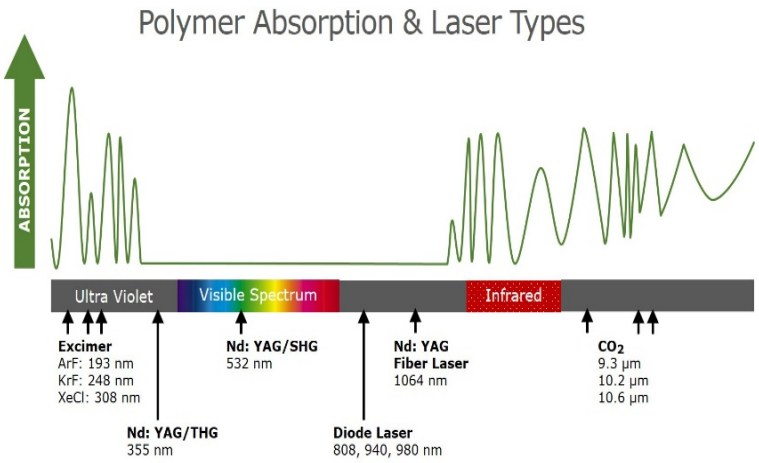
# $CO_2$ Lasers for Packaging: What they do, why it matters.

SYNRAD
A Novanta Company

$CO_2$ lasers appear across a wide range of industries because they offer increased production flexibility, improved production times, and lower operating costs. But what are they actually used for? And why does it matter?

## Background

Lasers of every type can be used for a variety of processes—including cutting, marking, and engraving—on materials we use daily. Each of these materials has a characteristic absorption spectrum, meaning there are certain wavelengths of light a given material will absorb more readily than others. Better absorption means that the material will be processed more quickly and effectively. Since wavelength is one of the defining characteristics of a laser, this allows us to pair the appropriate type of laser with the material for the best quality results and the fastest throughput. $CO_2$ lasers have longer wavelengths, which pair nicely with plastics, natural materials like paper, and certain metal foils —some of the most popular materials in the packaging industry.




## $CO_2$ Lasers for Packaging

The versatility of a single $CO_2$ laser allows you to mark information like date codes, cut films or packages, score for easy open, perforate to provide oxygen exchange for fresh produce, and kiss-cut labels.

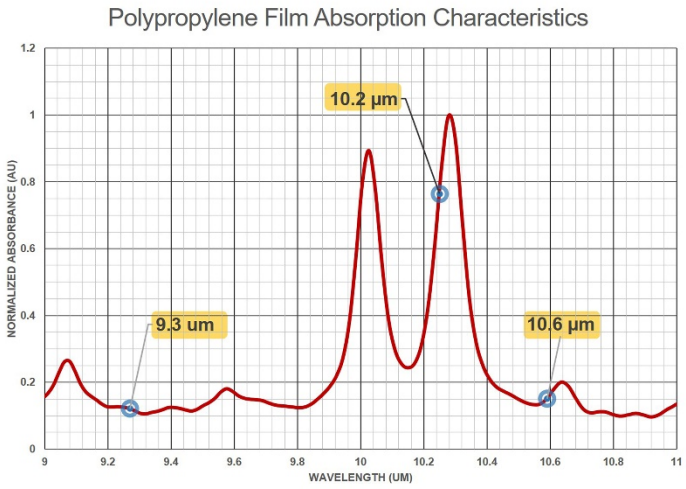
Constantly evolving customer and supply chain requirements mean that flexibility is key. Like the label market, packaging is quickly adopting digital printing because it offers easy customization (including regional, seasonal, or personal marketing) and supply chain optimization (including prototyping, economical short runs, and just-in-time production). Likewise, lasers are a piece of digital processing equipment: unlike mechanical methods, laser systems are controlled by software, meaning cut and mark patterns can be changed on-the-fly. This ability significantly reduces lead times, inventory, consumables, and changeover times. Their non-contact nature also allows processing of sensitive materials—preventing mechanical defects—and maintains a sanitary environment.

## Laser Processing Equipment

For those more familiar with mechanical equipment, transitioning to lasers will naturally raise questions. A few key areas to consider:

- **Reliability:** $CO_2$ lasers are designed for industrial environments, meaning they will perform 24/7 operation over the course of many years, despite challenging production environments. Synrad lasers are also backed by standard 1- or 2-year warranties with options for extended warranty or swap programs. These highly reliable pieces of equipment are the reason many customers have reported over a decade of use without a single service call.

- **Setup**: Lasers are digitally operated, so software is used to finely control positioning and mark or cut depth. This is achieved by altering the laser power and speed of delivery. Scoring or perforating patterns can be produced by controlling the laser pulses. So an individual laser can perform multiple processes in a single step. Applications testing can determine these speed vs. power parameters on your specific material. Once dialed in, these settings will work for any chosen design.
- **Safety**: Like any other piece of industrial equipment, a few safety measures should be put into place for proper operation, including: emergency stop circuitry, electrical interlocks, a safety enclosure around the processing area, fume extraction, and proper signage. With the proper training and safety measures, lasers are no more of a safety risk than traditional mechanical equipment. For more information, visit the Resources section of our website.
- **Tradeoffs:** Every piece of equipment has its tradeoffs; for lasers we need to be mindful of material interactions. Choosing a laser wavelength that is better absorbed by a certain material ensures that the resulting process is faster and the quality is higher. For example: polypropylene, commonly used in food packaging and labels, processes better at the 10.2 µm $CO_2$ wavelength verses the standard 10.6 µm. If you plan to process a variety of materials, be sure to work with an Applications Engineer to choose the most appropriate laser wavelength and learn how to optimize settings for each material you work with.




## Is Laser Processing a Good Fit?

Over the past decade, laser and beam delivery technology has developed higher power, faster processing systems, unlocking additional options for high-speed, high-volume production. So if your process involves marking, coding, cutting, perforating, or scoring, and your material is a paper, paperboard, poly-based plastic, thin film, or foil, then consider using a $CO_2$ laser.

These lasers are extremely flexible, able to perform a wide array of applications depending on their specifications, beam delivery, and settings. Application testing is key to determine the viability of $CO_2$ laser processing for your specific needs, because different combinations of these parameters can produce different results. For example: the same laser in the same system can be optimized via settings to produce a perfectly sharp, crisp cut edge, or can be modified to produce a rounded edge for a better hand-feel to customers. Many laser manufacturers often resort to talking about laser specifications to narrow options for customers, which has the unfortunate consequence of over-complicating matters.

## Why does it matter?

Lasers are a highly versatile, digitally controlled processing system. They are ideal for short-run, customized packaging and label applications. Initial setup is fast and easy, and once settings are dialed in, your time lost to changeovers is minimal. They allow you to offer unique solutions to your customers at an economical price point, with no minimum order quantity, and short turnaround times.



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