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# SHARPNESS ENHANCEMENT USING DUAL DROP WEIGHT SINGLE DENSITY PRINTHEADS

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**Sharpness enhancement using dual drop weight Single Density printheads**

The method described below proposes a printer configuration with two set of printheads with different drop size to enable a basic dual drop weight system.

Dual drop size configuration when printing is very much appreciated, cause it allows for better sharpness when using lower drop sizes combined with better ink efficiency when using larger drop sizes. While this has been lately largely developed in the high density printheads configurations, not without issues or trade-offs, old platforms that still uses old single density printhead configurations are much more limited and usually products are subjected to the limits imposed by the chosen printhead architecture.

The method uses simple current assets with no changes in printhead architecture and taking advantage of some of the post-halftoning transformations currently available in LFP printers..

In Dye Sub printing technologies, most common ink set used is just CMYK which allows for example to have new printhead configurations like the mirrored configuration introduced with the new HP Stitch S500 without increasing too much on the number of printheads.  An alternative printhead configuration may be a dual printhead architecture having dual drop size available for printing, thus being a simple and easy alternative to the high-density dual drop size options developed in the new products.

With this dual-printhead-dual-drop-size configuration, one idea to develop is how to print edges with the lower drop size printheads while the rest is printed with the larger drop size printheads. The invention described below uses current post-halftoning techniques and masking methods to solve the challenge on previously defined edges by means of image analysis.
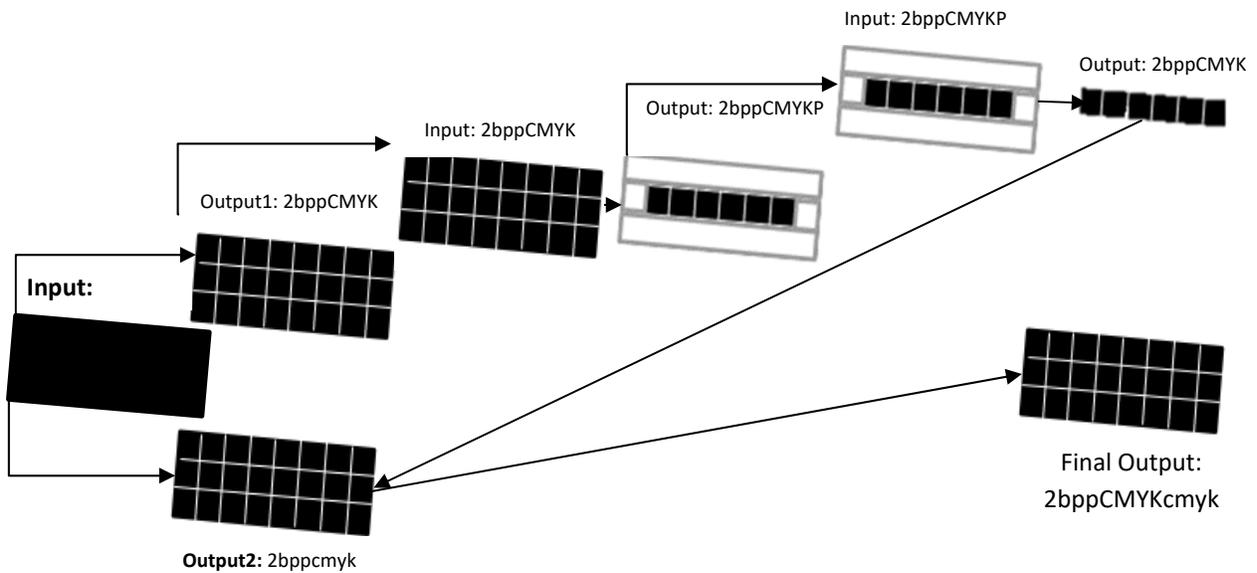
## Conventional approach

