LASER DESIGN

Laser designs tend to fall into the following classes:

Single Beam Laser Technology
Laser Diode Array
Creo Laser Diode Bar with Light Valve
GLV - Grating Light Valve Technology
Basys DMD - UV Conventional Plate Laser Technology
Presstek ProFire Laser Technology
Heidelberg SupraSetter Laser Head

Single Beam Laser Technology

While there are a few exceptions, platesetters using internal drum technology generally use a single laser. These platesetters use a transmission system which directs the laser beam to a mirror (or multiple mirrors) mounted upon a high speed spinner motor. The mirror(s) reflect the laser beam to the media, producing the image. In their green laser P9600 internal drum platesetter, Fuji also offered the option of splitting the beam, which had the effect of doubling the throughput speed. The service cost involved to maintain a consistently equal balance between the two beams led Fuji to abandon this technology with the introduction of their V (violet) 9600 model. In the violet model, rather than splitting the beam created by one diode, Fuji offered the option of an additional laser diode. To our knowledge, Fuji is the only manufacturer who has successfully offered dual lasers on their internal drum platesetter.

Single laser beam technology is perhaps the most economical since it involves the cost of just one laser diode. This diode has a life considerably longer than thermal diodes because of its low power requirements. The maximum life of the violet diode is generally in the realm of 10,000 hours, although the potential for considerably more hours remains. The cost to replace this laser varies irrationally between manufacturers, but it is still far more economical than the cost of replacing multiple high-powered laser diodes required for exposing thermal plates. Furthermore, because of the use of very high speed spinner motors (or in some designs, lower speed motors with multiple mirrors), output speeds attainable with this technology exceed anything historically available among competitively priced thermal platesetters.

Laser Diode Array Technology

Laser diode arrays are used in a variety of external drum platesetters, including those offered by Screen, Scitex, and Agfa.

Screen employs 830 nm laser diode arrays as their laser technology for all external drum models prior to the PT-R 8800. In most of these models (all except the PT-R 8600), Screen mounts individual diodes, each caged in a module, on a metal plate which has a maximum capacity of 32 diodes. The diodes are segmented into banks of eight, with each bank controlled by a circuit board. The laser beams from these diodes pass through a series of lenses, apertures, and modulators until finally a focus zoom device directs the beam to the media. While Screen rates each diode at 1 W of power, the net power at the media is considerably lower due to transmission loss. Net power is in the range of 270 to 300 mW for the PT-R 8000 and 240 mW for the PT-R 4000 series.

With the introduction of the PT-R 8600, Screen adopted a slightly different design, a Fiber Coupled Diode Array. This design is actually common in the industry. In this design, each laser diode is fused to a fiber optics cable to form the Fiber Coupled Laser Diode. These diodes are then mounted in groups on circuit boards. The number of circuit boards and lasers per circuit board will vary between manufacturers and models, but the concept remains the same. For all manufacturers using this technology, the number of diodes determines the maximum speed of the platesetter. In the PT-R 8600, Screen uses 64 diodes (32 in the later “E” models), each rated at 500 mW, mounted upon circuit boards in groups of 8 diodes. Agfa used a very similar arrangement in their original offering of their Xcalibur VLF. For their standard speed model, Agfa installed 48 diodes mounted on six circuit boards, and in the high-speed model, 96 diodes mounted on 12 circuit boards.

Scitex and certain Creo/Kodak successor models of the Lotem also employ this technology, using arrays of 12 or 24 diodes. In these Lotems, each diode has a dedicated control board. The diodes, with their control boards, are then mounted in groups of 12 or 24 on a circuit board. The V2 model with 48 diodes contains two 24 diode circuit boards. Only 12 diodes are used in the S (slow) model of the 4 up Lotem 400.

The laser array technology is an attractive choice because the platesetter can still operate when a diode fails. However, platesetter models vary in the effect laser diode failure has on the throughput of the machine. When a laser fails in a Screen or Agfa diode array machine, the imaging speed always drops to one-half of the rated speed until the failed diode is replaced, regardless of the number of lasers in the array. In the Scitex Lotems, the loss of output speed is contingent upon the location of the failed diode within the array. This benefit is derived from their design where each diode is controlled by a dedicated circuit board. Although, upon the surface, the individual circuit board design may appear wasteful, it mitigates the effect of a failed diode when compared to the Screen and Agfa design. To illustrate, if you number the diodes 1 to 24 (for the Lotem 800V) or 1 to 48 (for the Lotem 800V2) and you lose the first diode or the last, you lose the speed of just one diode. If you lose the second diode or the next to last, you lose the speed of just 2 diodes. This continues, until you lose diode #12 of 24 or #24 of 48, at which point you will lose half of the imaging speed, the maximum reduction in speed from a single failed diode.

Another subtle advantage of the diode array technology, for those who can accept the reduced throughput, is the ability to disable unneeded diodes. In this scenario, you can purchase, for example, a Lotem 800V2 with 48 diodes or a 32 diode PT-R model, and disable half the diodes. When a diode fails in the banks of diodes that are being used for imaging, you can use one of the disabled diodes to replace it, thereby eliminating the need to purchase a replacement diode at the inflated price charged by the manufacturers' parts departments. This practice is not nearly as feasible in the new market because of the much higher price charged for faster machines with more diodes, but this aspect of diode array machines can be beneficial in the pre-owned market, where the price spread between the two models is much less. In addition, if future business growth requires, it is possible to reinstate the original throughput capacity by reactivating the previously disabled diode banks, and purchasing diodes to replace any that had previously been used.

