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Cutting, Perforating and Scoring Flexible Film for the Packaging Industry

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‘Sealed Off’ CO_2-Lasers **Replace** Mechanical Tooling

To cut, perforate and score flexible film, the packaging industry demands tools that combine high processing speeds with compact size and high reliability – an ideal environment for the ‘sealed off’ CO_2 laser. It is, therefore, no surprise that such devices are increasingly replacing mechanical tooling in the production of flexible food packaging.

The packaging industry is a fast growing market for ‘sealed off’ CO_2 lasers that can process paper, plastic film and other flexible materials. Apart from already well-established marking processes, laser applications include the cutting, scoring and micro-perforation of various thin materials. As the laser machining process can be software controlled, process flexibility is significantly higher than with mechanical methods. This enables processing cycles to be rearranged or changed on the fly as required.

To produce the tear-off strips for easy opening packages, the surface of the packaging material is, for instance, scored with the laser. This weakens the material at this point so that it tears along the intended line when the package is opened. An outstanding benefit of lasers for this application is that they can precisely control the scoring depth and micro-perforation hole size, parameters that are difficult to consistently reproduce with hard tooling. With features such as high reliability, low costs and a compact footprint, the Diamond C-Series – which represents one of the latest generations of ‘sealed off’ Coherent CO_2 lasers – has become the tool of choice to process packaging materials. In addition, this laser fulfils the packaging industry’s demand for a high degree of reproducibility with respect to laser power and beam quality.

The perforation of thin films with compact excimer lasers is one of the key processes in the production of food packaging

Due to the large amount of capital expenditure that is needed, tooling and lines for the production of packaging are generally expected to have very long life cycles. This means that the laser is often considered as a direct one-to-one replacement for cutting blades and scoring tools in existing lines. With such retrofits, the compatibility of the laser with the conventional production process is, therefore, of utmost importance. This is where solutions such as the LaserSharp laser module from LasX Industries come into their own. This tool is offered as a retrofit for existing slitter/re-winder systems – an area where it has already gained widespread acceptance. In such systems, flexible packaging films have to be scored in a roll to roll process across a web width of one to two meters. To ensure that there is no reduction in the processing speed after the retrofit, the scoring blade is usually replaced by a number of laser systems.

Unless thicker flexible packaging films are specified, converting applications don't usually need more than 100 W of laser power. As the current Coherent 'sealed off' CO_2 lasers offer powers of up to 500 W, this means that either a number of lower power systems can be used or a single high power laser can be split into multiple beams. LasX has chosen to use a number of lower power lasers as this provides much tighter process control as well as more optimization capabilities. It is particularly important to be able to control the power of each of the laser beams independently of each other. On the other hand, the use of a single laser source together with beam splitters is anything but easy. The advantage of tight process control is clear from the example of processing a multi-layer structure for an easy-opening food package. Precise depth control prevents the barrier layer from being cut into and makes sure that the food in the package stays fresh for a longer period of time.

The integration concept of LaserSharp is based on four Coherent lasers that are placed on a gantry that traverses the web. If faster cycle times are needed, a further row of LaserSharp modules can be installed further along the line. Essential for this arrangement of a number of individual laser sources are factors such as low operating costs, high reliability and a compact size. These demands are met by the Diamond C-Series of lasers.

Product lifetimes are of particular importance to the user. Each laser working in a system with eight small lasers has to be more reliable than one large high-power laser. To make sure that these requirements are fulfilled, Coherent has developed the C-Series of Diamond lasers which feature a number of design innovations that further increase reliability and lifetimes. To emphasize the reliability, each Diamond C-Series laser is guaranteed for a period of at least 24 months.

The use of a folded waveguide resonator means that the laser has an excellent power to size ratio. This compact design simplifies integration into existing packaging machine lines as a cost-effective upgrade to replace compact mechanical cutting blades.

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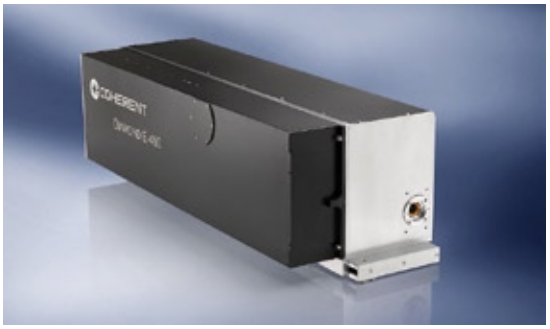
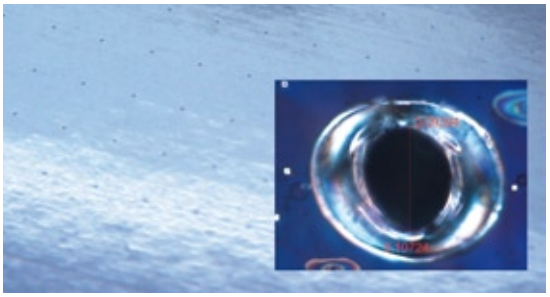


The introduction of compact CO_2-lasers enables a variety of applications for the production of flexible packaging.



Another application area for this laser: thin holes give the packaging of food a breathable structure.

This well-defined tear tab for flexible packaging has been produced with the Diamond Laser from Coherent.