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Image quality evaluation methods for printed matter

Part 11: Colour gamut analysis

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Foreword

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This document was prepared by Technical Committee ISO/TC 130, *Graphic technology*.

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Introduction

The colour gamut that can be achieved by a reproduction system is an important attribute. It enables users to compare the colour reproduction capabilities of different printing systems and to determine whether one system can simulate all the colours available in another. This document describes procedures to define and compare colour gamuts.

Given a set of coordinates known to lie on the surface of a colour gamut, the volume of the gamut can be determined by segmenting the gamut into a series of tetrahedra, computing the volume of each tetrahedron and summing the results. For a reproduction process with three colour components, a colour will lie on the surface if it satisfies the condition that at least one component has a value of 0 or 1, where 1 represents the maximum amount of the colour component. However, printing processes usually have four or more colour components (e.g. Cyan, Magenta, Yellow and Black in four-colour process printing), and determining which coordinates lie on the gamut boundary cannot be done solely from the relative amounts of the colour components. For CMYK processes, in almost all cases, the Black colorant extends the gamut below the gamut vertex at each hue angle. This makes it possible to identify a set of coordinates which are expected to lie on the gamut surface from the relative colorant amounts. For processes with more than four colour components, some knowledge of the colorimetry of a sample of colours from the colour data encoding is needed in order to determine which colours lie on the boundary.

For these reasons, coordinates on the surface of the gamut of RGB and CMYK printing processes can be determined by printing a test chart with suitable colorant combinations, and measuring the colours; while for other printing processes, it is necessary to model the colorant-to-colorimetry relationship in order to identify colours on the gamut boundary.

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