

NEPODUDARNOST STANDARDA I REALNIH OČEKIVANJA KVALITETE DIGITALNOG TISKA

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Stalni sudski vještak za grafičku industriju

Standards Approved or in Preparation by ISO TC 130

ISO 5-1:(WD)	Graphic technology and photography — Density measurements — Part 1: Terms, symbols, and notations
ISO 5-2:(WD)	Graphic technology and photography — Density measurements — Part 2: Geometric conditions for transmission density
ISO 5-3:(WD)	Graphic technology and photography — Density measurements — Part 3: Spectral conditions
ISO 5-4:(CD)	Graphic technology and photography — Density measurements — Part 4: Geometric conditions for reflection density
ISO 2834:1999	Graphic technology — Test print preparation for offset and letter press inks
ISO 2835:1999	Prints and printing inks — Assessment of light fastness
ISO 2836:1999	Graphic technology — Prints and printing inks—Assessment of resistance to various agents
ISO 2837:1996	Prints and printing inks — Assessment of resistance to solvents
ISO 2846-1:1997	Graphic technology — Colour and transparency of ink sets for four-color printing — Part 1: Sheet-fed and heatset web offset lithography printing (Revision of ISO 2846:1975)
ISO 2846-2:2000	Graphic technology — Colour and transparency of ink sets for four-color printing — Part 2: Coldset web offset lithographic printing on newsprint
ISO 2846-3:(DIS)	Graphic technology — Colour and transparency of ink sets for four-color printing — Part 3: Gravure printing
ISO 2846-4:2000	Graphic technology — Colour and transparency of ink sets for four-color printing — Part 4: Screen printing
ISO 2846-5:(CD)	Graphic technology — Colour and transparency of ink sets for four-color printing — Part 5: Flexographic printing
ISO 3664:2000	Viewing conditions — Graphic technology and photography
ISO 5776:1983	Graphic technology — Symbols for text correction (Under revision by WG 1)
ISO 10755:1996	Graphic technology — Prepress digital data exchange — Colour picture data on magnetic tape
ISO 10756:1999	Graphic technology — Prepress digital data exchange — Colour line art data on magnetic tape
ISO 10758:1994	Graphic technology — Prepress digital data exchange — Online transfer from electronic prepress systems to colour hardcopy devices
ISO 10759:1999	Graphic technology — Prepress digital data exchange — Monochrome image data on magnetic tape
ISO 11084-1:1998	Graphic technology — Register systems for photographic materials, foils and paper — Part 1: Three-pin systems
ISO 11084-2:(WD)	Graphic technology — Register systems for photographic materials, foils and paper — Part 2: Metallic printing plates
ISO 11628:2000	Graphic technology — Prints and printing inks — Assessment of resistance to acids
ISO 12040:1997	Graphic technology — Prints and printing inks — Assessment of light fastness using filtered xenon arc light
ISO 12218:1997	Graphic technology — Process control — Offset platemaking
ISO 12634:2001	Graphic technology — Determination of lack of paste inks and vehicles by a rotary tackmeter
ISO 12635:2001	Graphic technology — Plates for offset printing — dimensions
ISO 12636:1998	Graphic technology — Blankets for offset printing
ISO 12637-1:(CD)	Graphic technology — Multilingual terminology of printing arts — Part 1: Fundamental terms
ISO 12637-2:(WD)	Graphic technology — Multilingual terminology of printing arts — Part 2: Prepress terms
ISO 12637-3:(NP)	Graphic technology — Multilingual terminology of printing arts — Part 3: Printing terms
ISO 12637-4:(NP)	Graphic technology — Multilingual terminology of printing arts — Part 4: Post press terms
ISO 12637-5:2001	Graphic technology — Multilingual terminology of printing arts — Part 5: Screen printing
ISO 11084-2:(WD)	Graphic technology — Register systems for photographic materials, foils and paper — Part 2: Metallic printing plates

