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AUTOMATIC COLOR UNIFORMITY CHECK WITH INTERGRATED SCANNER DEVICE

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Automatic Color Uniformity Check with an Integrated ScannerDevice

Abstract

Current PageWide XL Pro products feature a color uniformity calibration that is performed by means of the integrated scanner. This procedure usually behaves good enough for the image quality requirements of this product family, but such behavior might be slightly worse depending on the media type that is being calibrated. The color uniformity acceptance criteria is difficult to communicate to the customers and may incur escalations. In this disclosure it is described an automatic procedure that allows checking and evaluating whether the calibration results are inside specs or not.

1 Introduction

Currently, there is no automatic closed loop procedure that allows performing a color calibration check in PageWide XL Pro printers. Customers can print several jobs and evaluate color uniformity by themselves. However, this results in:

- Time spent in manual inspection.
- Ink and media waste.
- Difficult to guarantee that results for all colors are optimal (many color densities need to be checked).

Instead of manually inspecting the output plots in a subjective manner to determine how the system is behaving, our proposed solution consists of an automatic and objective evaluation of the calibration results by the machine itself. This solution also allows for checking multiple color densities that cover the whole color spectrum, not just the ones that customers could see in their own personal jobs.

The fact of having an objective external agent (respect to the calibration process) that can tell whether the obtained color uniformity is inside specs or not, assures customers that their system is operating well and might potentially avoid related customer escalations.

2 Description

Current PageWide XL Pro products feature a color uniformity calibration that is performed by means of printing, scanning, and evaluating a target plot. The scanning step is carried out by the integrated image scanner, which is built by 5 different scanning modules, 4 out of which are used during the calibration to analyze the C, M, Y, K ramps. This is accomplished thanks to

the S2L calibration executed during the manufacturing process that allows using each one of these scanner modules as a colorimeter.

Having said that, our proposed solution for a closed-loop color uniformity check consists in printing a target plot which, like the one used in the CLC calibration, comprises several patches of different densities for each primary color. A representation of such plot is shown in figure 1. The global patch arrangement allows all of them to be scanned by the left-most scanning module, which is, in turn, the one unused during CLC. This is crucial since, thanks to that, we achieve that the uniformity evaluation is performed by an agent external to the original calibration, thus attaining a truly objective closed loop.

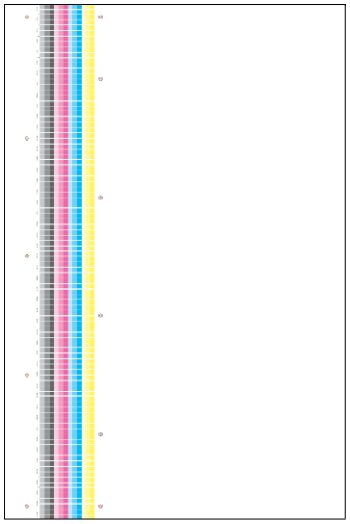

Figure 1: Color uniformity check plot

Once the plot has been scanned, an algorithm processes the data checking that all patches are uniform. This can be easily implemented with some leverage of the already existing color uniformity algorithm. After all patches have been analyzed, the final evaluation might be presented to the user via front panel in terms of pass/fail or uniformity percentage. Complementary, the CLC process could be automatically re-launched in case of need.

The whole close-loop check could be integrated into the CLC calibration itself since there is plenty of room in the leading-edge step to fit the color ramps and the post-processing could take place alongside the leading edge one. This would suppose no kind of media or time waste. In any case, the solution could also be presented as a standalone option that could be executed when the client considers.

In summary, the proposed invention provides an objective automatic procedure that allows customers to check if the obtained color uniformity is inside specs. That can be especially useful when using custom medias in which CLC results might be slightly worse than the ones obtained with HP media. All this could, ultimately, help avoid customer escalations/complains about color uniformity.

3 Conclusion

In this article we have described an automatic color calibration check procedure that could be easily integrated in the current color calibration workflow and that serves as a close-loop mechanism to ensure, in any scenario, that color uniformity is inside specs. Customer experience could benefit from that and customer escalations or complains related with color banding could potentially be avoided.

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