Stability evaluation of production printing

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Future of conventional offset printing

2 ways to profit

1. simple, low-quality, but cheap products
2. expensive, exclusive, value-added products

Factors of quality in offset

- original image and its quality
- paper
- printing inks
- printing equipment
- level of professionalism and efficiency of printers

“Offset printing quality”

What does it mean?

How qualitative is it indeed?

Quality of run = identity

- Print sheets identical to master print and consequently to each other prints
- Comparision with master print using densitometer, spectrophotometer and eyes

Objective characteristics of color images

- solid optical density
- interval of optical densities
- change in optical density
- dot area
- reproduction of gray and color scales (according to some printing inks)
- trapping
- gray balance

Research study

- Several student graduate works
- Conventional sheet-feed offset printing
- Real print shops
- Modern printing equipment, particulary with off-line measuring and control units

Methods

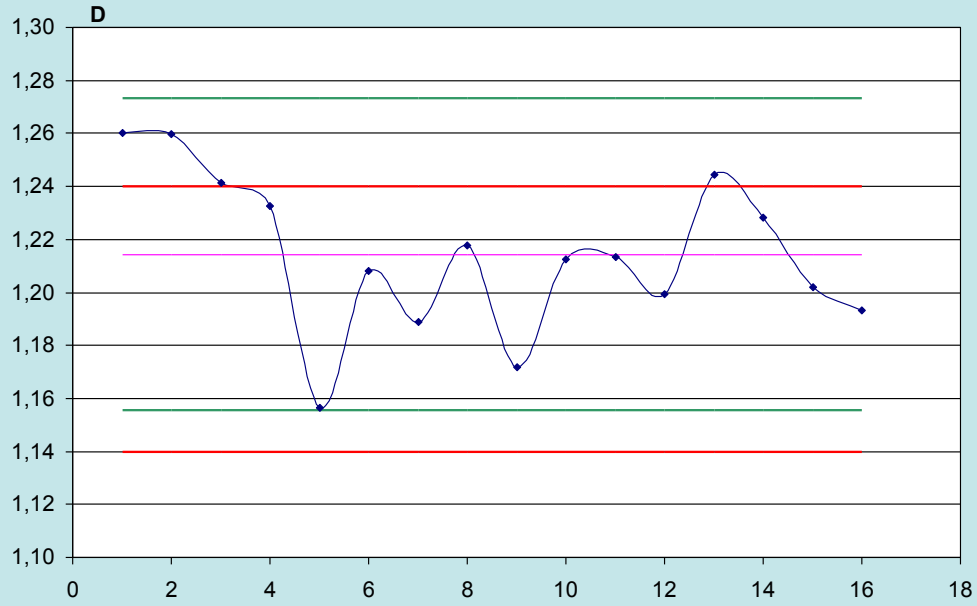
- Sample of 16-25 printing sheets (depending on the print run)
- Density, dot gain, T, CIELab, deltaE
- Statistical analysis: mathematical expectation (M), variance (D), standard deviation (σ)
- Control charts

Example 1

- Heidelberg Speedmaster 102
- Prinect Axis Control (off-line, spectrophotometer)