Graphic Arts Standards—A Status Report	Page 1
ISO 12639-1998	Graphic technology — Prepress digital data exchange — Tag image file format for image technology (TIFF/IT)
ISO 12640-1:1998	Graphic technology — Prepress digital data exchange — Standard CMYK color image data (CMYK/SCID)
ISO 12640-2:CD	Graphic technology — Prepress digital data exchange — Standard color image data — Part 2: XYZ/RGB encoded image data (XYZ/SCID)
ISO 12640-3:WD	Graphic technology — Prepress digital data exchange — Standard color image data — Part 3: CIELAB encoded image data (CIELAB/SCID)
ISO 12641:1997	Graphic technology — Prepress digital data exchange — Colour targets for input scanner calibration
ISO 12642:1997	Graphic technology — Prepress digital data exchange — Input data for characterization of 4-colour process printing
ISO 12644:1996	Graphic technology — Determination of rheological properties of paste inks and vehicles by the falling rod viscometer
ISO 12645:1998	Graphic technology — Process control — Certified reference material for opaque area calibration of transmission densitometers
ISO 12646:(CD)	Graphic technology — Colour proofing using a colour display
ISO 12647-1:1996	Graphic technology — Process control for the manufacture of half-tone colour separations, proof and production prints — Part 1: Parameters and measurement methods
ISO 12647-2:1996	Graphic technology — Process control for the manufacture of half-tone colour separations, proof and production prints — Part 2: Offset lithographic processes
ISO 12647-3:1998	Graphic technology — Process control for the manufacture of half-tone colour separations, proof and production prints — Part 3: Coldset offset and letterpress on newsprint
ISO 12647-4:(WD)	Graphic technology — Process control for the manufacture of half-tone colour separations, proof and production prints — Part 4: Gravure printing
ISO 12647-5:(DIS)	Graphic technology — Process control for the manufacture of half-tone colour separations, proof and production prints — Part 5: Screen printing
ISO 12647-6:(WD)	Graphic technology — Process control for the manufacture of half-tone colour separations, proof and production prints — Part 6: Flexographic printing
ISO 12647-7:(WD)	Graphic technology — Process control for the manufacture of half-tone colour separations, proof and production prints — Part 7: Reference printing conditions for electronic data exchange
ISO 12648:(DIS)	Graphic technology — Safety requirements for printing press systems
ISO 12649:(WD)	Graphic technology — Safety requirements for binding and finishing systems and equipment
ISO 13655:2001	Graphic technology — Spectral measurement and colorimetric computation for graphic arts images
ISO 13656:2000	Graphic technology — Application of reflection densitometry and colorimetry to process control or evaluation of prints and proofs
ISO 13928:1994	(TR) Application guide for ISO 10755, ISO 10756, ISO 10757, ISO 10758 and ISO 10759
ISO 14672:2000	(TR) Technical report — Statistics of the natural SCID images defined in ISO 12640
ISO 14981:2000	Graphic technology — Process control — Optical, geometrical and metrological requirements for reflection densitometers for graphic arts use
ISO 15076:(NP)	Graphic technology — Prepress digital data exchange — International colour profile format
ISO 15790:(DIS)	Graphic technology — Reflection and transmission metrology — Documentation requirements for certified reference materials, procedures for use, and determination of combined standard uncertainty
ISO 15929:2001	Graphic technology — Prepress digital data exchange — Guidelines and principles for development of PDF/X standards
ISO 15930-1:2001	Graphic technology — Prepress digital data exchange — Use of PDF — Part 1: Complete exchange using CMYK data (PDF/X-1 and PDF/X-1a)
ISO 15931:2001	Graphic technology — Spacing, mesh size, line and character font configuration for graphic arts

ISO 15930-3:(CD)	Graphic technology — Prepress digital data exchange — Use of PDF — Part 3: Blind exchange suitable for colour managed workflows (PDF/X-3)
ISO 15994:(CD)	Graphic technology — Testing of prints and printing paper — Determination of the visual gloss number
ISO 16044-1:(WD)	Graphic technology — Prepress digital data exchange — Data base architecture model and control parameter coding for process control and workflow—Part 1: Architecture model and database format
ISO 16044-2:(WD)	Graphic technology — Prepress digital data exchange — Data base architecture model and control parameter coding for process control and workflow—Part 2 Graphic arts database and parameter description
ISO 17321-1:(WD)	Graphic technology and photography — Colour characterisation of digital still cameras (DSCs) — Part 1: stimuli, metrology and test procedures.
ISO 17321-4:(WD)	Graphic technology and photography — Colour characterisation of digital still cameras (DSCs) using colour targets and spectral illumination.
ISO 20101:(WD)	Graphic technology — Process control — Cell volume measurement
ISO 22028:(WD)	Extended colour encoding for digital still image storage, manipulation and interchange (TR) Standard object colour spectral database for colour reproduction evaluation (SOCS)
ISO TBD:(WD)	

Notes: NP = New work proposal which is still in the technical discussion stage.

