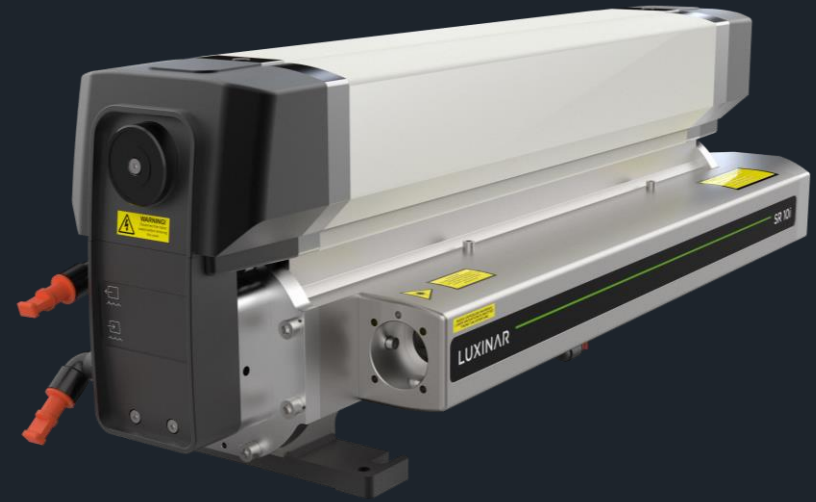


Wavelength band selected CO₂ lasers: Manufacturing and Application Challenges



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Technology Stream Manager – CO2 lasers

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About us



We are Luxinar



18000+

Lasers installed
around the world



7500

Square meters of manufacturing
space



20

Years of experience in
CO₂ laser technology



12

Product ranges of sealed
CO₂ laser sources

160+

Employees
worldwide



6

Sales & service
centres globally

100+



Countries where our lasers
are installed



IP66 Rating

Against dust & water
(most lasers)

