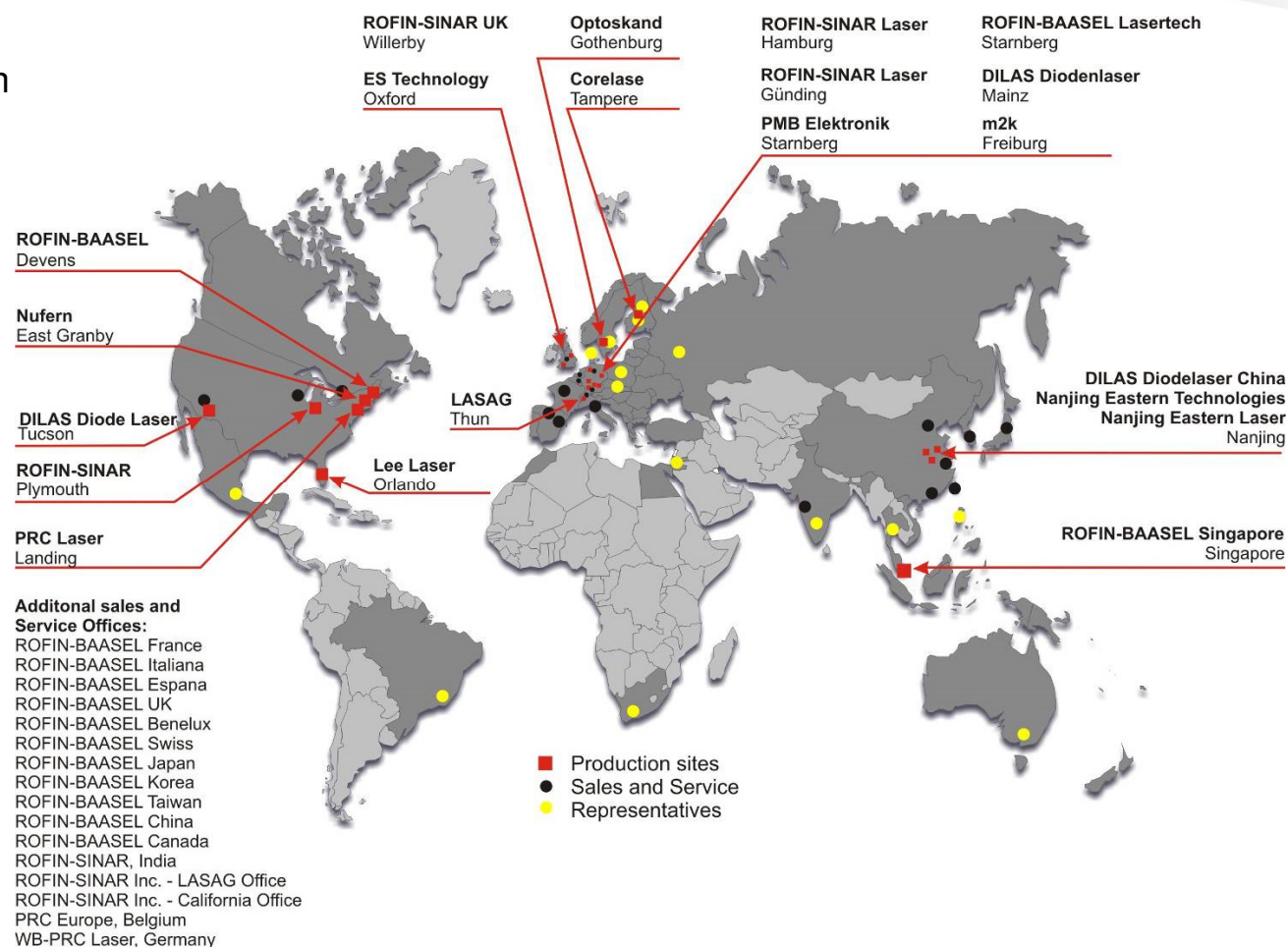
- 22 Rofin production facilities in Asia, North America and Europe

- Local customer service in 50 countries

- More than 4,000 customers worldwide

- Industry specialized sales engineers with strong regional focus

- Installed base of more than 38.000 laser systems

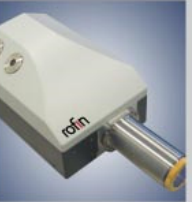


ROFIN - The Open Minded Consultant

rofin
LASER MICRO

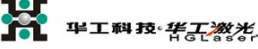
ONE SUPPLIER - ALL LASER TECHNOLOGIES

rofin

CO ₂ -Laser	Disc Laser	Rod Laser	Fiber Laser	Picosecond-Laser	Femtosecond-Laser	Diode Laser
						
   						
■ From sources to customized systems ■ Widest range of lasers ■ Leading laser manufacturer in material processing						

WE THINK LASER

ROFIN – Strong Customer Base

Automotive	Automotive Suppliers	Machine Tool	Semiconductor & Electronics	Other
  DAIMLERCHRYSLER  <i>Ford Motor Company</i> General Motors     PORSCHE  RENAULT  TOYOTA 	      Luk  ThyssenKrupp   Visteon Witzenmann 	 BLM GROUP          STIEFELMAYER   	                	   Balda AG BDF ●●●●● Beiersdorf BRAUN   EADS  OSRAM  SCHOTT glass made of ideas SIEMENS

ROFIN - We know Your Applications



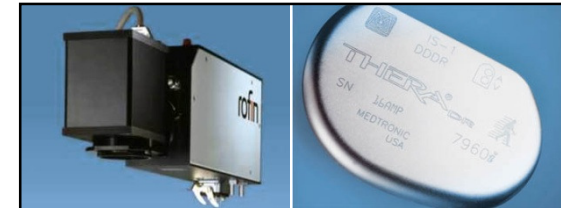
Macro

Cutting
Welding
Surface modification



Micro

Fine welding
Fine cutting
Micro structuring
Micro drilling
Perforation
Plastic welding



Marking

Metal marking
Marking of plastics
Day & Night applications
Label marking
SmartCard marking
Semicon applications

Laser Micro – Focus on Fine Solutions

Lamp & diode pumped solid-state lasers, systems



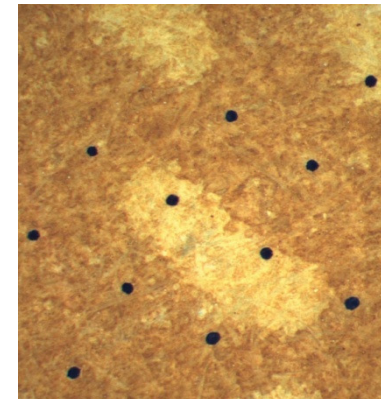
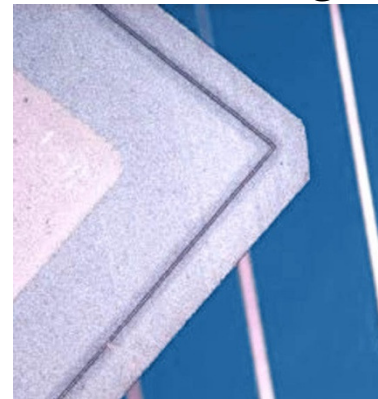
Diode lasers



CO2 lasers



Fine Welding – Fine Cutting – Micro Structuring – Perforation





rofin

LASERS FOR THE PACKAGING INDUSTRY



Why lasers in packaging ?

Selective weakening of packaging films

- to create Easy Opening features



Perforation of packaging films

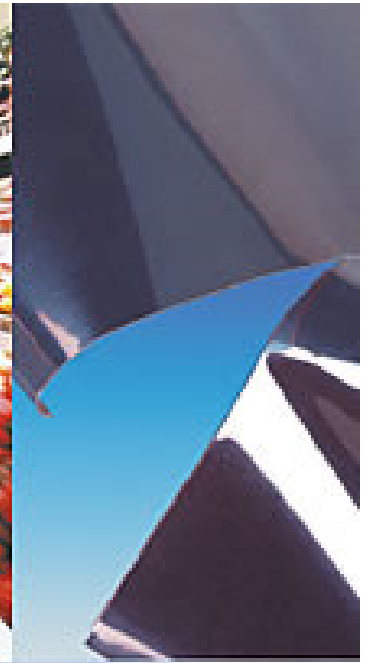
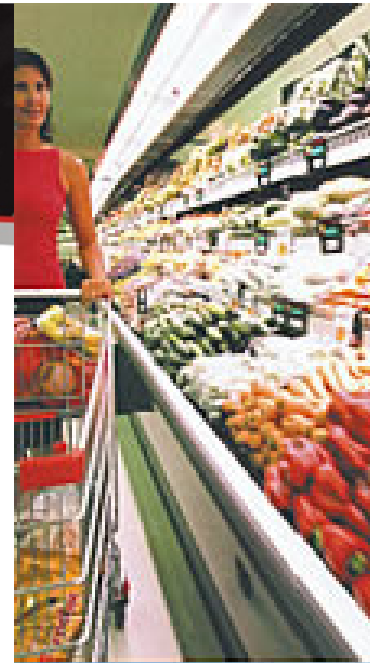
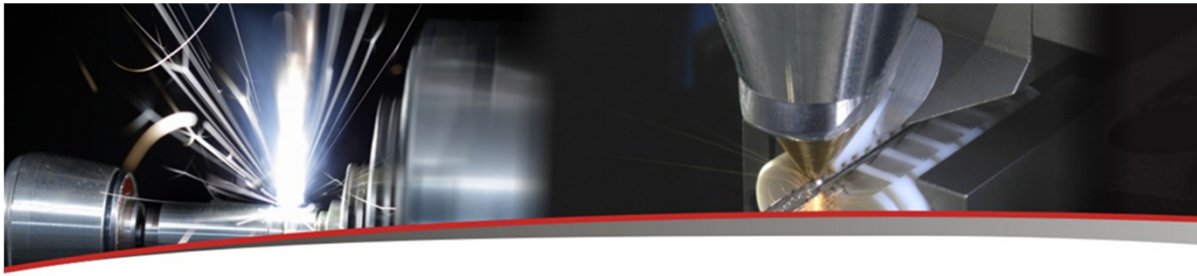
- for controlled atmosphere packaging significantly increases the shelf life for fresh produce
- to release pressure during microwave cooking
- Air release during filling process