WD = Working draft stage of development

WD = Working draft stage
CD = Committee draft

ANSI = *ANSI/ISA-TR-59.01-2003*—*Industrial control parameter coding for process control and workflow—Part 1: Architecture model and database format*

INTERNATIONAL
STANDARD

ISO
12647-7

INTERNATIONAL
STANDARD

ISO
12647-8

**Graphic technology — Process control
for the production of half-tone colour
separations, proof and production
prints —**

**Part 7:
Proofing processes working directly from
digital data**

*Technologie graphique — Contrôle des processus de confection de
sélections couleurs tramées, d'épreuves et de tirages —*

*Partie 7: Processus d'épreuve travaillant directement à partir de
données numériques*

**Graphic technology — Process control
for the production of half-tone colour
separations, proof and production
prints —**

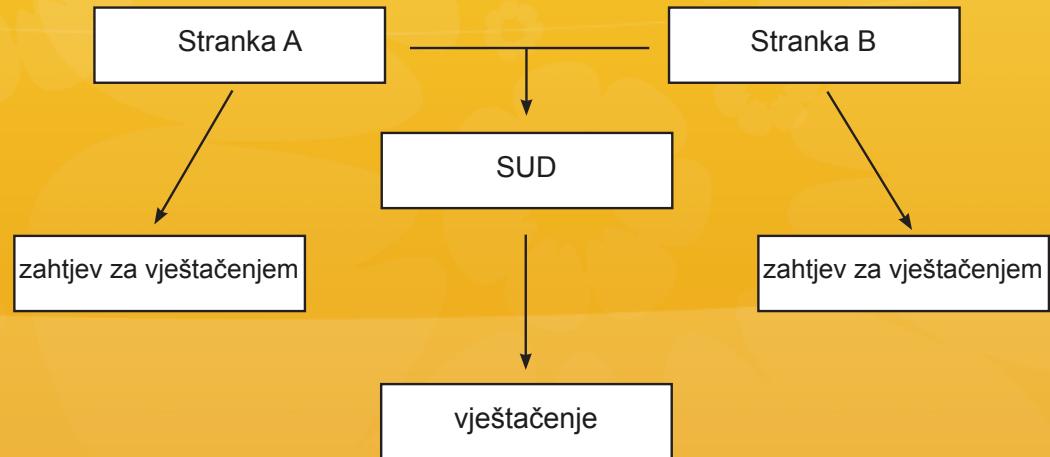
**Part 8:
Validation print processes working
directly from digital data**

*Technologie graphique — Contrôle des processus de confection de
sélections couleurs tramées, d'épreuves et de tirages —*

*Partie 8: Processus d'impression de maquette couleur produite à partir
de données numériques*

