NSG NEWS RELEASE

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Nippon Sheet Glass Co., Ltd.

Joint development of LED print head with Fuji Xerox

We received a number of inquiries following the publication of articles in the Nikkei Sangyo Shimbun on November 11 and in The Chemical Daily on December 9. The following information is therefore given to explain the situation.

Nippon Sheet Glass Co., Ltd. (NSG) has agreed to collaborate with Fuji Xerox Co., Ltd. and Suzuka Fuji Xerox Co., Ltd. in the development of 1200 dpi (1200 pixels per inch) light-emitting diode (LED) printing heads using **S**elf-Scanning **L**ight **E**mitting **D**evices (SLEDs) and radially distributed refractive index rod lens arrays (**S**elfoc® **L**ens **A**rrays: SLA®s) developed by NSG.

Among toner-based electro-photography printing technologies used in various equipment including photocopiers and office printers, laser systems have conventionally dominated the market and are currently being used in approximately 90% of such equipment. In recent years, however, LED technologies have been attracting increasing attention in response to growing demand for such features as higher resolution, higher speed, better color quality, smaller size, and more environmental benefits.

In view of the shift for higher resolution from 600 dpi, the most widely used resolution for current electro-photographic systems, to 1200 dpi in the near future, the tandem configuration with conjoined four print heads, one for each color, is expected to become the mainstream. In this configuration the LED system using SLEDs will be able to offer greater advantages than laser systems.

In addition, while a new laser system has to be developed for each new end product, the same LED system can be used for different products, which will lead to reduction in development costs as well as to better recyclability of components.

LED systems, however, have had some less favorable features in image quality and product cost, which have limited the expansion of their usage. This joint development project aims to resolve these issues and produce a system superior to laser systems in terms of the total life-cycle costs of the end product.

NSG announced the successful commercial production of the world's first SLED in 1999. This integrated the light source LED and driver IC on the same chip, giving the following benefits:

(1) Wire bonding reduced to approximately 1/50th that of previous systems due to the elimination of wire connections between the LED and IC
(Wire bonding reduced from approximately 10,000 to 200 on A4 1,200 dpi type, producing dramatic yield rate and cost benefits)
(2) Reduced number of wire bonding pads allows the LED chip area to be reduced to approximately 1/3 the size (Resulting in significant LED material cost benefits)
(3) Number of IC driver chips reduced to approximately 1/15 to 1/30 (Resulting in significant IC material cost benefits)
(4) Emission luminosity increased approximately 10-fold (Resulting in increased printing speed and reduced head heating benefits)
(5) Light emission intensity distribution reduced to less than 1/3 (Resulting in improved image quality)

These outstanding characteristics of SLEDs, not possible with other systems, are the basis for the companies to commence this joint development project.

Upon success of the project, Suzuka Fuji Xerox plans to actively promote them on the marketplace, and Fuji Xerox plans to incorporate them in and market a wide range of products that can take advantage of the LED systems' exceptional qualities.

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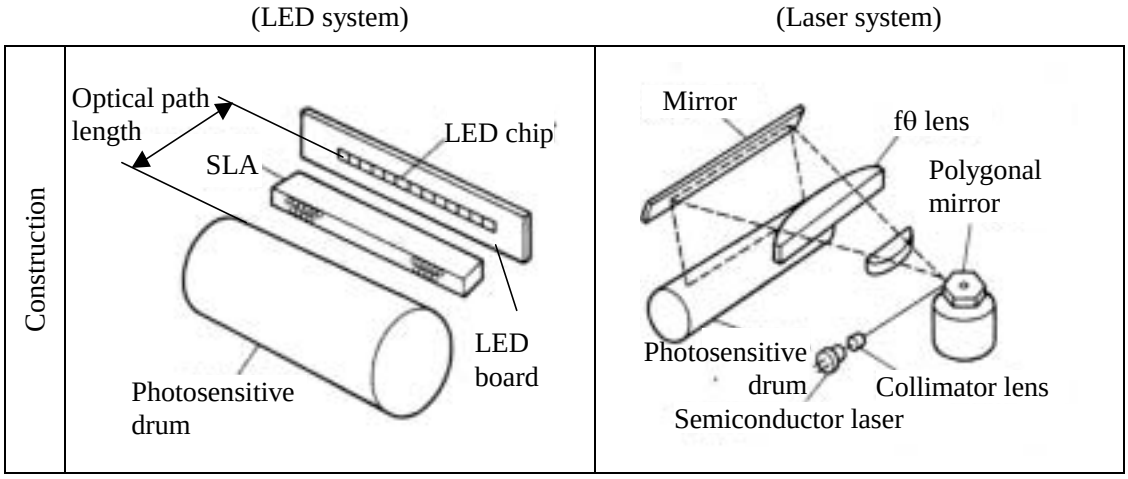
<Reference notes>

1. Laser and LED system configurations



	LED system	Laser system
Pros	Short optical path reduces head size and weight, allowing **compact and lightweight products**.	Bulky optical system makes size and weight reduction difficult.
	Small number of mechanical moving parts reduces **noise and vibration** to below measurable limits.	Difficult to avoid MPA characteristic vibration noise (31 dB)
	Printing is performed simultaneously in the scanning direction, giving high print speeds.	Low print speed due to requirement for raster scanning
	Minimal standby power consumption (close to 0 W)	MPA continually consumes power (3 to 5 W).
Cons	Short optical path requires **large photoreceptor circumference**.	Small photoreceptor circumference
	Shallow focal depth (±0.05 mm)	Large focal depth (±1 mm)
	Susceptible to vertical streaks at joins if chips are mounted offset	———
	Large fluctuation in light intensity between LED chips, **requiring light intensity correction**	———
	Susceptible to cross-talk	———
	Optical components are exposed, making them susceptible to dust and dirt.	———

2. Differences between SLEDs and conventional LEDs