LASER AND PLATE TECHNOLOGY

The visionaries of the late 1980s and early 1990s determined that film-based imagesetting equipment had matured to such a level that the basic design principles could be adapted to imaging directly to plates. The key ingredient missing in that era was an affordable laser with the power necessary to image the less sensitive emulsion of the plates available at the time. CTP technology progressed as advances were made in both laser technology and plate technology, which generally progress in unison.

LASER WAVELENGTHS

Lasers are usually described by platesetter manufacturers according to their position on the color spectrum. The spectrum is measured in nanometers (nm). Each laser color requires a plate with an emulsion that is sensitive to that particular laser wavelength. Below is a chronological listing of lasers used in CTP equipment, along with corresponding technological advances in available plates.

CTP Lasers

nm	Color
360-450	Ultraviolet
405-410	Violet
488	Blue
532	Green (YAG)
633-670	Red
830	Infrared - thermal
1064	Infrared (YAG) - thermal

Chronological Introduction

Year	nm	Technology	Applications
1994	532	Green	Very early Creo 3244 platesetter, Cymbolic Sciences Platejet, Agfa Galileo.
1994	488	Blue	Gas laser tubes used in the Barco Crescents and the ECRM AIR 75. This technology is completely obsolete because of the unreliable nature of these lasers.
1995	1064	Infrared	The thermal 1064 nm laser represents a doubling of the 532 nm green laser and was used in internal drum machines. This technology has been replaced by extra drum platesetters with 830 nm lasers. The 1064 nm laser is completely obsolete.
1995	360-450	Ultraviolet	Technically not a laser, this is a UV light source that is used to expose conventional plates. This technology was pioneered by basysPrint. Other manufacturers have attempted to create competitive equipment to expose conventional plates, but until Lüscher's entry into this market in 2006, only basysPrint had widespread acceptance. Lüscher is now offering serious competition to basysPrint in this market.
1996-8	830	Infrared	Thermal - Pioneered by Creo, Scitex, and Screen, and now the standard laser wavelength in all thermal platesetters.
2000	633-670	Visible Red	VR diode - Generally found as an option for ECRM platesetters. The red laser diode never found wide acceptance and is no longer used in current production platesetters.
2000	405-410	Violet	Silver-based - Introduced at Drupa 2000, violet technology was well received as an alternative to green lasers. Violet sensitive plates can be handled in user-friendly yellow safelight conditions. Violet lasers also cost less than green and thermal lasers. All early offerings of this laser were for use with silver-based plates.

2000	830	Processless	Ablative (thermal) – Presstek pioneered specialized plates that can be imaged by thermal lasers and that do not require chemical processing. Presstek's plates are imaged by an ablative process, in which the laser erodes the emulsion, creating a dust that must then be removed from the machine's interior. This requires a device to vacuum the dust out of the system. However, even with this device, regular cleaning of the machine interior is essential. Recent innovations have created processless plates that do not require chemical development and do not use an ablative process for imaging.
2002	405-410	Violet	Photopolymer - Photopolymer plate requires a more powerful laser than the original 5 milliwatt (mW) violet laser that most manufacturers used when violet platesetters were first introduced. Generally, these plates require at least a 30 mW laser for exposure. Depending upon the architecture of the platesetter and the sensitivity of the plate being used, a 60 mW laser may be required. There is no silver content in photopolymer plates, eliminating the need to deal with this pollutant. Photopolymer plates are also cleaner than silver plates and require less processor maintenance.
2005	830	Chemical Free	Non-ablative (thermal) - At Graph Expo 2005, Agfa introduced their Azura plate. This plate is technically classified as "chemistry-free", since it requires processing with a gumming solution prior to printing. The Azura plates have an advantage over the Kodak and Fuji true "processless" plates in that there is a clear visible image on the plate prior to mounting on the press.
2006	830	Processless	Non-ablative (thermal) - Plates requiring no processing prior to mounting on the press are currently offered by Kodak and Fuji. The primary difference between the two offerings is the sensitivity of the emulsion. Kodak's plates require 300 mJ per cm^2 of laser power for exposure, compared to 120 mJ per cm^2 for the Fuji plates. The more sensitive the emulsion, the less laser power is required to expose the plate. Fuji's more sensitive emulsion allows exposure of their plates on all existing 830 nm thermal platesetters without slowing the speed of the drum. Of course, less laser power equates to longer laser life. Kodak's and Fuji's processless plates do have the disadvantage of having minimal visible image for inspection prior to mounting on the press. These plates are also prone to losing the image if not used within 4 hours after being exposed. In addition, the press operator must turn on the water to saturate the exposed emulsion, and then turn on the ink to further saturate the exposed emulsion for printing off this emulsion until a quality printed image is achieved.

As the market evolved, the industry abandoned less reliable and less cost-effective technologies, and as a result, the 830 nm infrared laser and the 405 nm violet laser are the thermal and visible light lasers that have survived. Generally, visible light platesetters can image either silver-based plates or the more environment-friendly photopolymer plates. Furthermore, with the recent introduction of 120 mW violet diodes combined in multiple diode arrays, violet platesetters are now available that are able to image conventional UV plates. Thermal platesetters can image plates requiring chemical processing or, depending on the laser power, non-ablative processless plates. The ablative processless plate continues to be offered by Presstek, but has been abandoned by other manufacturers. We will address the laser power requirements of these varying plate technologies in detail in the next section.

Both Agfa and Fuji have been developing a processless violet plate for some time. Although it has been displayed at graphics shows and talked about as a coming product since 2005, this plate has not been available to the market. Finally, at Drupa 2008, it appears that they are on the verge of introducing a commercially viable product. These plates are not true processless, but rather are chemistry-free, as they require preheating and gumming before they can be used on press. It is reported that initially Agfa will restrict availability of their processless violet plates to the newspaper market. Whatever initial limitations for availability there may be, at least it appears that a chemistry free violet plate will be available to the market in the near future. It is anticipated that a 30 mW laser will be required to image these plates, with the 60 mW laser preferred for optimum performance.