Laser Diode Bar with Light Valve Technology (Creo Laser Head)

The Creo laser head uses an integrated laser bar with light valve transmission. This design was unique among CTP systems until the introduction of GLV technology in 2000. In their laser head, Creo utilizes an array of 19 laser diodes molded together to form an integrated laser diode bar. The beams from these diodes are concentrated through a series of lenses, mirrors, and prisms into a single beam aimed at a light valve, which splits the single laser beam into channels. This light valve is the distinctive feature of the Creo head. It is responsible for the creation of the "SQUAREspot", which according to their marketing department, sets Creo's technology apart from its competitors. This light valve also allows Creo to create varying speeds by controlling the number of channels emitted. By creating 128, 192 or 224 channels, simply by setting the light valve to emit the desired quantity, Creo is able to offer S (Standard speed - 128 channel), F (Fast -192 channel), and V/VF (Very Fast - 224 channel) models. Refer to the GLV portion of this Laser Design section for a more detailed description of light valve technology.

The Creo laser head comes in six basic models: the Thermal 1.0, Thermal 1.7, Thermal E, Thermal 2.0, Thermal 2.5, and the Thermal 3. Each of these basic models has their own niche in the Creo platesetter offerings. The following will attempt to describe the specifications of each of the laser head models. See pages 13A/B for a matrix of Creo laser heads and compatible platesetters.

Thermal 1.0 Head (TH 1.0)

This is the original head that created the Trendsetter SQUAREspot platesetter. Although SQUAREspot was not initially promoted from a marketing standpoint, it has been inherent in the engineering of the Creo head from the outset. This head is a 20 W, 2400 dpi head, and is available in S and F speeds. The very earliest heads had a high failure rate, which was quickly identified as an overheat problem and remedied with the introduction of an air-cooled model. The problematic heads have been removed from the market, and all 20 W heads still in use are this improved air-cooled Th 1.0 head.

A real concern regarding the early versions of the TH 1.0 head is the method of mounting the laser head in the Trendsetter. Sometime during the early period of manufacturing Trendsetters, Creo changed the mounting configuration of the laser head. We do not know the exact serial number when this change occurred, but we believe it to be between the serial numbers of S100 - S150. This mounting change has the effect of making the earliest Trendsetter models incompatible with newer heads. We recommend that buyers be wary of these older machines, because of the questionable future availability of replacement laser heads.

Thermal 1.7 Head (TH 1.7)

The TH 1.7 head was introduced in conjunction with the Spectrum proofing option. Proofing material requires more laser power for exposure than the 20 W TH 1.0 head offered. The TH 1.7 head is in the same enclosure as the TH1.0 head, but is equipped with a 40 W laser bar and has improved fluid cooling. The standard resolution for this head is 2400 dpi, but an optional 3200 dpi head is available. This head is offered in S, F, and VF speeds. In 2002, Creo badged all their SQUAREspot capable platesetters, including those using the TH 1.7 head, as "Quantum" models. This renaming was done for marketing purposes, to distinguish SQUAREspot machines from those fitted with the newly introduced entry level head, designated the TH E.

Thermal E Head (TH E)

This head has the same housing as the TH 1.0 and 1.7 heads. In fact, it appears to be identical to the TH 1.7 head, but with a re-engineered light valve. This new light valve has the effect of removing many features available in the TH 1.7 head but not required by many users in the marketplace. It was introduced in 2002 by Creo as, in our opinion, a marketing tool. It allowed Creo to create a lower-priced, "entry-level" model of the Trendsetter to cater to smaller enterprises that couldn't afford, or didn't need, a full-featured Trendsetter. To match the lower price tag, there are a variety of features that Creo limited in machines with this head. Platesetters with the TH E head are limited to 200 lpi and Staccato 25 micron screens, and do not include the temperature compensation feature. In the original Trendsetter 800 models where the TH E head was initially introduced, the V speed, Spectrum, and Autoloader options available on previous Trendsetters were no longer offered. With the next generation of the Trendsetter 800, badged as the 800 II, these options again became available, but the lpi, Staccato dot size, and temperature compensation limitations remain. The TH E head was installed in most Trendsetters without the Quantum designation sold since early 2002.

Thermal 2.0 Head (TH 2.0)

The TH 2.0 head was introduced in 2002 and was used to convert the Lotem 800V series of platesetters, acquired from Scitex, to Creo laser head technology. This head is much smaller than the TH 1.x and E series heads, and is engineered standard with a 40 W laser and 224 pixels.

Lotems with this laser head have the Quantum designation. This head was installed in the Lotem 800V/V2 models, which were then renamed the Lotem 800 Quantum, and in the Lotem 400V, which was correspondingly renamed the Lotem 400 Quantum. After Kodak's acquisition of Creo, this model was further renamed the Magnus 400 Quantum in 2005. Although the Thermal 2.0 head is engineered with 224 pixels, implying it only operates at VF speed, the Lotem Quantums are actually offered in varying speeds with corresponding varying price levels. This is possible because Scitex engineered the Lotems to allow for factory setting of the maximum speed of the drum. In early models, the speed settings in the Lotem Quantums were controlled by passwords, but apparently these passwords became compromised, so in later models the speed settings are controlled by program chips.

Thermal 2.5 Head (TH 2.5)

This head was introduced at Graph Expo 2005. It is basically the same head as the TH 2.0, but contains a 50 W laser. It is installed in the "X" series of Trendsetter Quantum platesetters, and has more recently been carried forward to the Magnus models.

Thermal 3 Head (TH 3)

This head was also introduced at Graph Expo 2005, and is an entirely new design. At the show, it was installed in an 80 inch Magnus VLF. From the outside this head could be mistaken for the TH 2.0 head, but inside it is quite different. The TH 3 head has two 50 W laser bars, which made possible 448 laser channels and 100 W of laser power. This head continues the SQUAREspot technology.