Packaging / CO₂-Systems: Installations by Country



CO2 systems installations in all red marked countries



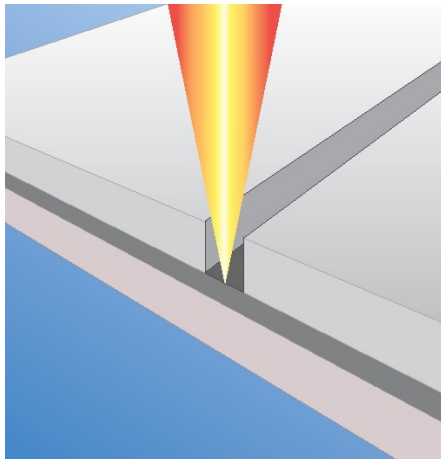
rofin

Laser technology in Packaging



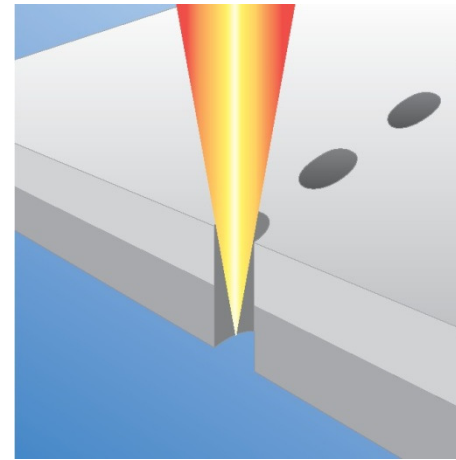
Definition

Scribing



Removal of one layer in a laminate

Perforation

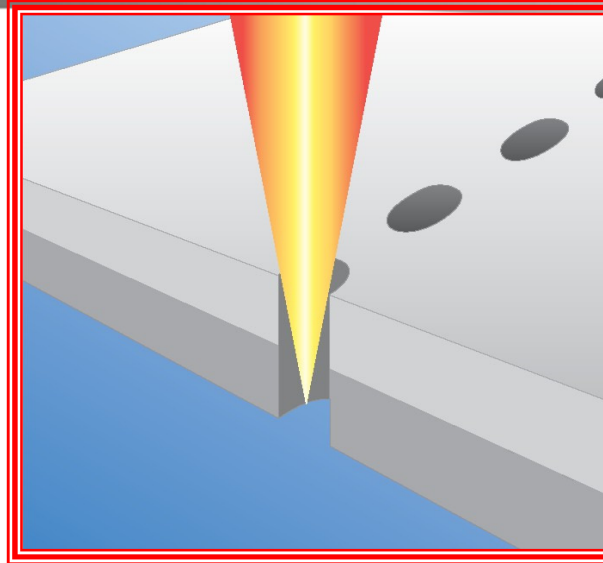


Holes through the complete laminate

Perforation



- Reinforced through rim
- $>60\mu\text{m}$



**Pressure
release**



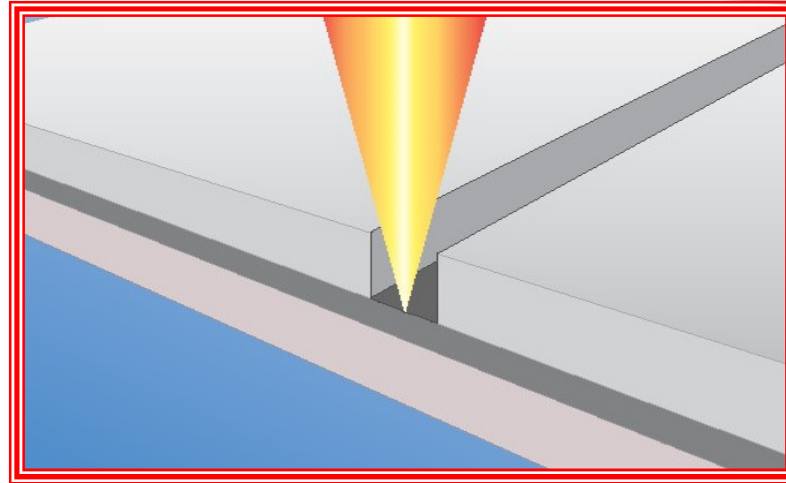
MAP



**Easy Opening + Air
release**



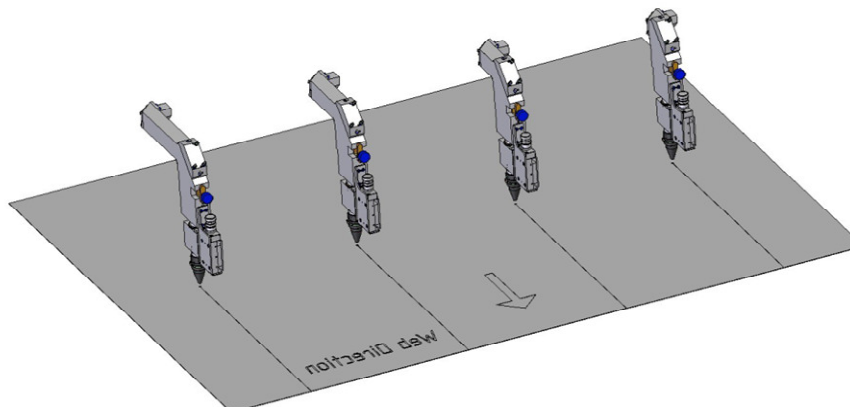
Scribing



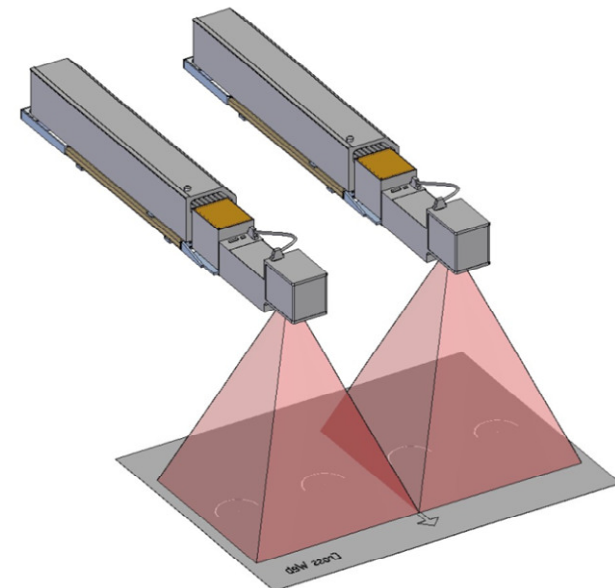
Easy and direction-controlled opening

Definition

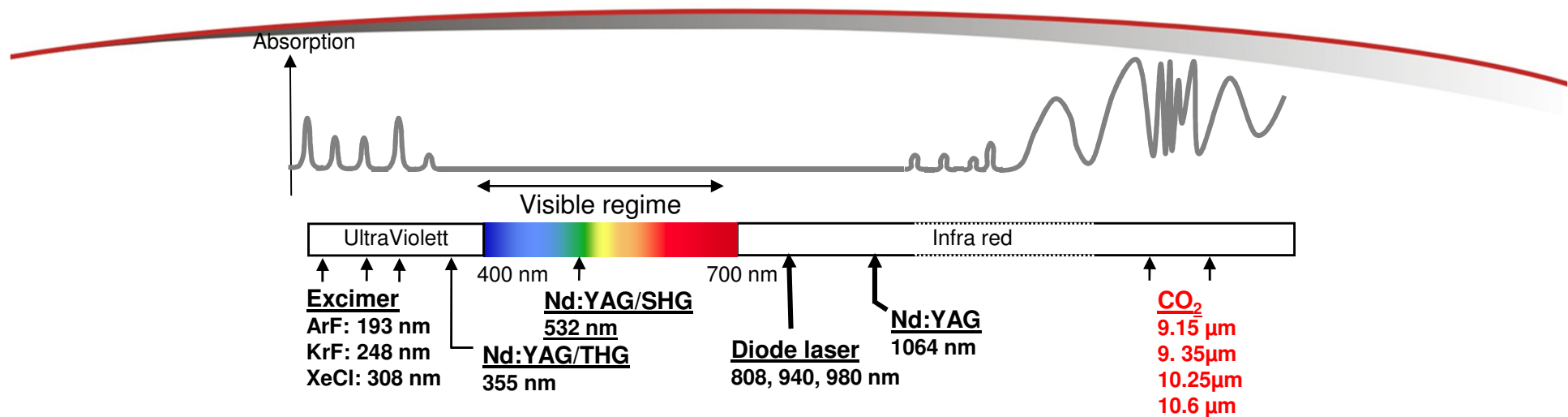
Web direction



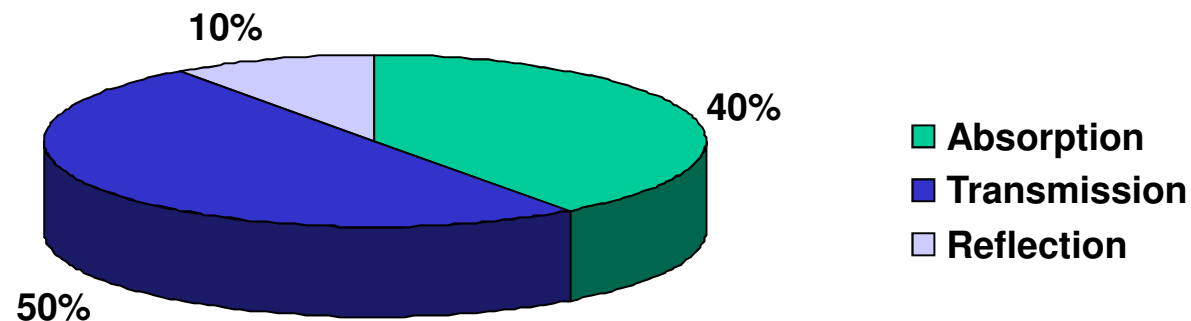
Cross web



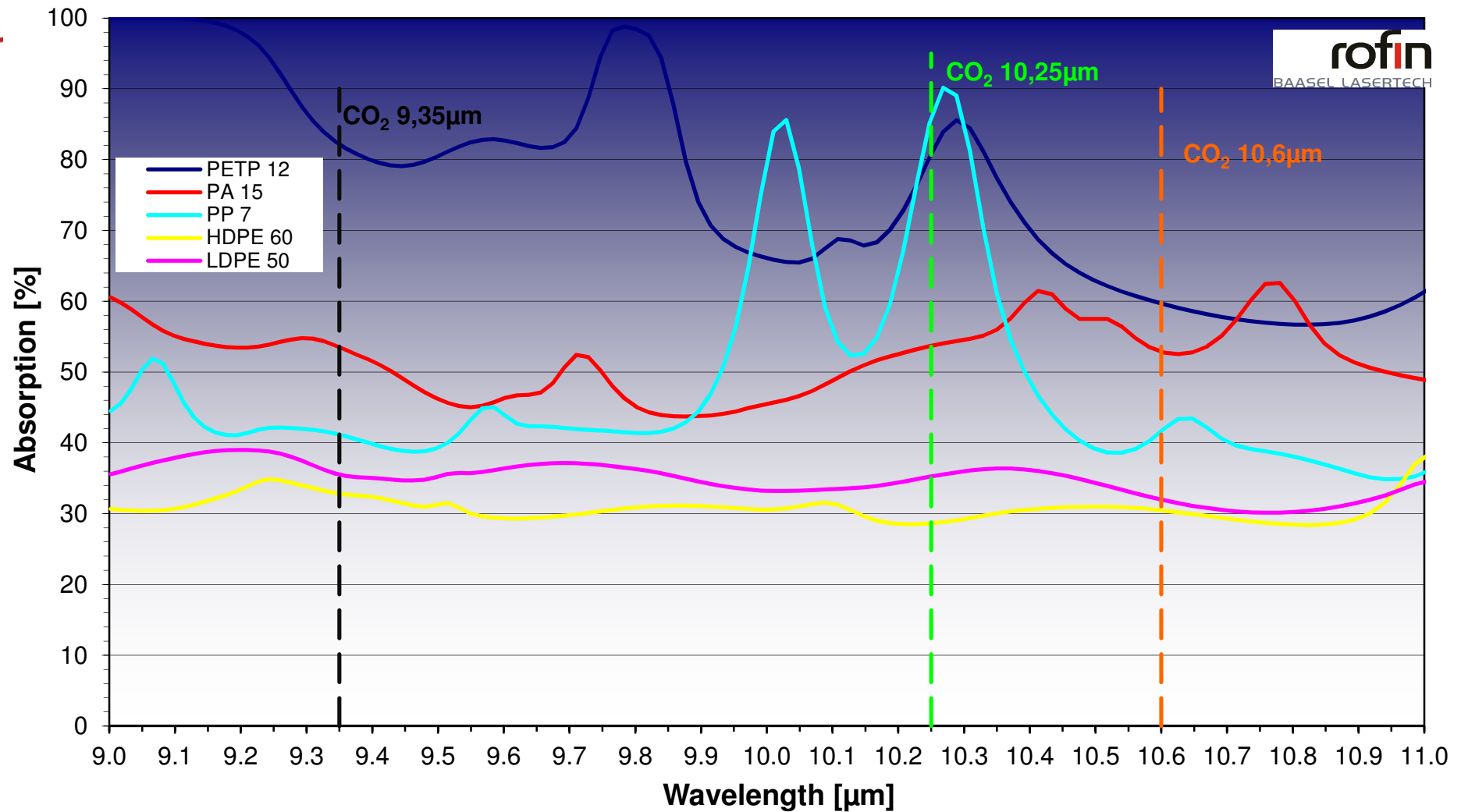
Why CO₂ Lasers for Flexible Packaging Material ?



Typical properties of one material in regards to laser energy of one specific wavelength



Absorption for PET, PA, PP und PE



Typical Material Combinations of Packaging Laminates...

...and how they can be scribed

Laminates with Aluminium Layer

- The metal layer ($> 4\mu\text{m}$ thickness) works as natural barrier for the laser power
- The threshold to damage aluminium or the layer below is high $\gg$ safe & reliable process