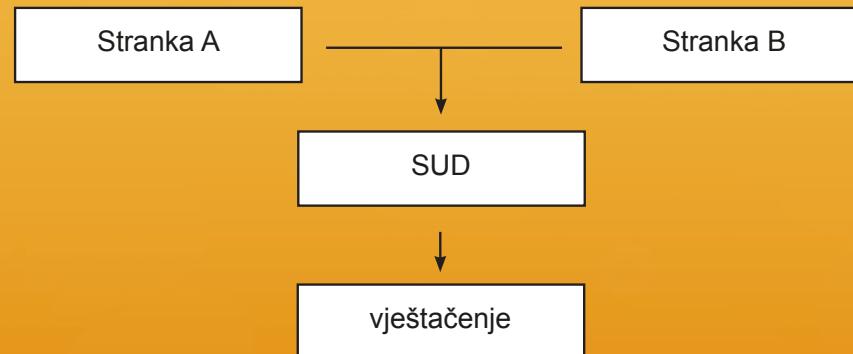
Prvi slučaj

Stranke traže vještačenje



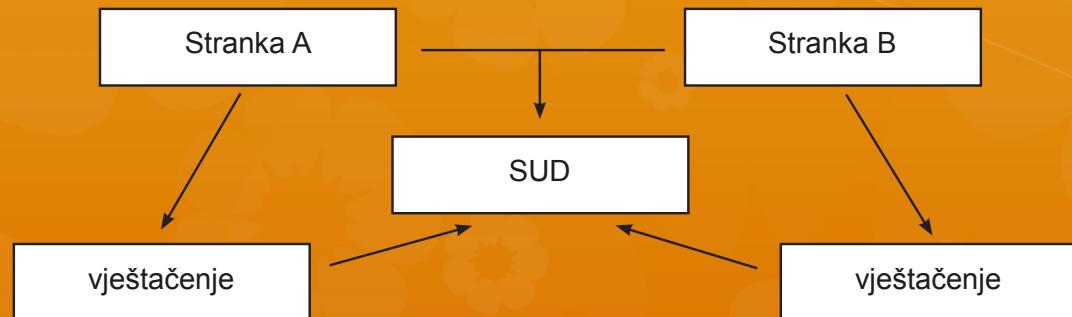
Drugi slučaj

Sud samostalno određuje vještačenje



Treći slučaj

Stranke rade vještačenje kao dokazni materijal



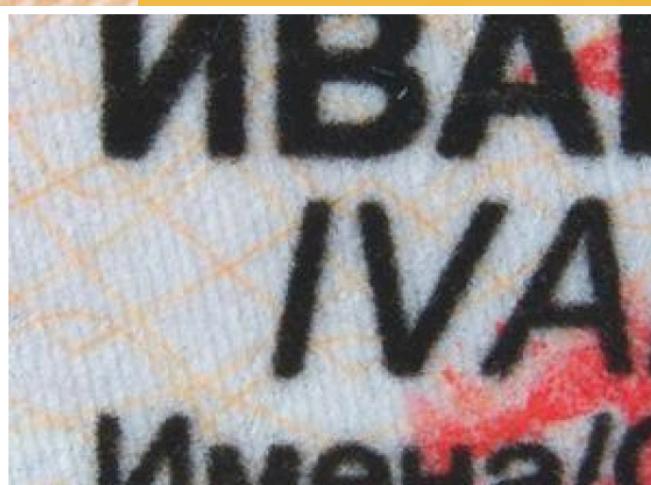
Definiranje kvalitete tiska

Ugovor vs dogovor

- 1) Prema probnom otisku
 - problem tehnike tiska probnog otiska
 - kalibracija i karakterizacija
- 2) Prema standardu
 - problem kvalitete vanjske pripreme
- 3) Prema prethodno
otisnutom uzorku
 - promjena boje uslijed starosti
 - materijal drugog proizvođača
 - na čemu je tiskano
 - kalibracija i karakterizacija
- 4) Prema “osjećaju”
 - postupak je potpuno neispravan