ISO 9001:2015

Quality management
accreditation



9-11 μ m

Wavelengths
in our range



10



Working days to
return your processed
samples

1200

Characters per second
are laser marked by
MULTISCAN

Follow us on



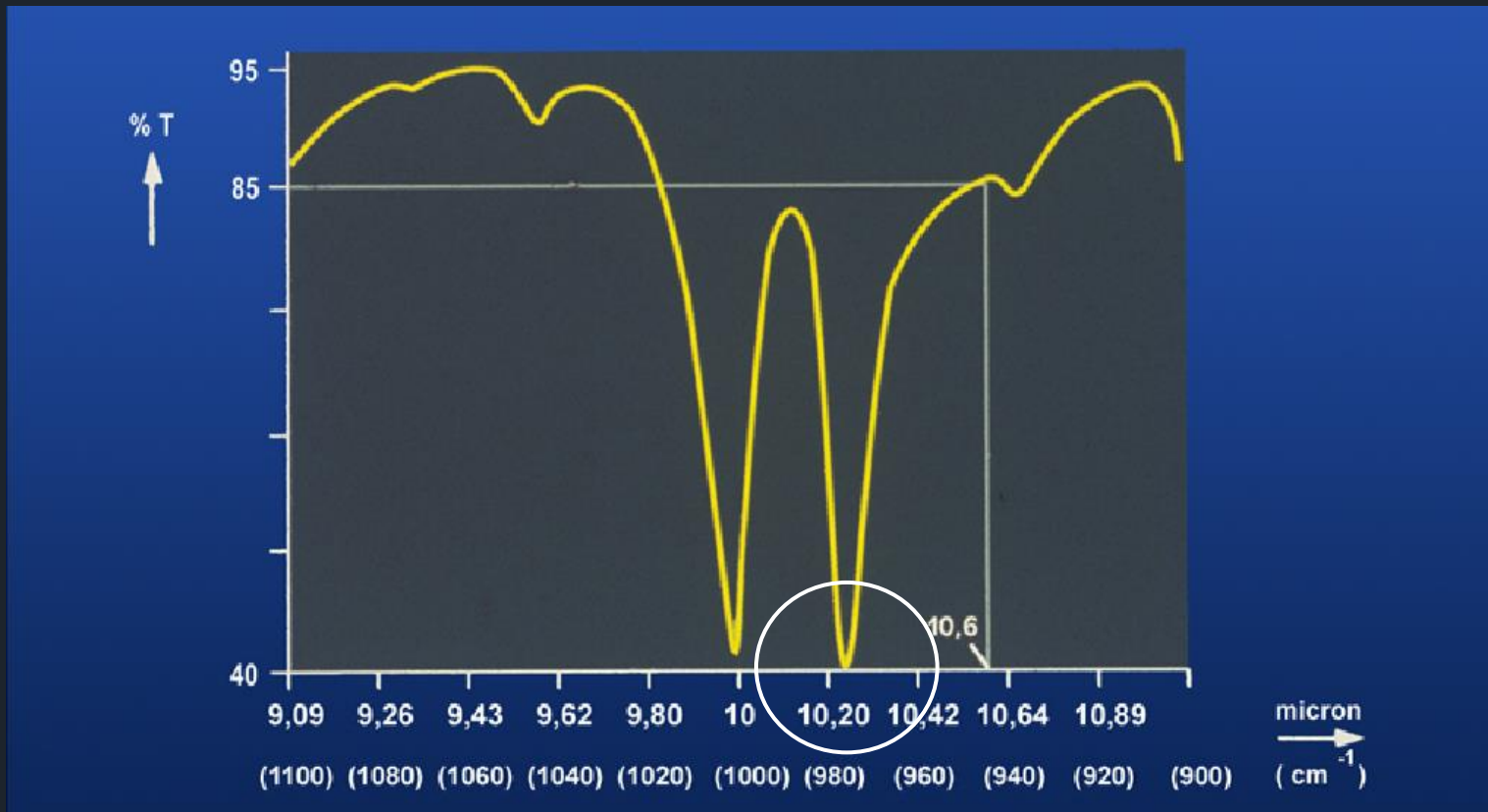
www.luxinar.com/contact



info@luxinar.com

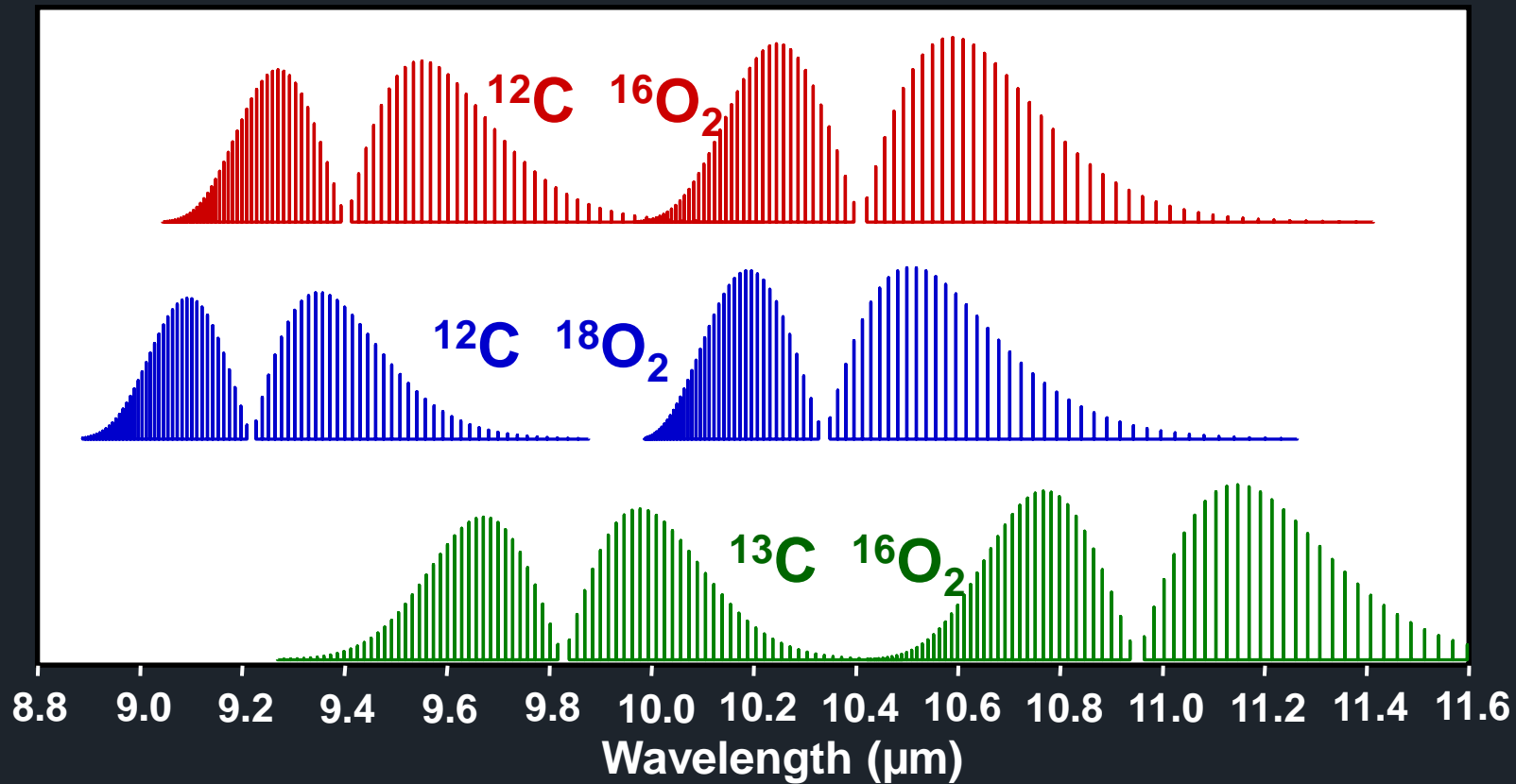
The need for wavelength selection

Transmission through 25um thick PP film (Bi-axially orientated)



- Speed
 - ❑ In thin films $\leq 100\mu\text{m}$, speed can be greatly enhanced using the correct wavelength. Heat affected Zone (HAZ) may also be a determining factor
- Heat Affected Zone (HAZ)
 - ❑ In substrates $\geq 250\mu\text{m}$, HAZ and not speed is the determining factor in choosing to move from 10.6um operation