- A paper layer absorbs a high amount of laser power
- Metallization ($< 4\mu\text{m}$ thickness) is likely to be removed in the laser process
- A metal layer requires significant higher laser power for perforation



Scribing into PET



Scribing into PP



Scribing into PET

Scribing of Laminate with Aluminium Layer



← PET

← Aluminuim

← PE

← PE

Typical Material Combinations of Packaging Laminates...

...and how they can be scribed

Laminates without Aluminium Layer

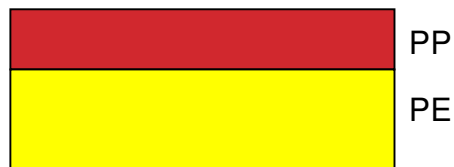
- No natural barrier exists to limit the scribing depth.
- Differences in absorption rate of each layer define the barrier (scribing depth) for the laser beam
- Laser power stability is crucial for a constant quality
- The scribing depth *within one layer* can not be guaranteed.
- The better absorbing layer will be scribed >> Select the best wavelength
- The thickness of the film defines the necessary laser power for perforation.



Scribing into PA



Scribing into PET

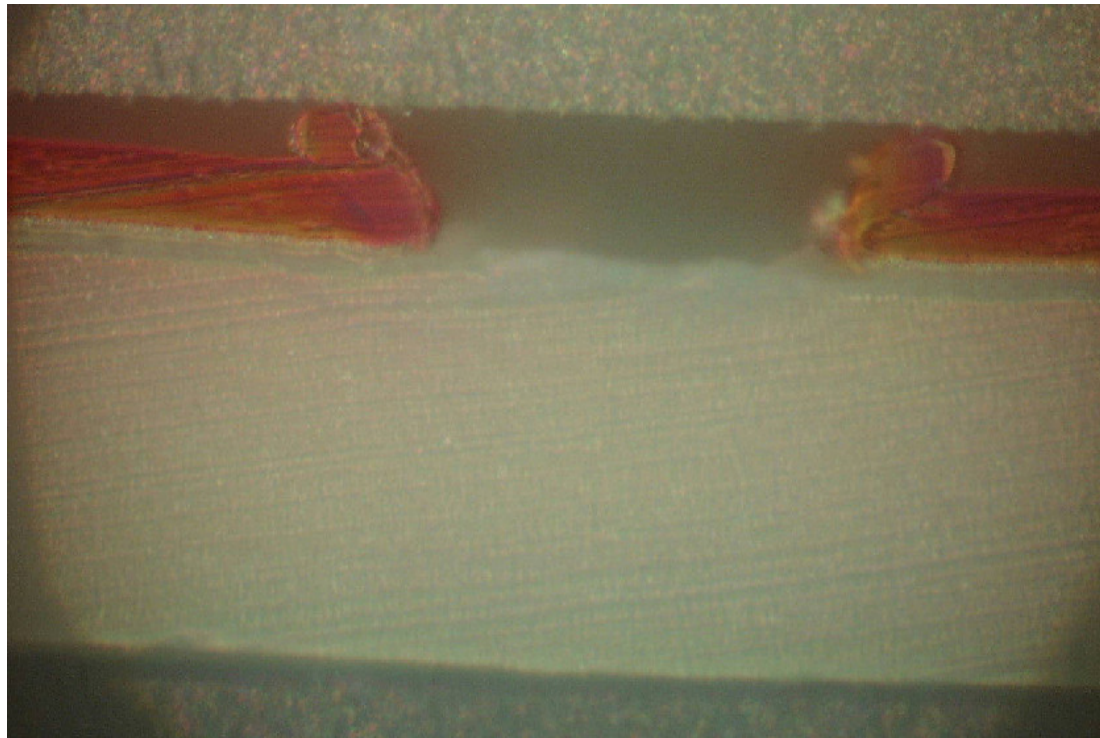


Scribing into PP



Scribing into PET with 9,35μm

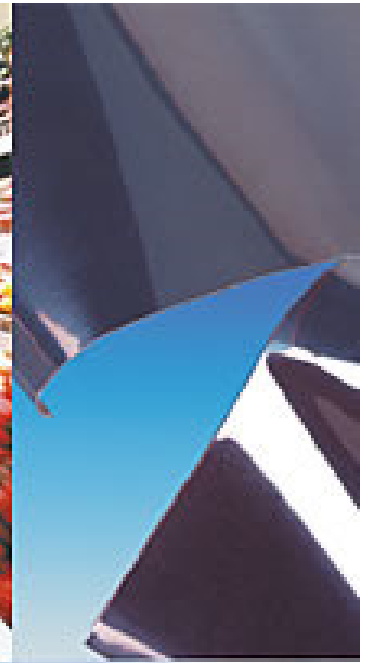
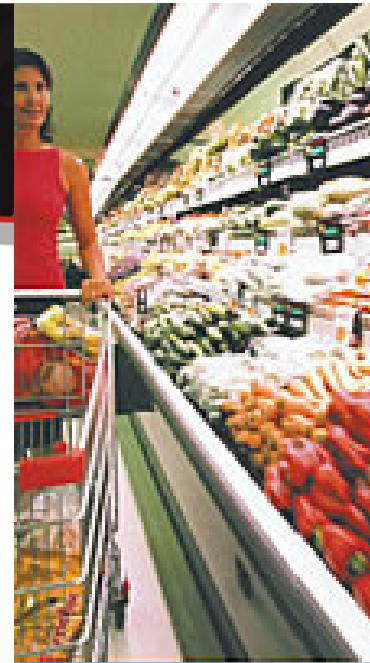
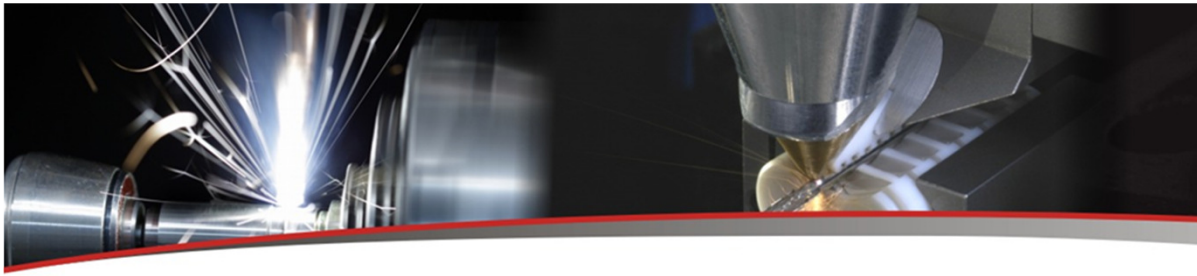
Scribing in Laminate Without Metal Layer