aña

Offsetni tisak

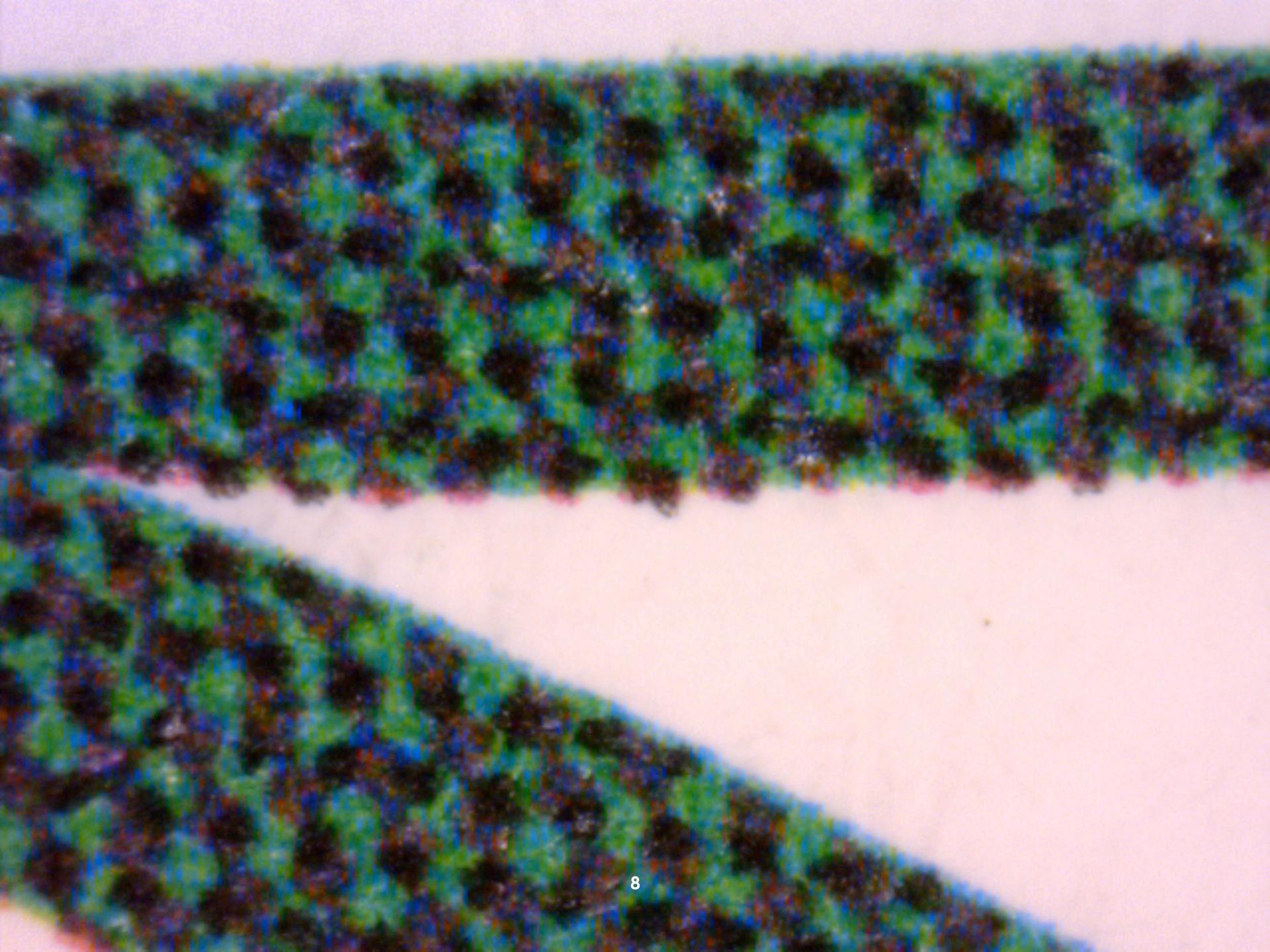


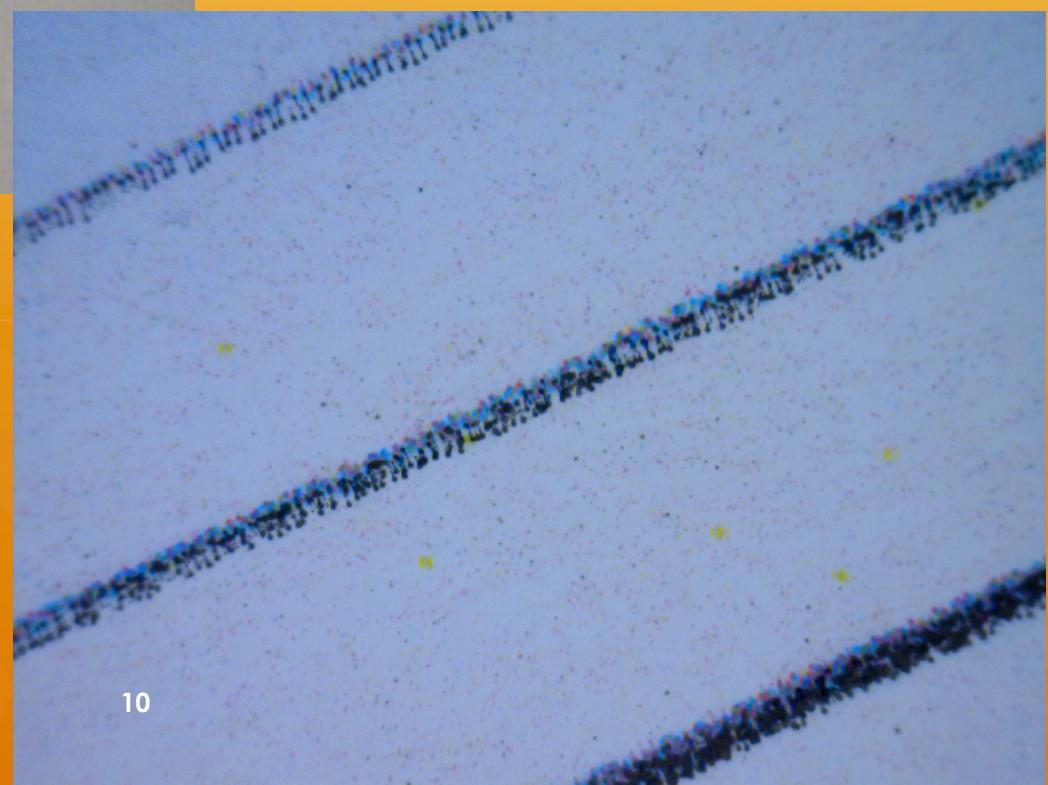
Elektrofotografija



Ink jet

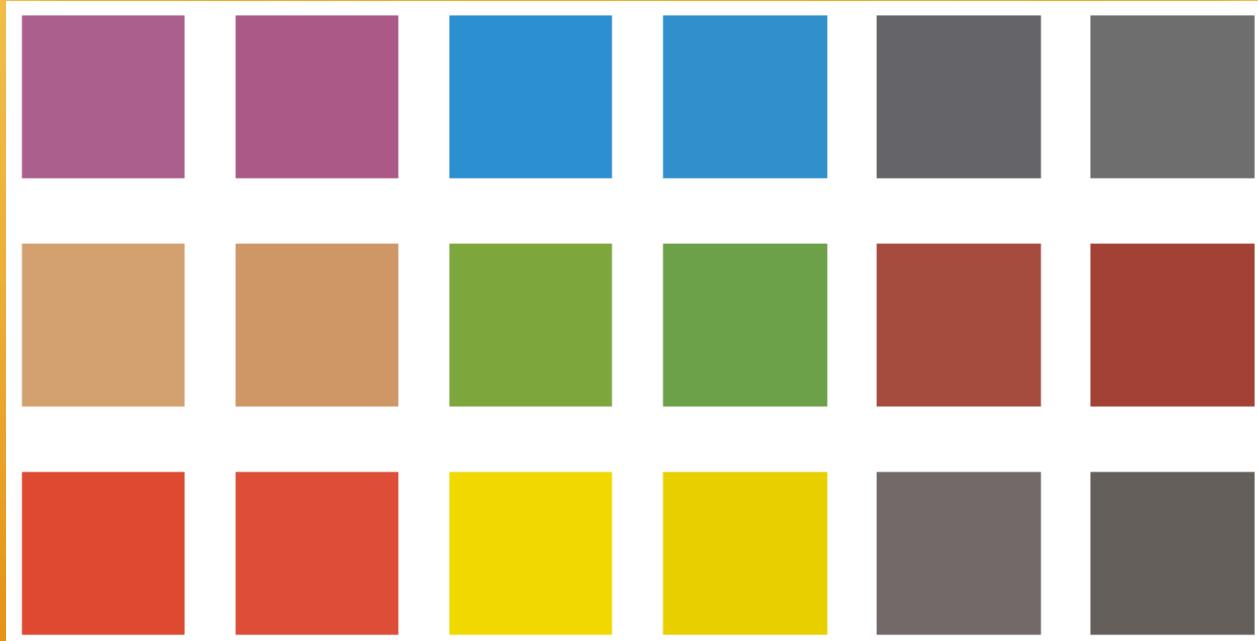






10

Metamerizam

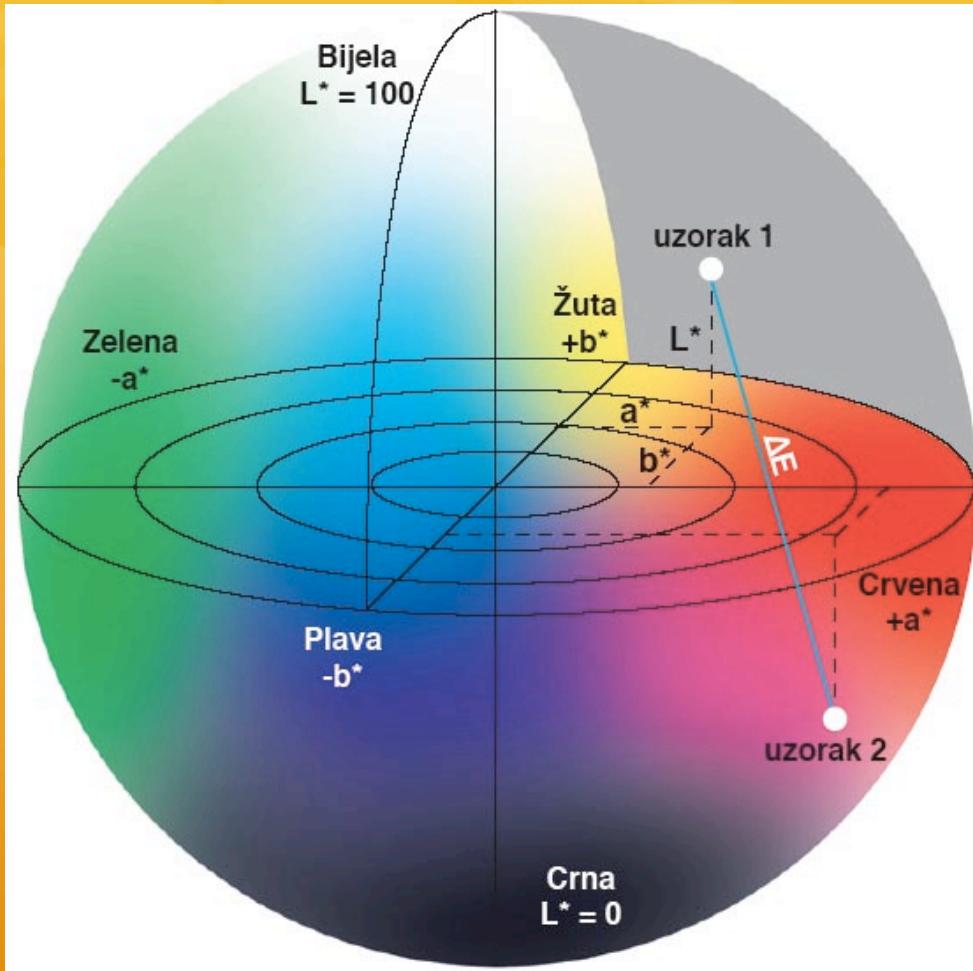


Uzroci nekonstantnosti obojenja (npr. elektrofotografija)

- Prilikom osvjetljavanja bubenja može doći do oscilacije napona. Oscilacija napona može ali i ne mora biti uzrokovana naponskom mrežom ili nekim otporima prije nego struja dođe na stroj.
- Promjena napona može uzrokovati različit intenzitet osvjetljavanja kod lasera.
- Promjena u naponu na fotoreceptoru prilikom rada korone.