Band selection method in Luxinar CO₂ lasers, 80 to 450W rated



- Isotopic gas fill method
 - ❑ Issues killing out neighbouring branches
 - ❑ Availability and cost of isotopic gas is variable
- Band select cavity optics
 - ❑ Coatings need to be robust – high flux density, proximity to RF discharge
 - ❑ Ability to suppress the neighbouring branch without reducing gain at the required wavelength
 - ❑ Niche coating designs can lead to lower yields and longer lead times

Integration

- Polarization

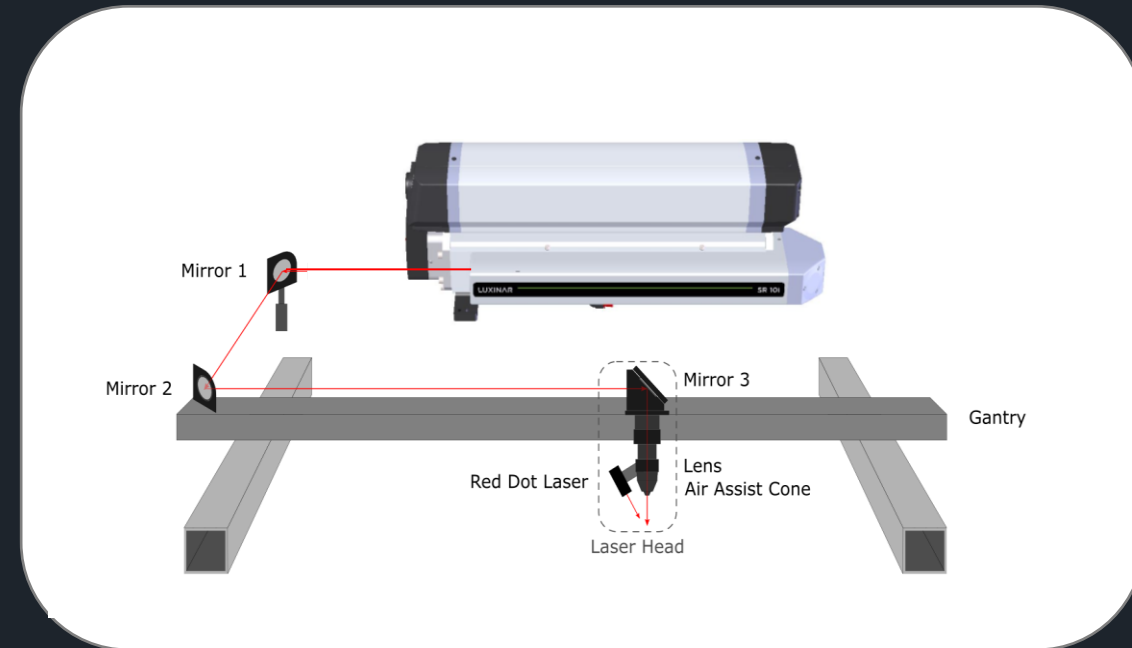
- ❑ Standard 10.6um dielectric mirrors can depolarize circular polarized light
- ❑ Isolation mirror solutions are lambda specific