← PET

← Adhesive

← PE



rofin

Laser technology in Packaging

www.rofin.com/flexible-packaging



Rofin StarPack

StarPack WD



StarPack CW

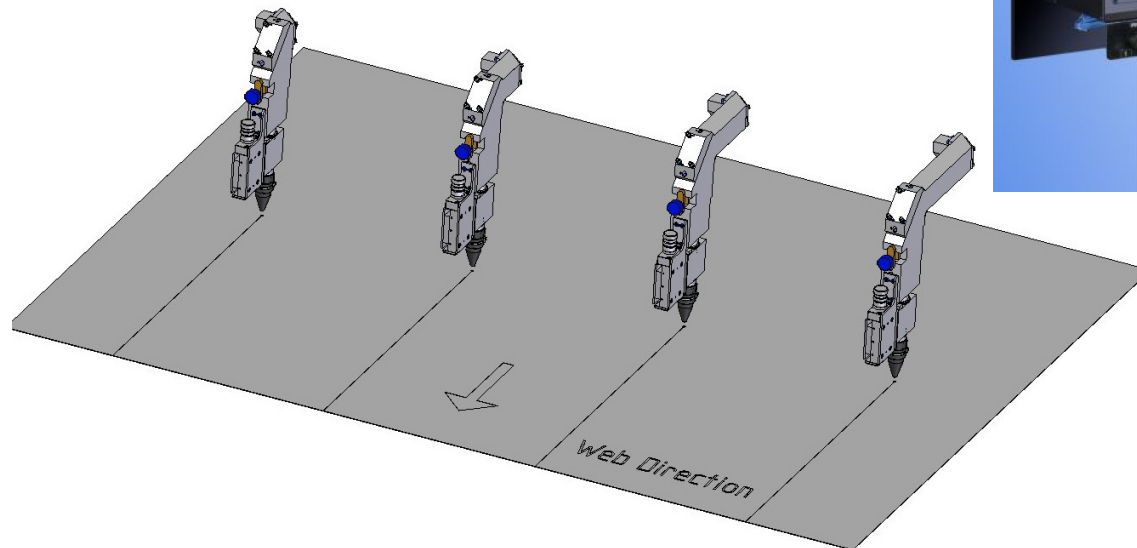


StarPack Pouch



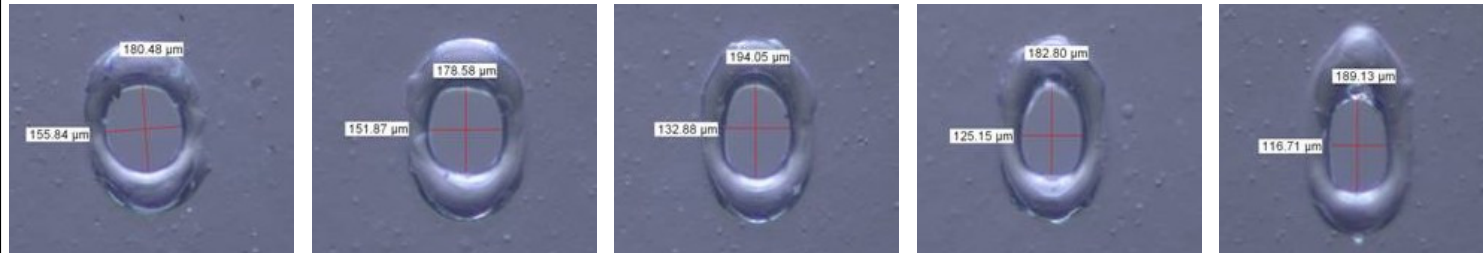
StarPack WD

- Scribing or perforation of web material / Superior perforation results with optional WebMovementCompensation

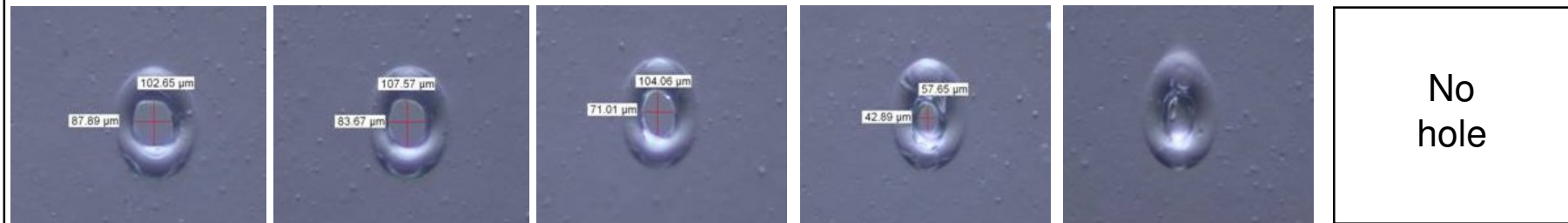


StarPack WD / Micro Perforation

Standard system at long pulse duration → holes become oval at high speed



Standard system at short pulse duration → no hole at high speed



10m/min

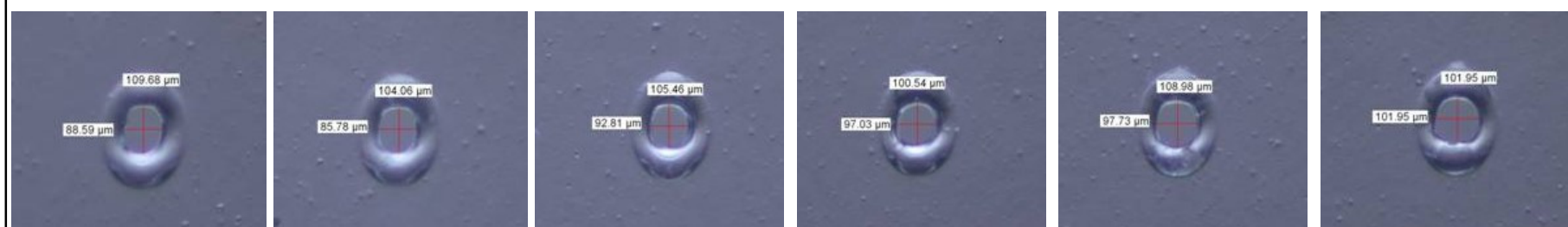
50m/min

100m/min

150m/min

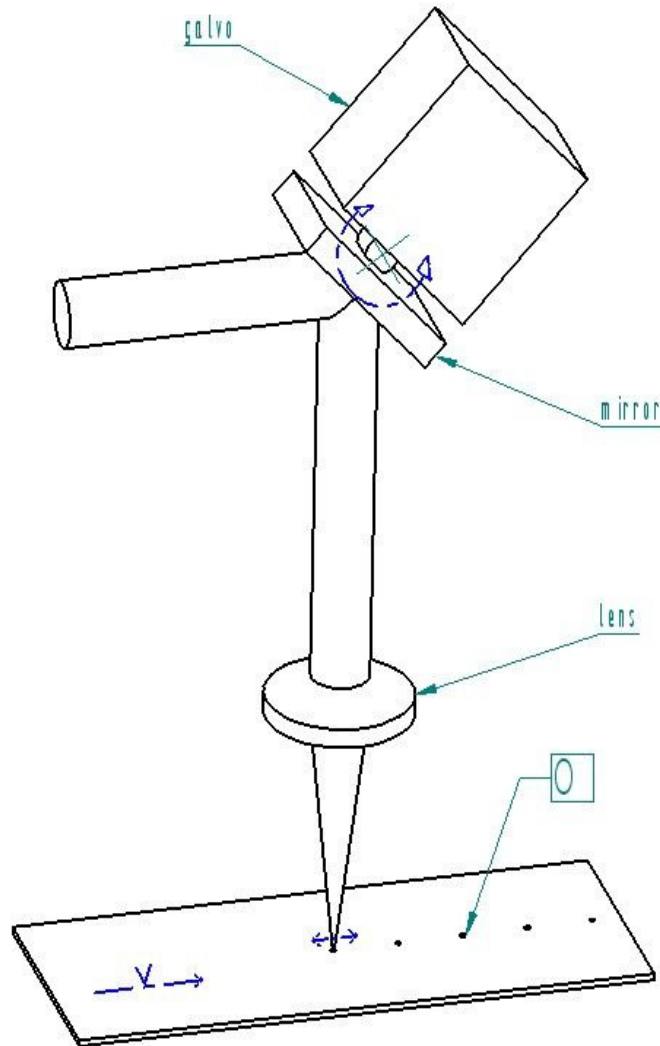
200m/min

250m/min



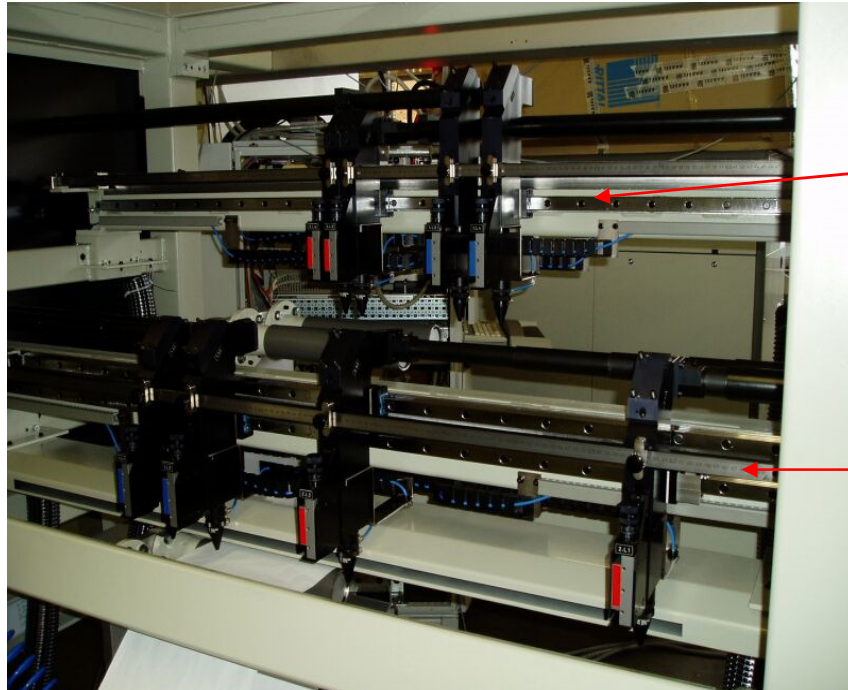
StarPack with WebMovementCompensation

StarPack – WMC Technology



- Pulsed laser
- Long pulses
- Last bending mirror can swivel to synchronize beam to web movement (galvomotor driven)
- Constant hole shape with increasing speed even at long pulses