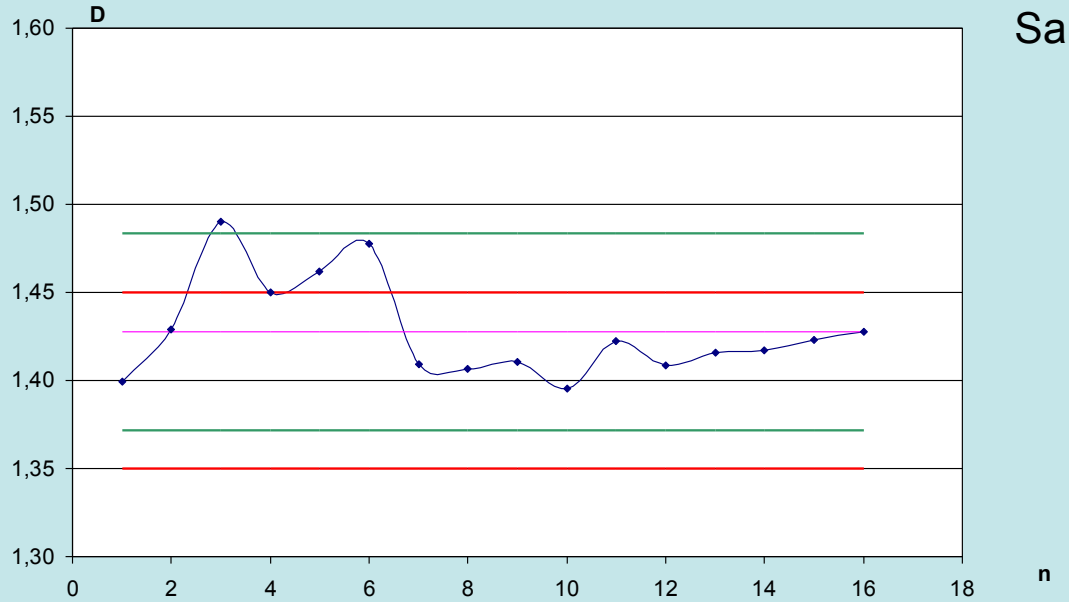
Control chart

cyan 100% density



Density
M
tolerance zone
4σ

SM without AxisControl

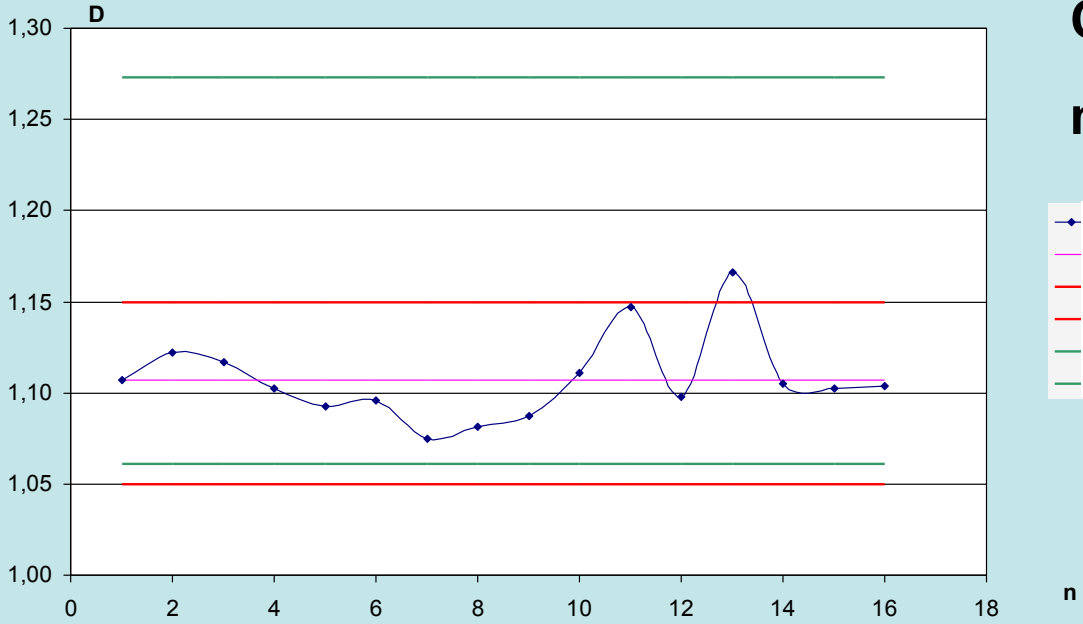