- Absorption in air

- ❑ At 9.3um, especially at high powers, lens effects due to absorption distort the beam – N₂ purging / moving dry air needed

- Loss

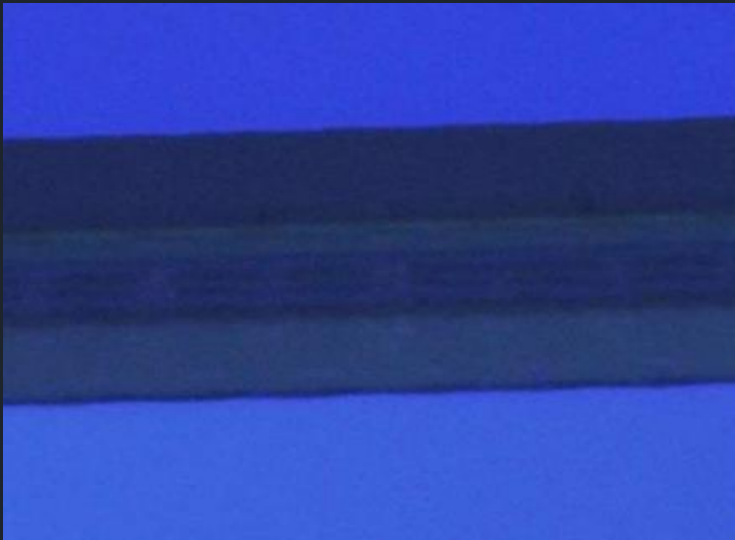
- ❑ Loss per surface on standard 10.6um AR/AR transmissive optics ~3 to 5% at 9.3um operation – back reflections, heating of optic mounts
- ❑ Loss on standard 10.6um dielectric folding mirrors not generally an issue



Applications

SR series 9.3 μm – sealed CO₂

- **Higher quality cutting edge** compared to standard pulsed CO₂ lasers

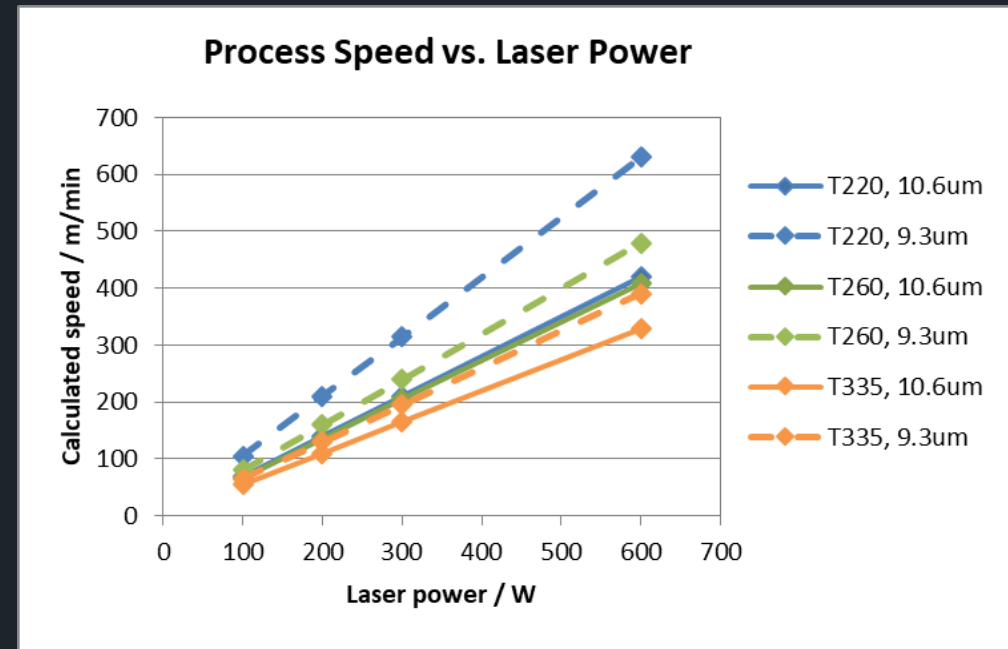


Luxinar SR 25 AOM (9 μm)