Part of the methods used for this invention are not new, like detecting edges by means of image analysis or the manipulation at halftoning level of  the edges of an image. The novelty of the idea relies in the combination of this methods together with a new printhead configuration and masking decision that allows to have 2 different drop sizes available to print in the same image. This is new in single density printhead architectures
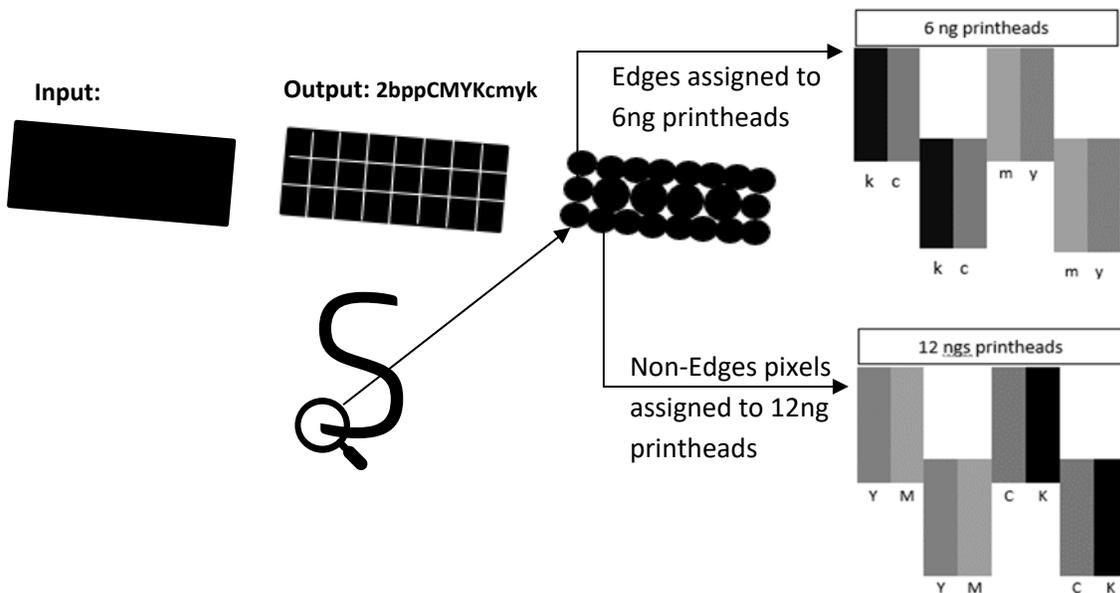
## New approach

In order to have such a dual printing method, it is necessary to detect the edges.of an image. One way of doing that is by using the current Fixengen and Fortification  Fusion modules present in

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current Low Volume Printer's ASIC hardware. This modules have been used in the past to generate "blooming" options and apply different fluids like latex optimizer .

A graphic representation of an example of  what can be done with these modules is presented below. 2 different halftone outputs will be generated for both, for example a 6ng and also 12 ng possible outputs (6ng represented as cmyk, 12ng represented as CMYK). An additional plane is created in the halftoning output corresponding to the 12ng output. This additional plane is manipulated so to discard the non-edges pixels. The non-edges pixels are subtracted from the 6ng halftoned output image and both are merged in a new halftoned image output where edges are associated 6ng output planes while the rest will be associated to the 12ng output planes. Compared to current halftoning process this invention may require extra-computational efforts and additional functionality as for example manipulating two different halftoning outputs.

Input: 2bppCMYKP

Output: 2bppCMYK

Output: 2bppCMYKP

Input: 2bppCMYK

Output1: 2bppCMYK

**Input:**

Final Output:
2bppCMYKcmyk

**Output2:** 2bppcmyk

So, in summary, CMYK information sent to the printer will be split in 2 different channels after the halftoning processes and then printed through masking addressing different printheads in the carriage set.

**Input:**

**Output: 2bppCMYKcmyk**

Edges assigned to 6ng printheads

6 ng printheads

k   c          m   y

k   c          m   y

Non-Edges pixels assigned to 12ng printheads

12 ngs printheads

Y   M          C   K

Y   M          C   K

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**Disclosed by** *Toni Gracia, Andreu Viñets and Andrei Dafinoiu, HP Inc.*