

Quantify The Subjective



3M™ Quantum Dot Enhancement Film



PQM: A Breakthrough quantitative tool for evaluating display design options

Cost Effective Way to Manage Your Challenges

Today, you can create displays with levels of resolution, luminance, contrast and color that approach the limits of human perception. However, due to cost, sustainability and other constraints, as a product designer, you usually don't maximize all performance characteristics in every display. Instead, you make choices about which configuration of characteristics will achieve the best mix of market appeal and profitability.

You now have extraordinary opportunities for advancing display performance without the expense of huge consumer preference studies.

3M has developed a new tool that allows you to forecast how design decisions affect perceptions of quality. The Perceptual Quality Metric (PQM) calculates expected viewer perceptions of quality based on display size, resolution, luminance, contrast and color gamut. Using this tool, you can quantify the perceptual quality improvements in products based on changes in display specifications, without investing in large and expensive consumer preference studies.



Forecast How Design
Decisions Affect
Perceptions Of Quality

Unprecedented Levels of Perceived Quality

In general, PQM suggests the highest luminance and a low color gamut will generate an acceptable quality value, but superior quality values are not achievable without a higher color gamut.

Further, color saturation can be used to maintain high values if the developer opts to lower another performance characteristic.

For example, if a developer sought to improve a display's energy efficiency by lowering luminance, expanding the color gamut can maintain or increase the display's quality value. Increasing color gamut can achieve excellent quality values, even at mid-range (250-300 cd/m²) luminance levels.



Photographs were used as a context-dependent condition to simulate display use where subjects have an expected color.



4K Resolution: Worth the Cost?

Based on PQM, the short answer is “yes”—especially among the largest displays—but the effect diminishes quickly after 4K, making 8K resolution a less attractive improvement.

The value of PQM is greater than assessing the impact of improving one performance characteristic while constraining another. The values generated by PQM can also reveal when an improvement will produce little or no change in consumer perception of quality—that is, when the benefit is “maxed out.”

The latest models of ultra-high-resolution or 4K LCD televisions provide a good case in point. Objectively, the displays are a significant improvement; current HD sets with 1080p have one-quarter the resolution of the 4K sets.



Learn More Now

PQM is a valuable new tool. With it, you can make clear choices to differentiate your products in a crowded marketplace. 3M can help. Contact us now at www.3M.com/displayfilms. Just click on the colorful 'swoosh' and it'll take you to the right page.

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