Simplified Scoring and Communication for Print Suppliers and Print Buyers

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The metrics and parameters used by print suppliers to ensure quality and process control are often mysterious and impenetrable to the uninitiated. Printers wishing to ensure a buyer the quality of a job is acceptable are faced with explaining concepts such as tone value increase or ΔE. There is a way to simplify this communication and combine most print quality metrics into an easy-to-understand single number. This paper will lay out the case for how this can be done.

The first step is to determine what data will be used to create the score. This will be referred to as the Print Quality Level (PQL). The score is based on the PQL and the Rate of Compliance (ROC).

The PQL is based on a self-weighing method to grade Δdot area and Δcolor. The range is determined by a given tolerance. Each measured sample gets its own PQL. The number of samples should reflect statistically valid sampling based on the method of printing e.g., number of impressions, number of rolls, number of sheets, etc.

All scores (PQL) are computed following a common rule:
range = 2 x tolerance
score = 100 - deviation / range x 100

Example 1: A color deviation of ΔE = 1.0 at a tolerance of ΔE = 1.0 (just in spec)

- range = 2 x 1.0 = 2.0
- score = 100 - 1.0 / 2.0 x 100 = 50

Example 2: A Tone Value Increase difference of + 2.0% at a tolerance of +/- 5.0%

- range = 2 x 5.0 = 10.0
- score = 100 - 2.0 / 10.0 x 100 = 80

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Example 1 is just within the passing score of 50. Example 2 is well within the tolerance and gets a higher score of 80 reflecting its higher quality.

A user can choose any number of the following categories to measure or visually monitor to calculate the PQL. Each category and color have a PQL.

- primary ink color
- substrate
- undertone color @ mid tone
- dot area @ min dot
- dot area @ 25%, 50%, 75%
- spot color [line colors and builds]
- visual check-up, shared between
  - Match To Target (color distribution, readability, registration etc.)
  - Print Clarity Checklist (defects)
  - Barcode (quality, code verification

The average Print Quality Level (PQL) as a single indication can still be misleading. It is easy to be fooled by data that is simply averaged, therefore, a rate of compliance is applied as a means to weigh data and account for potential smoothing of data. This is calculated by the number of passed samples per total number of measured parameters per printed sample (number of inks, spot colors and sections) and used as factor to compute the final score.

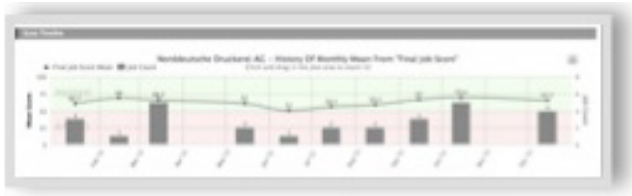
Example:

	PQL 1	PQL 2	average PQL	ROC	Final Score
job 1	100	0	50	1/2 = 0.5	25
job 2	50	50	50	2/2 = 1.0	50

In the above example job 1 and job 2 each have two PQL. Job 1 scores a 100 plus a 0, job 2 scores a 50 plus a 50. If the PQL is averaged both jobs would have a 50 as the average PQL, but obviously job 2 is more consistent than job 1. In order to reflect the difference between job 1 and job 2 a Rate of Compliance (ROC) is applied. Job 1 had 1 of 2 samples that passed for a ROC of 0.5 or 50%. Job 2 had 2 of 2 samples that passed for a ROC of 1.0 or 100%. The ROC is multiplied by the average PQL, as a result job 1 gets 50% of the average PQL of 50 for a resulting score of 25. Job 2 gets 100% of the average PQL of 50 for a resulting score of 50.

This differentiates between job 1 and job 2 and reflects the overall quality of the production in a more meaningful way than simple averaging would allow.

Scores are uploaded to a server where they can be sorted by printer, job, or any other category that makes the most sense to the users. Below is an example of a scorecard the server monitoring scores over time.



The benefits to suppliers in utilizing such a scoring system gives operators immediate feedback on press about specific print quality issues (good and bad), it is easy to use and understand, aids consistency between presses or plants, resulting in a reduction in waste. When the buyer is confident in the relationship between the scorecard and quality you should require fewer on-site approvals.