- Promjene u naponu razvijačkog sistema gdje automatski dolazi do promjene količine tonera na foto konduktoru. Nakon što je toner prenešen na prijenosnu traku, količina tonera može biti ovisna o transfernoj koroni koja ovisno o naponu može privući više ili manje tonera.
- Male promjene u naponu na fotokonduktoru mogu djelomično kompenzirati snagom osvjetljavanja, odnosno lasera.

Uzroci nekonstantnosti obojenja

- Promjene u kvaliteti tiska mogu biti uzrokovane i različitom temperaturom fuziranja, a čija je temperatura opet ovisna o naponu i tolerancijama.
- "Tribo" efekt – trenje između čestica tonera koji toliko nema veze s naponom koliko ima veze s kvalitetom tonera u smislu veličine i strukture pigmenata kao i nositelja pigmenta.
- Kvaliteta tiskovnog materijala (papira) jer prihvatanje tonera uvelike ovisi o tome koliko vlage ima u papiru, sama kvaliteta premaza papira, elektricitet, temperatura itd.



ΔE

14

< 1
1 - 2
2 - 3,5
3,5 - 5
5 >

tolerancija

smatra se da ljudsko oko ne vidi razliku
vrlo mala razlika, optimalno
umjerena razlika
razlika
velika razlika

Table 1 — Nominal gloss of various substrate types

Substrate type	Nominal gloss ^a
Unit	1
Glossy white (e.g. glossy paper coated paper, grade 1)	> 60
Semi-matte white (e.g. coated paper, grade 3 coated paper, grade 5 super-calendared paper)	20 to 60
Matte white (e.g. uncoated paper, liner board, improved newsprint, newsprint)	< 20

^a Measurement according to 5.6.