StarPack WD 8 Head System



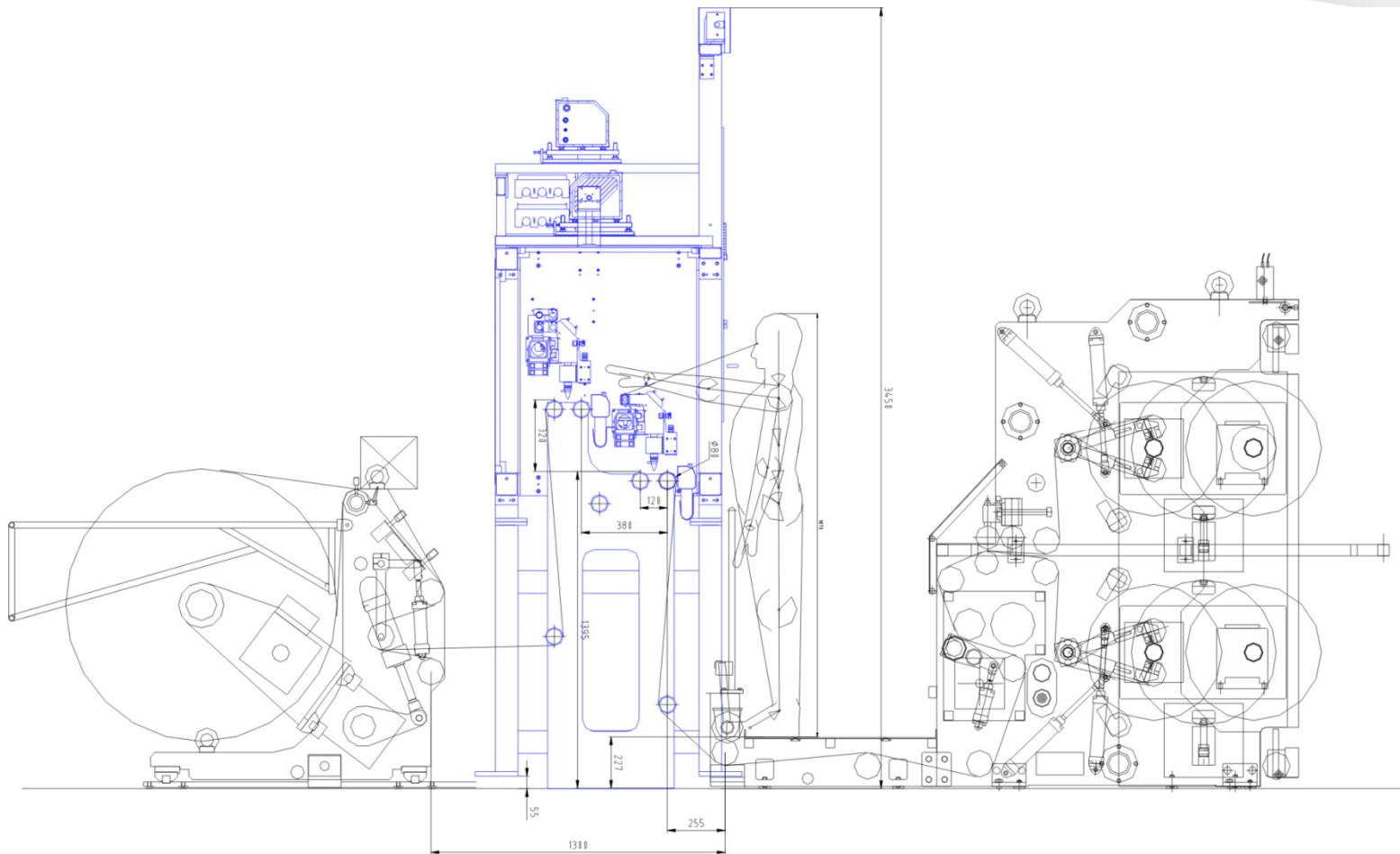
2nd
level

1st
level

- 8 – Head System
- Arrangement in two levels => easy adjustment of position and focus
- No stagger between heads (intermittent lines possible (also with trigger sensor synchronization))
- Minimum distance between two lines limited to 36mm (in one level), 0mm between heads in two levels



Typical System Integration



Application - Perforation



Perforation of pouches for fresh produce

Application - Perforation

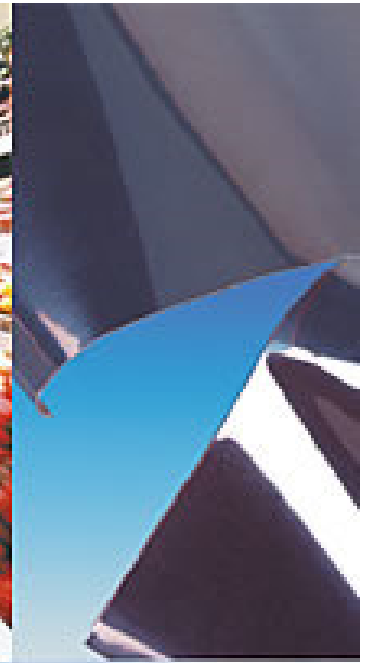
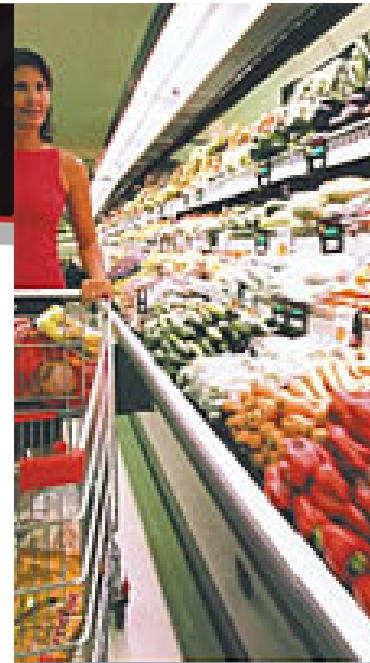
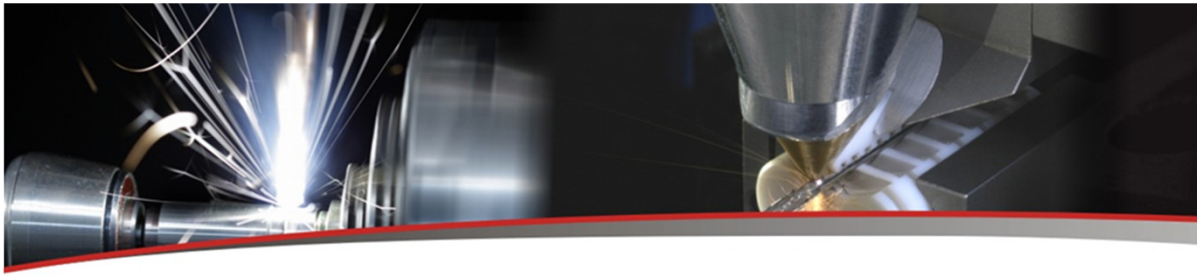


Ventilation valve in Coffee packages

- complex integration
- high costs per valve
- disturbing the design

Replacement by laser perforation

- laser integrated on slitter unit
- almost no costs for the perforation
- invisible for the eye
- as reliable as the valve



