

Studies on Electrophotographic Imaging Process of High Speed Laser Beam Printers

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New high speed imaging processes, analyses on latent charge image formation and toner image developing method were investigated from the view point of designing high speed laser beam printers for computer output printing, and the prototype machines were manufactured.

The photodecay characteristics and voltage sensitivity of various photoreceptors were evaluated, and it was found that selenium photo-receptor was most suitable. From this result, a two-layer-type selenium photoreceptor drum was manufactured for high speed printers.

In the conventional process, printing speed was limited by anomalous increase of residual voltage of the photoreceptor, because its surface was reversely charged when toner image was transferred to recording paper. To prevent this phenomenon, a new imaging process of uniform exposure and re-charging process before toner transfer was developed and the printing speed was doubled.

With regard to developing process, it was shown that optical image density was mainly influenced by the electric field strength of latent image, toner supply ability and the charge characteristics of toner in developing space region. Based on this analysis, a new high speed developing method was proposed and it was verified experimentally that a speed more than 1 m/s was possible.

A new high speed color imaging process was proposed and studied based on the above results. The printing speed was more than ten times of that of the conventional color printers.

Using these results, an "High Speed Kanji Laser Beam Printer" and a "High Speed Color Laser Beam Printer" were fabricated. Both of these printers had the highest speed in the electrophotographic printers in their respective field. Good quality of print images and high reliability of the apparatus were confirmed.