Samples

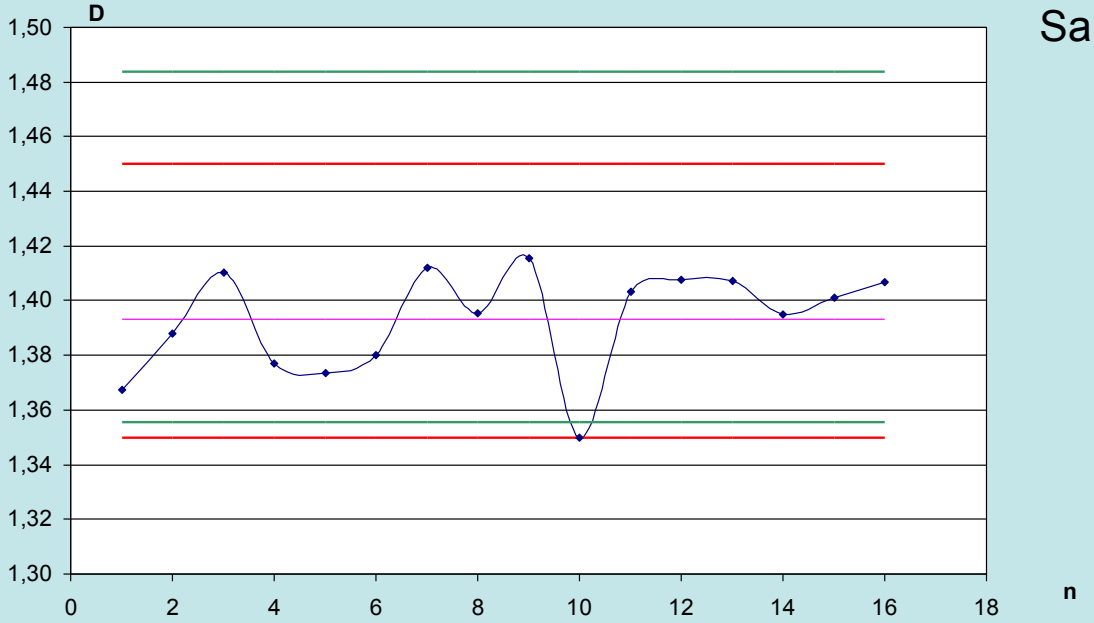
SM with AxisControl

Control chart

magenta 100% density



SM without AxisControl

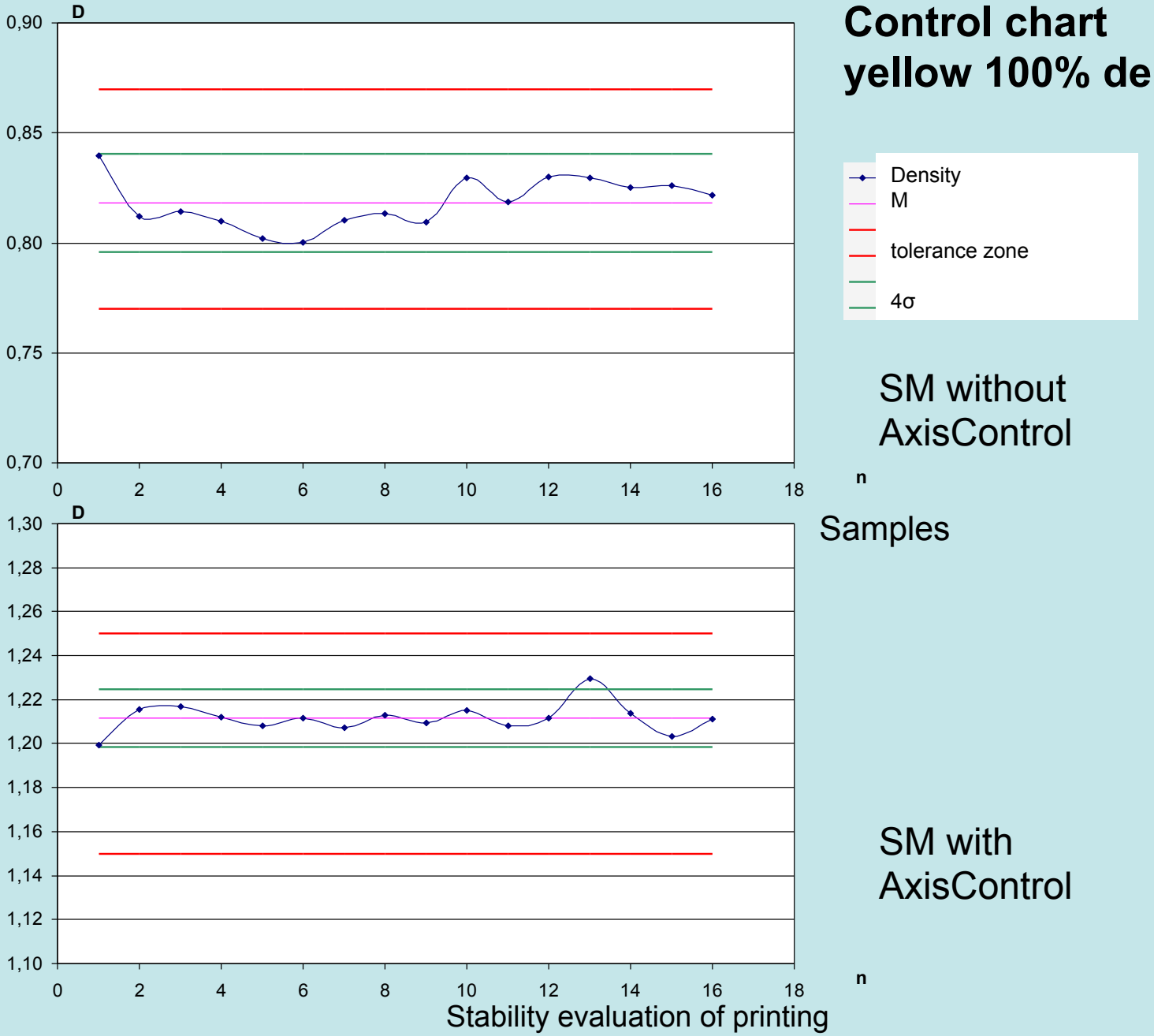