rofin

Laser Technology in Packaging

www.rofin.com/flexible-packaging



Rofin StarPack

rofin
LASER MICRO

StarPack WD



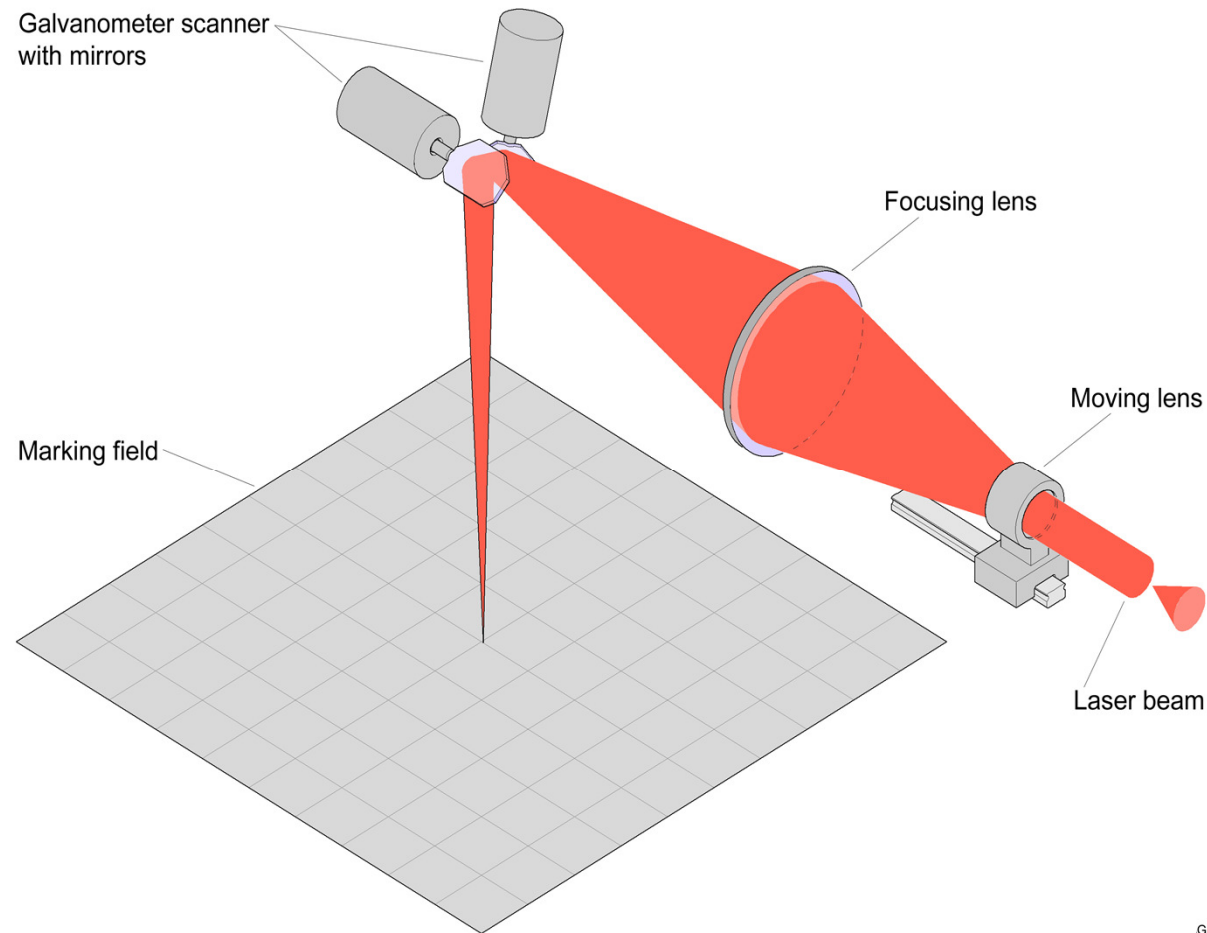
StarPack CW



StarPack Pouch



StarShape C 3A Galvo Technology



Free Form Scribing and Perforation



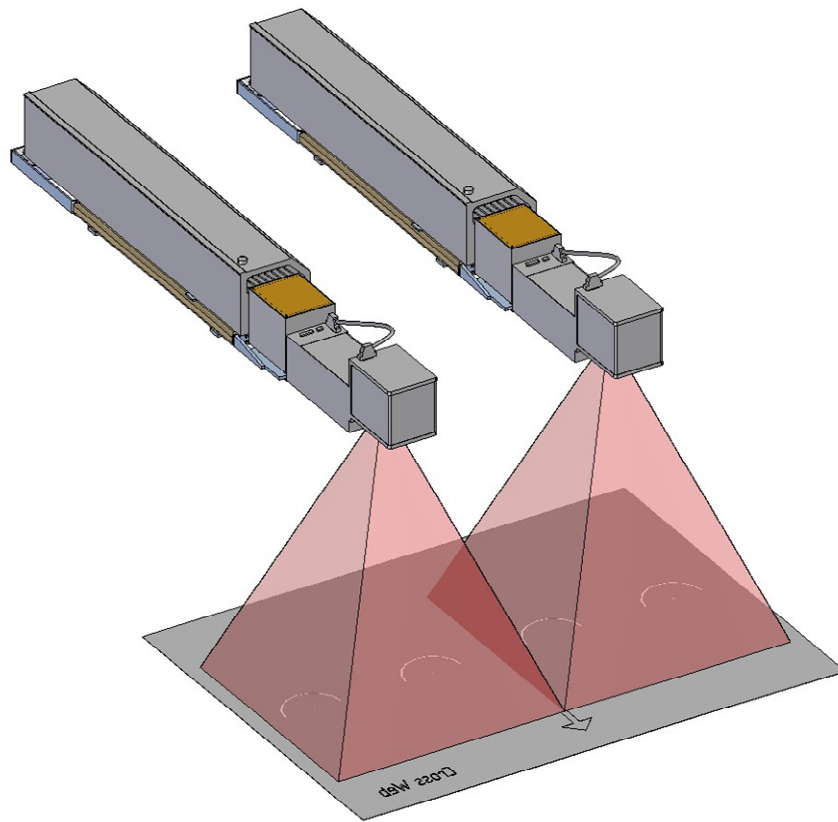
Laser

Scanner

System: StarPack CW

StarPack CW (Cross Web)

- Solution for scribing across web direction / Any user defined shapes are possible



StarPack CW (Cross Web)

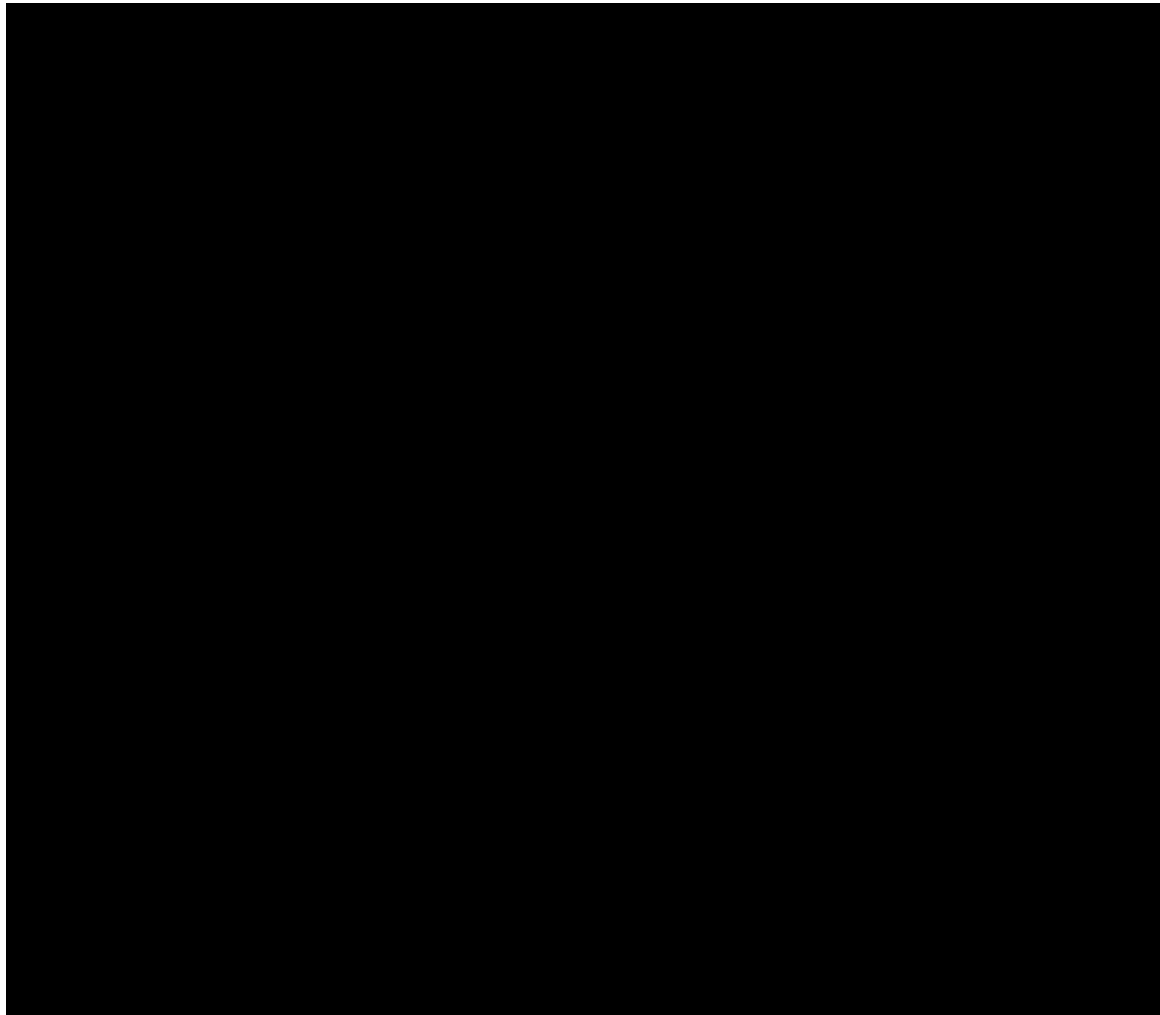


- Solution for scribing across web direction
- Any user defined shapes are possible
- Made for scribing on large areas or multiple products cross web
- On the fly technology (scribing synchronized to the web movement)

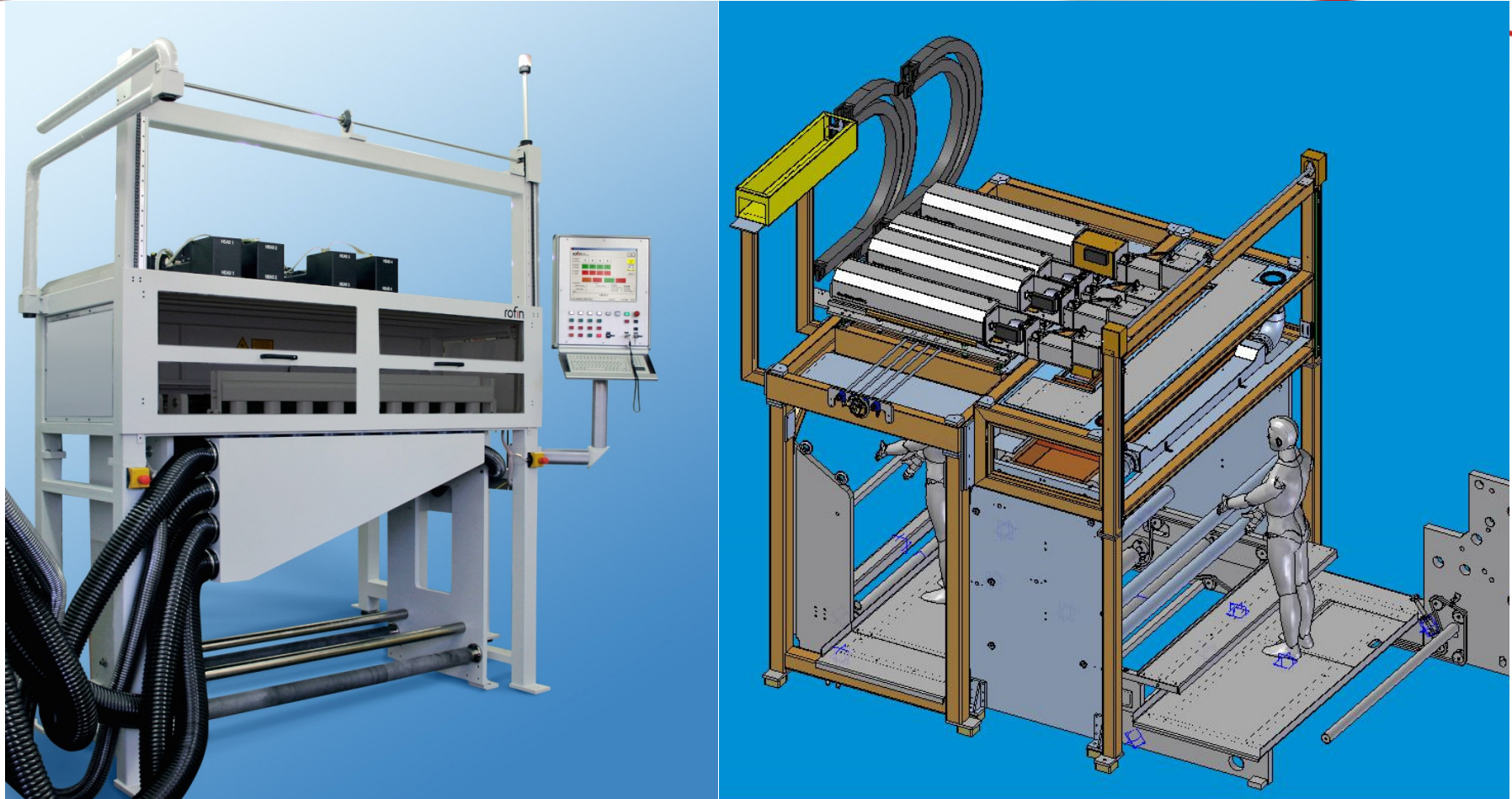


- Web width up to 1.600mm
- From 100W single laser to 6 x 300W multi laser solutions
- Up to 6 galvo heads (up to 750mm x 750mm working area per head)
- Powerful LaserCad and StarPack Software for easy operation
- Web speed strongly depends on application