**Table 3 — Repeatability of primary and secondary colour solids
and primary colour mid-tones (CIELAB 1976 colour differences)**

Type	Solids	Mid-tones (40 % to 50 %)
Validation print	2,5	3,0

Unit: 1

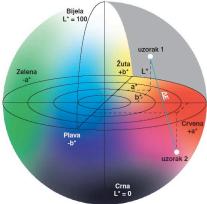
**Table 2 — Tolerances for reproduction of all patches in the validation print described in Clause 5 by
comparison to the values of the characterization data of the printing condition being simulated**

Unit: 1

Patch in validation print form	Tolerance
All patches described in 5.2	Maximum: $\Delta E_{ab}^* \leq 8$ Average: $\Delta E_{ab}^* \leq 3$
Patches described in 5.2 a) (C,M,Y,R,G,B)	Maximum: $ \Delta H_{ab}^* \leq 4^a$
Patches described in 5.2 c)	Average: $\Delta C_h \leq 2,5^b$
Selected surface gamut patches as listed in Annex B (taken from ISO 12642-2)	Average: $\Delta E_{ab}^* \leq 4$
All patches described in ISO 12642-2	Average: $\Delta E_{ab}^* \leq 3$ 95 % percentile: $\Delta E_{ab}^* \leq 6$

^a Due to the sign character of ΔH , the absolute values are used.

^b ΔC_h is the CIELAB chromaticness difference between two colours of approximately the same lightness projected onto a constant lightness plane in the CIELAB colour space. This is calculated the same way as ΔE_c , stipulated in ISO 12645.



$$\Delta E = \sqrt{(\Delta a^*)^2 + (\Delta b^*)^2 + (\Delta L^*)^2}$$



Table 3 — Repeatability of primary and secondary colour solids and primary colour mid-tones (CIELAB 1976 colour differences)

Unit: 1

Type	Solids	Mid-tones (40 % to 50 %)
Validation print	2,5	3,0

Ciljane vrijednosti
(potpisane, ugovorene,
dogovorene, probni
otisak)



✓
✗
✓
✗
✓
✓
✓
✓
Mali pomak u svjetlini
– tamnije

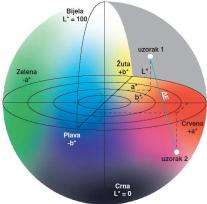


✗
✗
✓
✗
✓
✗
Veći pomak u svjetlini
– tamnije

✗

✗

✗



$$\Delta E = \sqrt{(\Delta a^*)^2 + (\Delta b^*)^2 + (\Delta L^*)^2}$$

Table 3 — Repeatability of primary and secondary colour solids and primary colour mid-tones (CIELAB 1976 colour differences)

Unit: 1

Type	Solids	Mid-tones (40 % to 50 %)
Validation print	2,5	3,0



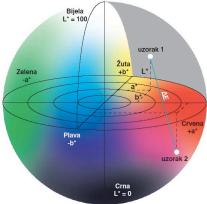
Ciljane vrijednosti
(potpisane, ugovorene,
dogovorene, probni
otisak)



Mali pomak u svjetlini – svjetlige



Veći pomak u svjetlini – svjetlje



$$\Delta E = \sqrt{(\Delta a^*)^2 + (\Delta b^*)^2 + (\Delta L^*)^2}$$

Table 3 — Repeatability of primary and secondary colour solids and primary colour mid-tones (CIELAB 1976 colour differences)

Unit: 1

Type	Solids	Mid-tones (40 % to 50 %)
Validation print	2,5	3,0



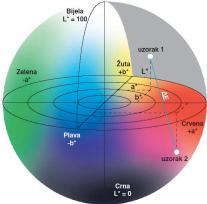
Ciljane vrijednosti
(potpisane, ugovorene,
dogovorene, probni
otisak)



Mali pomak u tonu
– zelenije



Veći pomak u tonu
– žuće



$$\Delta E = \sqrt{(\Delta a^*)^2 + (\Delta b^*)^2 + (\Delta L^*)^2}$$

Table 3 — Repeatability of primary and secondary colour solids and primary colour mid-tones (CIELAB 1976 colour differences)

Unit: 1

Type	Solids	Mid-tones (40 % to 50 %)
Validation print	2,5	3,0



Ciljane vrijednosti
(potpisane, ugovorene,
dogovorene, probni
otisak)



✓
✓
✓
✓
✓
✓
Mali pomak u tonu
– crvenije



✗
✗
✓
✓
✓
✓
Veći pomak u tonu
– plavije

Zaključci:

1. Standardi kvalitete digitalnog tiska se moraju nadopuniti, preciznije definirati,
2. prilikom sklapanja posla, potrebno je definirati toleranciju kvalitete.
3. koliko je god moguće, u odobrenje otiska uključiti naručitelja,
4. prilikom otiskivanja, potrebno je što je više držati se već postojećih standarda, uz obavezno uključenu vizualnu procjenu.

Hvala !!!

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