HIGH SPEED LASER PERFORATION

Tobacco Industry
Lasers in the tobacco industry

ROFIN’s Perfo Series
- The Masters of Perforation

With its Perfo systems, ROFIN has set the benchmark for laser perforation of cigarette tipping papers and plastic films for over 20 years now. Without the use of components like beam switches, masks, needles, choppers or perforation electrodes, the contact-free laser perforating process offers optimum hole quality and process control. Modifying production parameters is a breeze, so changing market requirements or future law restrictions can be met with great flexibility and without additional investments.

Unique beam multiplexer for maximum performance and accuracy

The core technology for perforating, developed by ROFIN, is a unique beam distribution mechanism, the beam multiplexer. A rotating polygon mirror delivers up to 32 perforation beams which can perforate up to 1,060,000 holes per second. Hole densities vary between 5 and 50 holes per cm and row. For maximum precision the position of each perforation head can be adjusted in steps of 0.01 mm. Processor-controlled winding motors guarantee a speed uniformity better than +/- 0.5 for web speeds between 50 and 700 m/min. With this extraordinary accuracy the standard variation of porosity reaches the lowest levels available.

Reliable quality assurance with visual porosity measurement

Rising quality standards and stricter laws require substantially improved quality assurance systems. With the introduction of VPM – a device measuring the porosity of perforated tipping in Coresa Units in real-time at max. 700m/min, ROFIN provides an extremely reliable quality assurance tool for laser and electrostatic perforation systems. ROFIN’s patented technology yields rich information: porosity per hole dimensions and the overall porosity of the perforation zone are calculated and displayed. Since the system calibrates itself, the results are extremely accurate.
Latest laser technology with minimum maintenance costs and lowest gas consumption

**PerfoLas**
- **High Throughput Perforation**
With up to 4,000 W laser power and 16 or 32 perforation heads, PerfoLas is designed for high production volumes. The system perforates and cuts up to 4 bobbins in parallel which means 480,000 holes per second, respectively 1,060,000 holes per second with ROFIN’s custom made Dual PerfoLas version.

**PerfoLite**
- **Compact Solution for Medium Batch Sizes**
Based on the same technology as PerfoLas but with less power and 8 perforation heads and up to 150,000 holes per second, PerfoLite is ideally suited for small and medium batch production.

**PerfoLab**
- **Smaller Volume Production and Evaluation**
PerfoLab offers the same hole quality as its bigger siblings. With 4 perforation heads and up to 85,000 holes per second, it is designed for smaller production volumes and evaluation of new perforation designs in laboratories.

**Approved and Tested Components**
All PerfoLas systems use ROFIN’s industry standard-setting CO₂ slab laser sources. The laser operates with only a few extremely durable components and does not need conventional gas recirculation – leading to a considerable reduction of maintenance and service. The gas bottle, integrated in the laser head, lasts for up to 15 months.
Specifications

<table>
<thead>
<tr>
<th>PerfoLab</th>
<th>PerfoLite</th>
<th>PerfoLas</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CO₂ Laser</strong> (10, 6)</td>
<td>100 W/200 W</td>
<td>1000 W</td>
</tr>
<tr>
<td><strong>Perforation unit</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perforation rows</td>
<td>up to 4</td>
<td>up to 8</td>
</tr>
<tr>
<td>Hole diameter</td>
<td>50 - 200 µm</td>
<td>50 - 300 µm</td>
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<tr>
<td>Holes per row/cm</td>
<td>5 - 50</td>
<td>5 - 50</td>
</tr>
<tr>
<td>Holes per second</td>
<td>up to 85,000</td>
<td>up to 150,000</td>
</tr>
<tr>
<td>Porosity</td>
<td>50 - 1000 CU</td>
<td>100 - 1200 CU</td>
</tr>
<tr>
<td>Variation</td>
<td>2 &lt; variation &lt; 5</td>
<td>2 &lt; variation &lt; 5</td>
</tr>
</tbody>
</table>

**Winder (servomotor)**

- Speed (up to) | 50 - 400 m/min (up to 6.7 m/sec) | 50 - 600 m/min (up to 10 m/sec) | 50 - 700 m/min (up to 11.7 m/sec) |
- Acceleration | < 2 to 400 m/min | < 2 to 600 m/min | < 2 to 700 m/min |
- Speed uniformity | < +/- 0.5% | < +/- 0.5% | < +/- 0.5% |
- Rewinding quality | +/- 0.15 mm | +/- 0.15 mm | +/- 0.15 mm |
- Core diameter (mm) (options) | 63, 65, 66, 67, 70, 76, 100, 120 | 63, 65, 66, 67, 70, 76, 100, 120 | 63, 65, 66, 67, 70, 76, 100, 120 |
- Bobbin | 1 | 1 | 1 > 2.4 |

- Paper width | 25-80 mm | 25-80 mm | 25 - 270 mm |
- Paper length | 4000 m | 4000 m | 4000 m (< 12.000 m max. diam. 750 mm) |
- Rewinding bobbin | 4000 m | 4000 m | 4000 m |
- Max. bobbin diameter | 400 mm | 450 mm | 450 - 800 mm |
- Changeover time | 2 min | 2 min | 3 min |
- Control unit | PC 104 modul, real time information | PC 104 modul, real time information | PC 104 modul, real time information |

- Polygon | gold plated | gold plated | gold plated |
- Faucettes | 52 | 26 | 13 (high power version polygon) |
- Frequency | 50 - 400 Hz | 50 - 700 Hz | 50 - 1100 Hz |

**Additional information**

- Laser can be used for 16,000 h | gas consumption < 0.15 l/min | gas consumption < 0.15 l/min |
- Bottle contains 1,500 NI | up to 25,000 h | 1 bottle lasts for 1 - 1.5 years (3 shifts) | 1 bottle lasts for 1 - 1.5 years (3 shifts) |