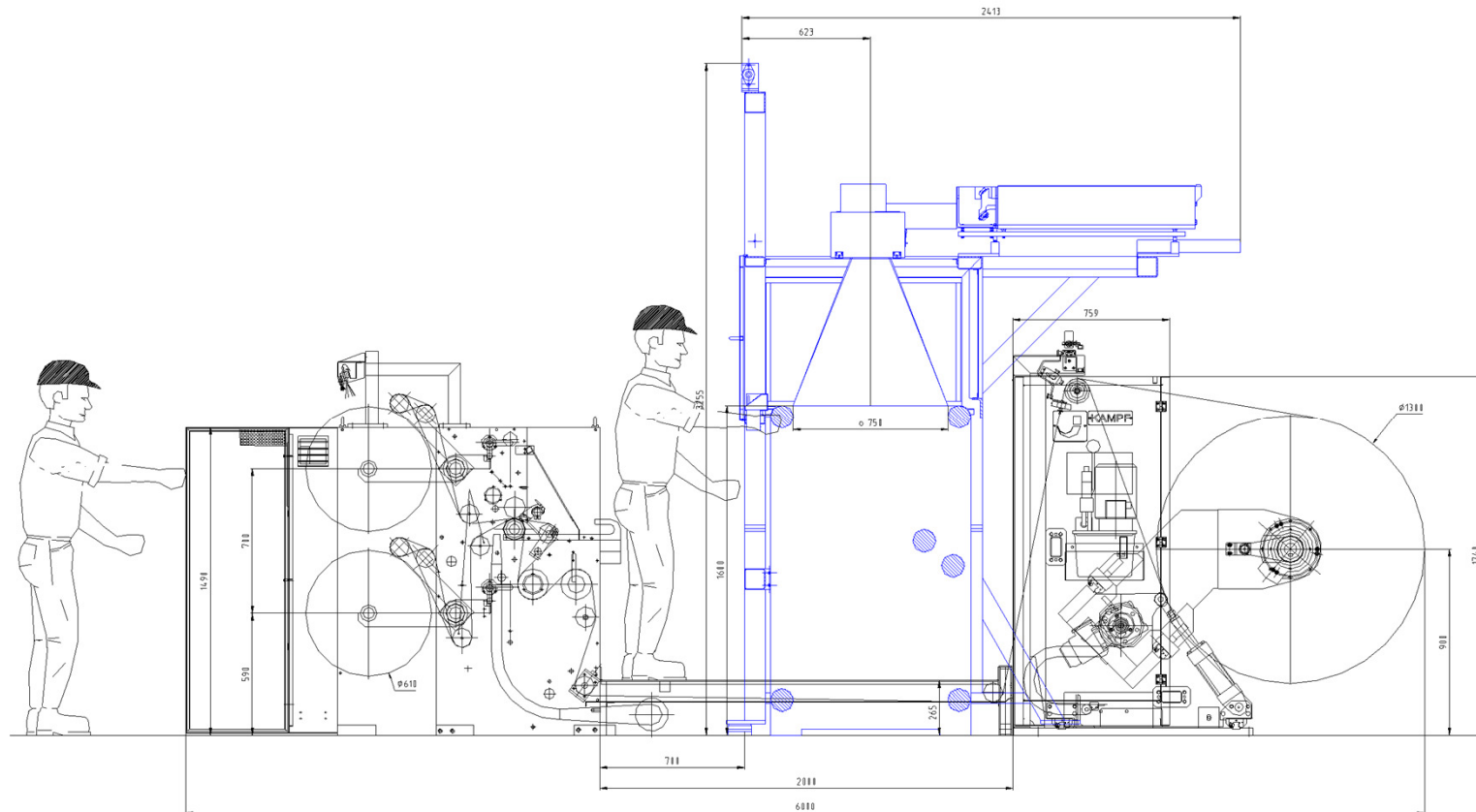
StarPack CW - Scribing in production



StarPack CW - 4 Laser System



Typical StarPack CW integration



Rofin StarPack Pouch

StarPack WD



StarPack CW



StarPack Pouch



StarPack Pouch

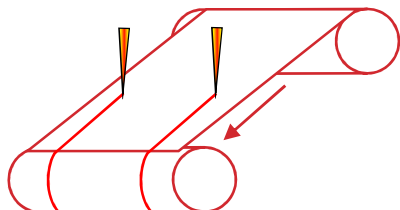
- All solutions for integration into Pouch Makers of FFS systems with fixed optics
- Based on StarPack (100 – 300W)
- Flexible and individual adaptation to the pouch maker
- System can be removed from the pouch maker to use space for other modules (i.e. zipper insertion)



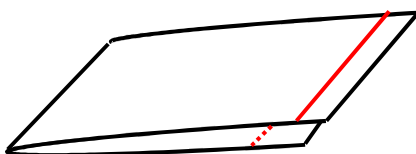
WD SCRIBING During POUCHMAKING

Standard

1. scribing on web material



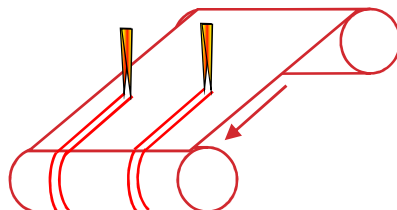
2. Folding process, pouch making



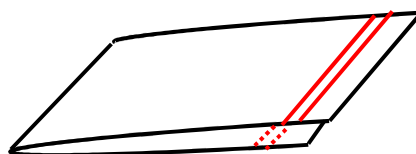
Mismatch of laser lines possible

Dual Spot Optics

1. Double line scribing on web material



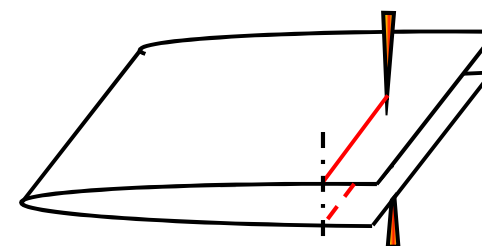
2. Folding process, pouch making



Up to 8 mm mismatch can be compensated



Scribing of folded Pouch



100 % alignment of laser lines

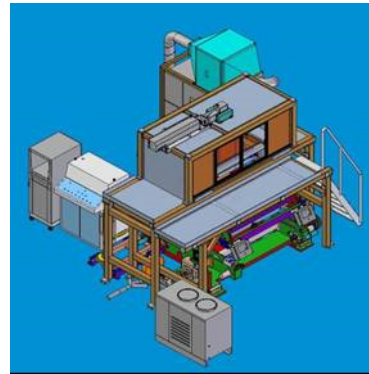
Advantages of the StarPack Pouch

- Front and back laser line are exactly matched
- Faster product design changes possible
(easy introduction of Easy Opening in new products)



Rofin StarPack All Purpose

StarPack AP



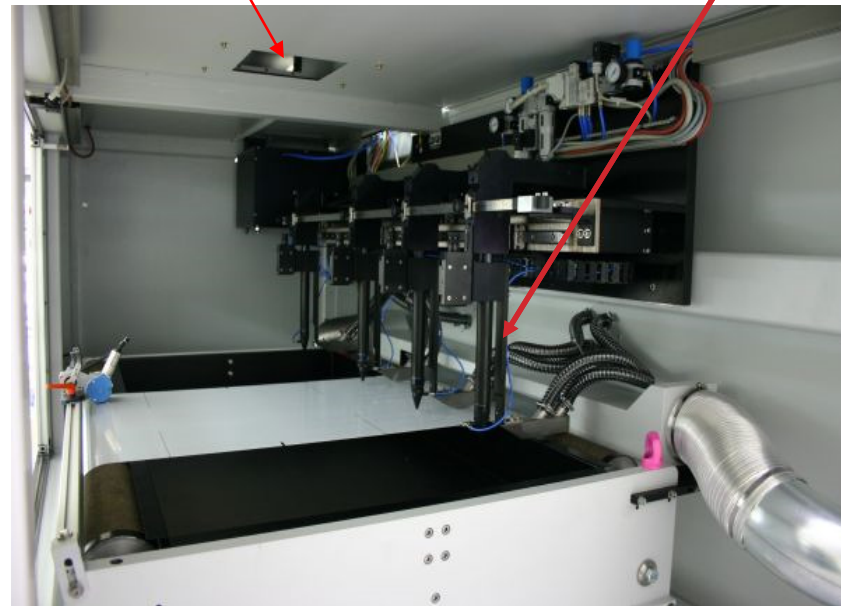
StarPack AP (All Purpose)