The benefits to buyer in utilizing such a scoring system includes real time reporting from anywhere in the globe and an equal way to evaluate suppliers with the same scoring system. This leads to a reduction in the need for on-site press approvals and a large net savings in travel costs. As well as driving consistency into the supply chain, no more “silos of excellence”. The use of digital references for color standards in the cloud-based system helps to reduce color variation on shelf when packaging is supplied by multiple vendors. Customers see the recognizable brand equity color on the shelf. Finally, the quality score itself becomes a useful metric when evaluating suppliers for future contracts.

This same program will also have the ability to connect to a central hub for project management, adding design input and on-line approvals for artwork. The project management software can pull meta data from various databases opening the door to automation of mundane tasks and eliminate the need to rekey data multiple times. It will also be important for the program and the project management software to have a two-way communication exchanging scores and scorecards. Keeping any reference data or scores and scorecards on a cloud-based system is important to its’ cross-application success. It will be important to connect to various measurement devices, whether traditional 45-0 hand-held single measurement, hand or inline scanning. Looking to the future we would want to include spherical geometry devices to address the rise in the use of special effects inks and metallic substrates.

A web-based application platform specifically tailored for the packaging graphics manages your internal process end-to-end, to help deliver right first-time print, with advantageous reporting, metrics and process optimization and empower your

digital transformation from strategy to execution. A powerful, secure, web-based packaging management and collaboration platform allows companies of all sizes to digitize their processes and meet their challenges head on.

Process management specification¬¬¬ means new requests can be initiated much faster for lead time reduction on packaging creation with less resource utilization. Search and customizable reports allow better risk management and clear visibility on bottlenecks. Approval cycles are faster, and the number of revisions is reduced. The integration with business systems reduce risk, avoid data duplication and speed up handover.

Digitizing your design management and collaboration processes will improve process efficiency and streamline communication between your departments, with your customers, and your suppliers. All exchanges are systematically tracked, and risks are flagged ahead of time. By digitizing collaborative processes, you will improve process efficiency and communication across your departments, with your customers, and your suppliers. This increases the print spec brief quality and creates a single source of truth for color specs.

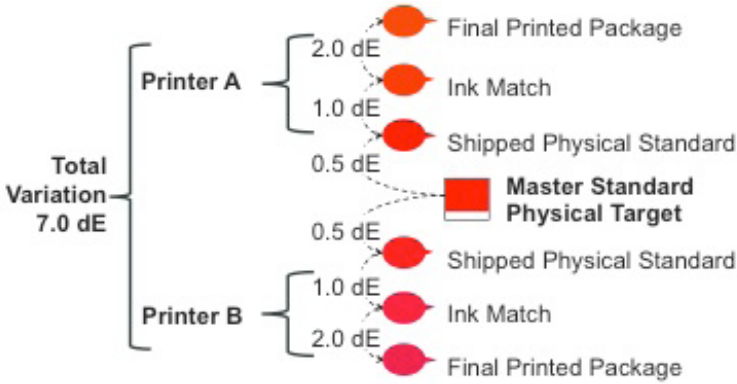
This leads to automated job creation by extracting colors from legacy files which in turn leads to a cost reduction due to automation when creating the print quality job. Process consistency is maintained by reducing human errors and approvals cycles. There is scalability in volume and scalability in new printer onboarding.

Closed loop print quality monitoring creates a simplified & traceable process as part of the overall packaging workflow with a digital record of each step. A color scorecard and on demand reports provide metrics and trends related to any SKU and process step.

The closed loop will save time and enable collaboration by connecting all supply chain stakeholders in one system, providing a single version of truth with a standard scorecard so the color quality is measured consistently and objectively across partners. This system collects print specifications, communicates them automatically to the supply chain, and returns a scorecard of each job.

Print suppliers face a growing number of challenges due to the ongoing digitization of the industry and the evolving uses of print. Businesses need the tools to efficiently feed presses, take time out of the production process and gain greater operational control. Switching from physical color standards to digital standards distributed in a cloud-based system will help reduce the problem of error stacking.

The error stack comparison – when using physical targets for color references the “error stack” grows with each step (or measurement or match) in the process:



When digital reference standards are used it eliminates the error stack created by repeated measuring and drifting of the target, each step is only one step removed from the digital standard.