5 layer film (upper protection film 50 μm – upper silicone 8 μm – touch film 65 μm – adhesive silicone 20 μm – lower protection film 50 μm)

OEM series 9.3 μm – sealed CO₂

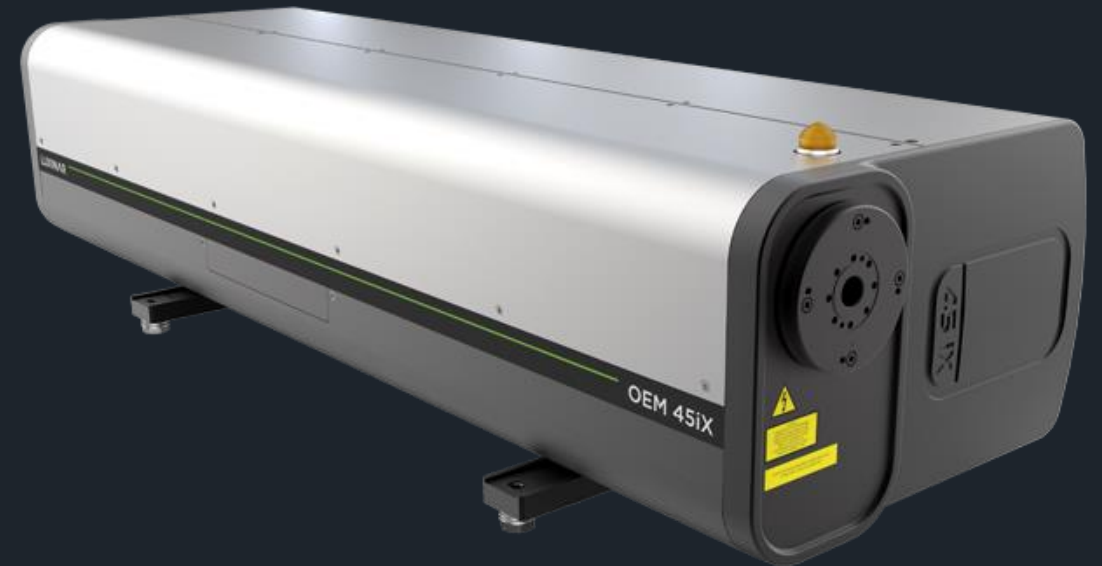
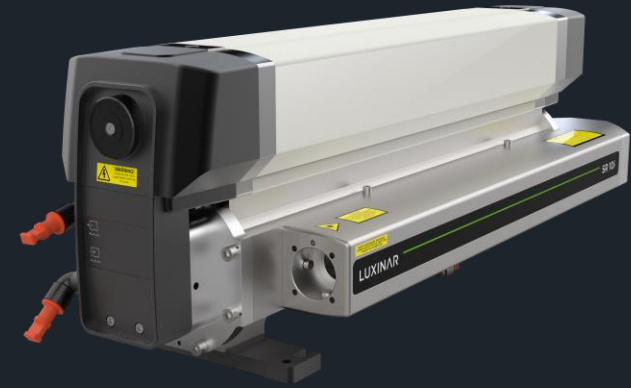
- **Faster cutting speed at 9.3 μm** compared with standard 10.6 μm lasers



220g/m², 260g/mm², 335g/m², 0.4mm to 0.65mm thick paper

Summary

- Certain materials can only be machined using band selection optics
- 10.6, 10.25 and 9.3um sources available from Luxinar, 80 to 450W rated
- Manufacture and characterization of Band select optics requires collaboration and planning between Luxinar and optics supplier
- Integration at 9.3um can be more involved than at the standard 10.6um wavelength



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