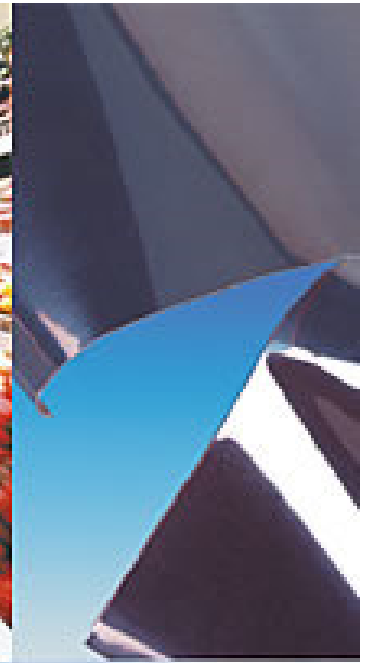
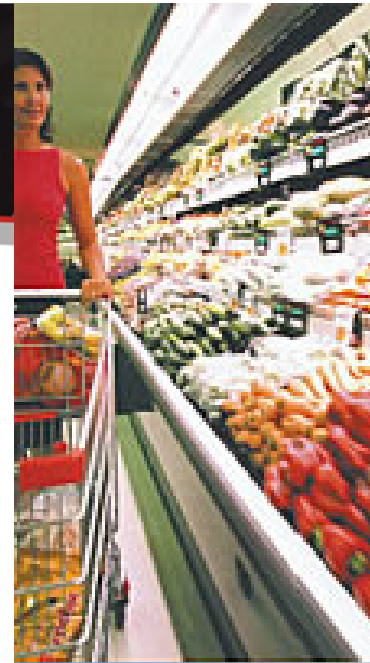
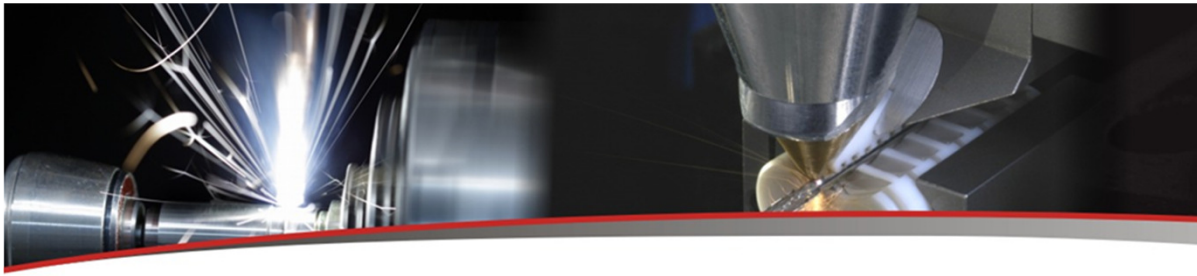


- Solution for scribing in web direction OR in cross web direction
- The most flexible system

Galvo outlet for CW scribing

Fixed optics for WD scribing





rofin

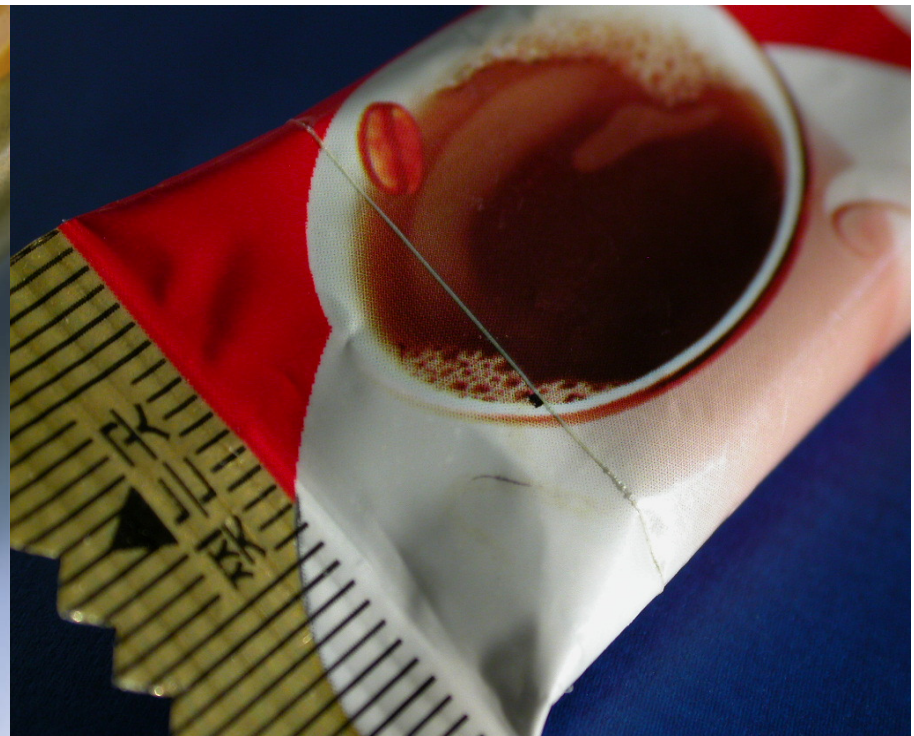
Applications



Application – Easy Opening CW



Application – Easy Opening CW



StarPack CW - Application „Easy Opening“



Application – Easy Opening CW



Laser easy opening packaging

AMCOR FLEXIBLES

Application – Perforation CW

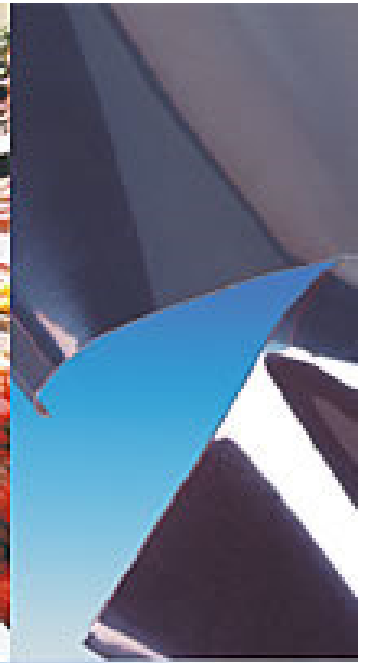
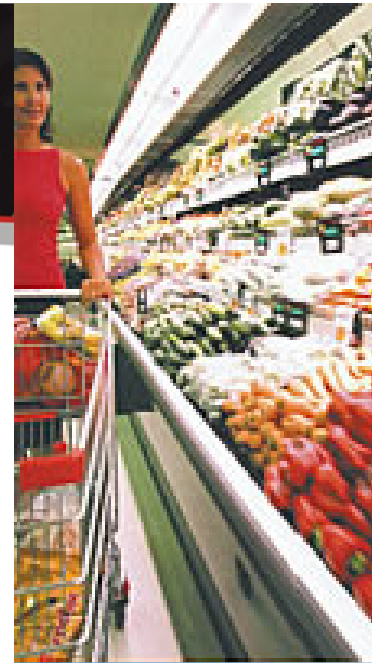
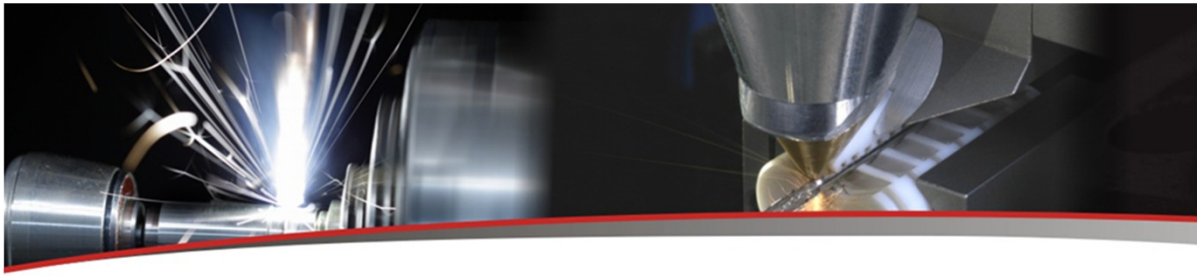


Application – Easy Opening WD



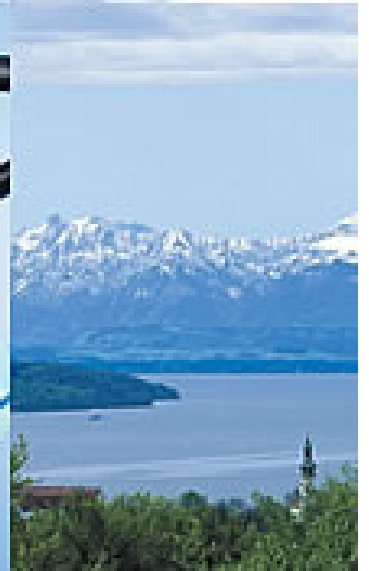
Application – WD Easy Opening





rofin

Application Lab



Try our possibilities in our lab

- **6 different laser systems are available for almost any type of application**
 - + PerfoLas System**
 - + SSH 300 3A on winder**
 - + SSH 2000 3A**
 - + SSH 300 2A**
 - + SSH 300 3A/M**
 - + SPA**
- **3 different wave lengths available (10.6, 10.25, 9.35μm)**
- **First tests are carried out free of charge**
- **Three application engineers perform more than 350 applications per year**
- **Your presence is highly welcomed**

Material conditions for trials

- For all applications On the Fly or in Web Direction the material must be delivered on bobbins.
- The **width** of the bobbins should not exceed **800 mm** and the **diameter** should not be larger than **500 mm**.
- Inner core diameter of the bobbins 76mm. Empty cores in the same width of the material are **absolutely** necessary.
- Depending on the required web speed the length of the material on the bobbin should be adequate.

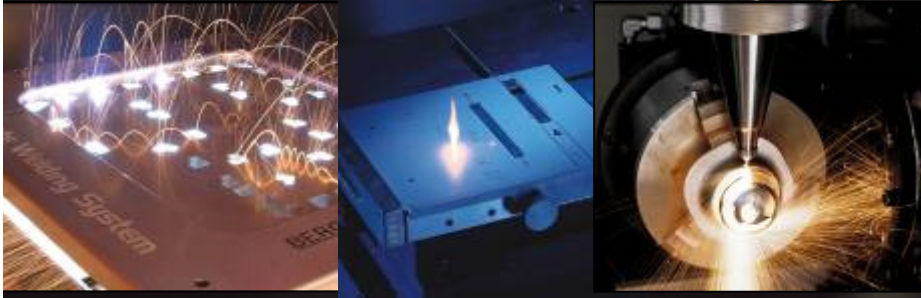
Required Process Information

- **Required web speed? Speed variation?**
- **Web width?**
- **Application in web direction or across the web?**
- **Hole diameter / line width?**
- **Hole number, hole distance, No. of rows?**
- **Pitch (stagger) between lines / figures, line length / size of figures?**
- **On which machine should the laser module implemented?**
- **Power ramping during acceleration / braking required?**
- **Tachometer signal / eye mark signal provided?**
- **Sensitive web tension control? Very important issue for across the web application**

rofin

ROFIN-SINAR TECHNOLOGIES

WE THINK LASER



Laser