Samples

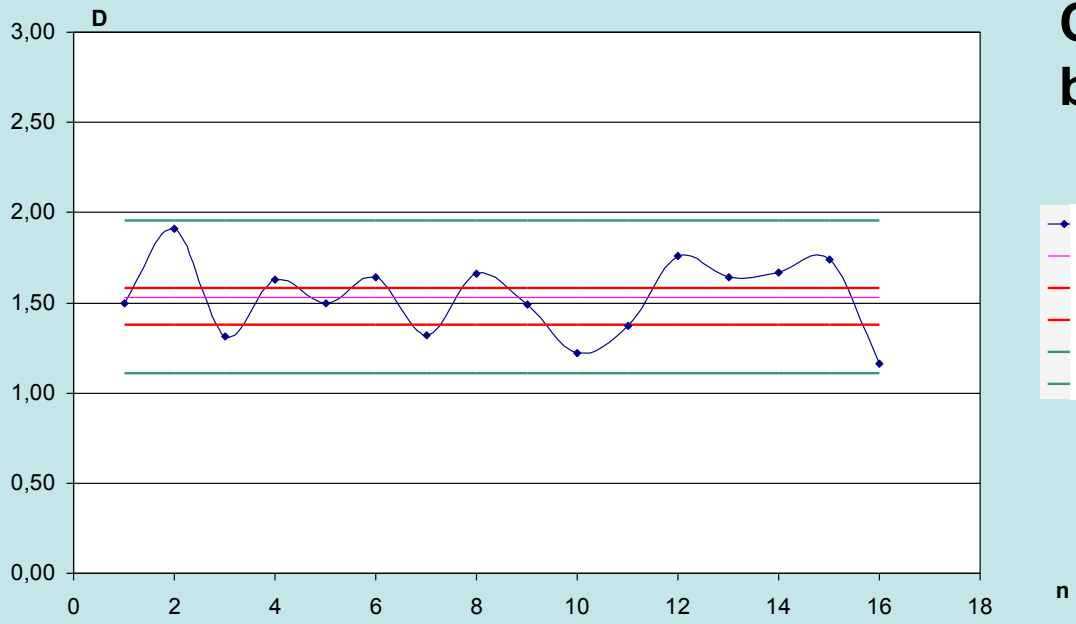
SM with AxisControl

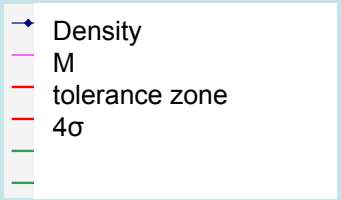
Stability evaluation of printing

Control chart yellow 100% density



