Imaging Silver and Photopolymer Printing Plates at 405 nm

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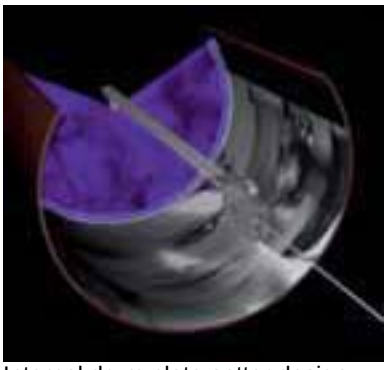
The dawn of violet era
Both commercial and newspaper printing strongly depend on excellent focussability of single-mode lasers. In former times internal drum or flatbed plate-setters took advantage of frequency-doubled Nd:YAG lasers (532 nm). However, the pursuit of higher throughput and better imaging resolution received a new push when the new violet diodes became available in 1999. Huge investments were spent to benefit from the new wavelength 405 nm, both on the plate and the plate-setter side.


Internal drum plate-setter design

Why violet?
There are several basic advantages of violet versus green laser which were previously used in CtP:

- Handling of violet plates under yellow light. Operators can distinguish contrasts on the plate more precisely. Green plates require red light handling in order to avoid unwanted exposure. Obviously, colors cannot be perceived well under red light.
- Green lasers typically emit CW and cannot be modulated intrinsically. Any pulses have to be generated by external devices, for instance AOMs. The violet diode laser can be modulated directly and thus saves costs by disposing of external pulsing devices.
- The shorter violet wavelength (405 nm ⇔ 532 nm) enables either better resolution (smaller focus diameter) on the plate or faster scanning at same resolution (smaller beam diameter ⇒ smaller spinning mirror ⇒ higher revolution of spinning mirror possible)

Diode laser system iPulse 405

Plate technology
As to the plate side, two plate materials with different illumination sensitivity are currently available on the market:

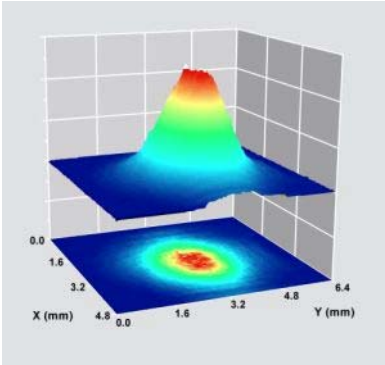
- silver halide plates
- photopolymer plates


Ultrafast rise and fall time in the nanosecond regime

Whilst silver halide plates only require low power of approx. 1 to 5 mW, photopolymer plates ask for significantly higher laser power (> 20 mW). The

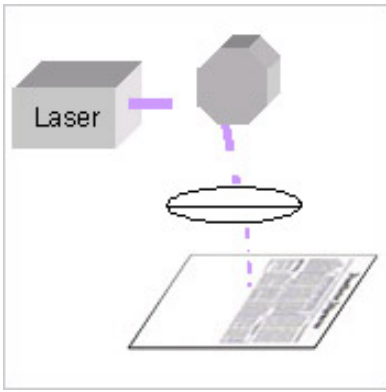
power requirement results from a minimum energy level to start the chemical reaction on the plate spot. While the amount of energy per spot is plate-dependent and thus fixed, the energy is the product of laser pulse power and imaging time. To achieve a fast exposure, the exposure time is kept low and the pulse power high.

Obviously, any fast scanning along the plate can only be accomplished if the laser on/off cycles (e.g. the laser pulse duration as well as pulse rise and fall times) are short enough. Typical requirements are currently in the very low ns or even sub-ns regime. Additionally, rise and fall time effect the sharpness of the exposed spot on the plate. Any slow pulse rise or fall time will immediately result in blurred plate images or reduced contrast.



Diffraction-limited beam profile

Due to their design, internal drum setters provide a constant working distance from focusing lens to exposure plane on the plate. Contrary to this, all flatbet setters need an f-theta lens to correct for the varying working distance over the scan area. This additional optical element and its varying absorption depending on the scan angle makes it necessary to compensate for this effect by using analog laser power modulation.



Flatbed plate-setter set-up

Pulsed diode lasers
TOPTICA was the first company worldwide to provide industrial 405 nm diode lasers for the printing industry in 2000 (PVLS) and has since then continuously improved its product spectrum. In the meantime the PVLS and its successor iPulse are appreciated by more than 1000 customers worldwide.

- CtP application especially benefits from some record values of the latest iPulse:
- output power of more than 60 mW @ 405 nm for high plate throughput
- optimum beam quality (wavefront error < 0.05 lambda) for best imaging result
- pulse modulation up to 200 MHz (500 MHz optional) for fastest imaging
- shortest pulse rise and fall times (approx. 1 ns) for sharp imaged dots on the plate


Optional fiber coupler FiberDock

Furthermore, the iPulse supports flatbed plate-setters by analog modulation which can be used up to the MHz range. Any modulation depth and levels in the range from 1 to 100% can be set by the customer and changed later on to adapt to future needs.

Regarding lifetime, the iPulse shows a very long operation time (exceeding 10.000 hours) and even monitors the effect of laser diode aging. By this, the remaining lifetime of the installed diode can be estimated quite accurately. Planned exchange of a laser module during an intended downtime optimizes the productivity of the plate-setter.

Finally, if a service is required, only the diode itself needs a replacement. All other components last for many years. Costs for refurbishment thus reach an attractive low level, compared to green lasers.

For utmost demanding customers, the iPulse's great beam profile can be enhanced to the physical limit by single-mode fiber coupling. Our self-developed fiber coupler FiberDock perfectly matches the iPulse and convinces by extreme low thermal drift and best power stability at the end of the fiber.

TOPTICA provides not only standard versions but also customized lasers. Manufacturers of plate-setters thus benefit from optimized interfaces and added value not available from any other laser supplier.