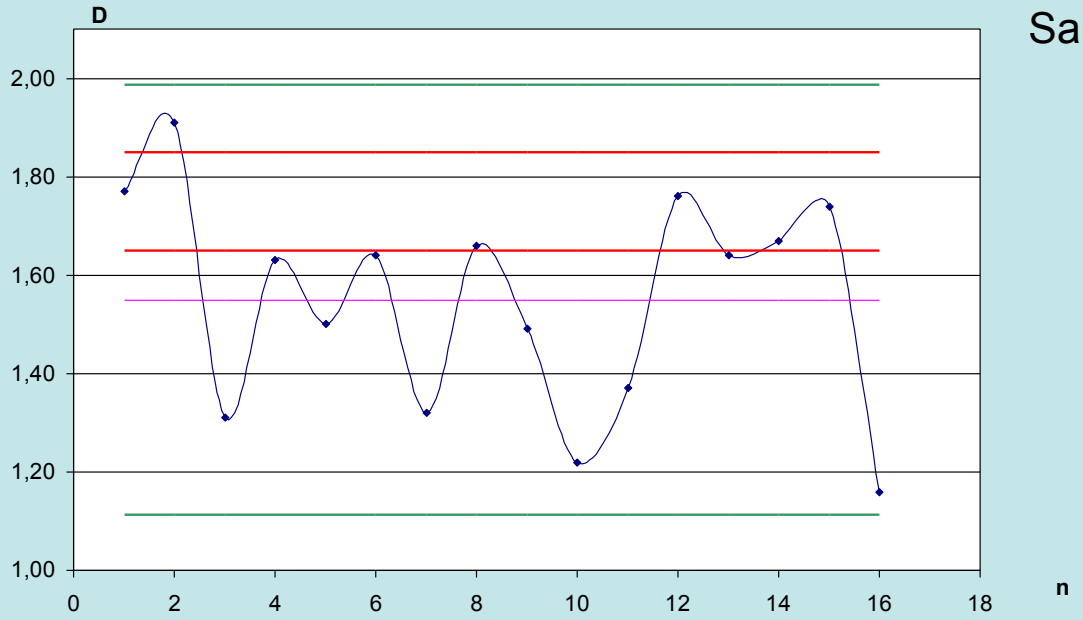
Control chart
black 100% density





SM without AxisControl

Samples



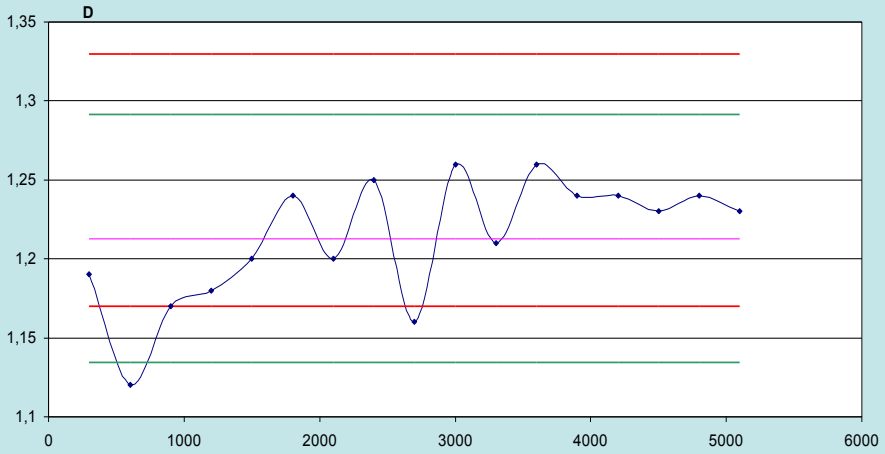
SM with AxisControl

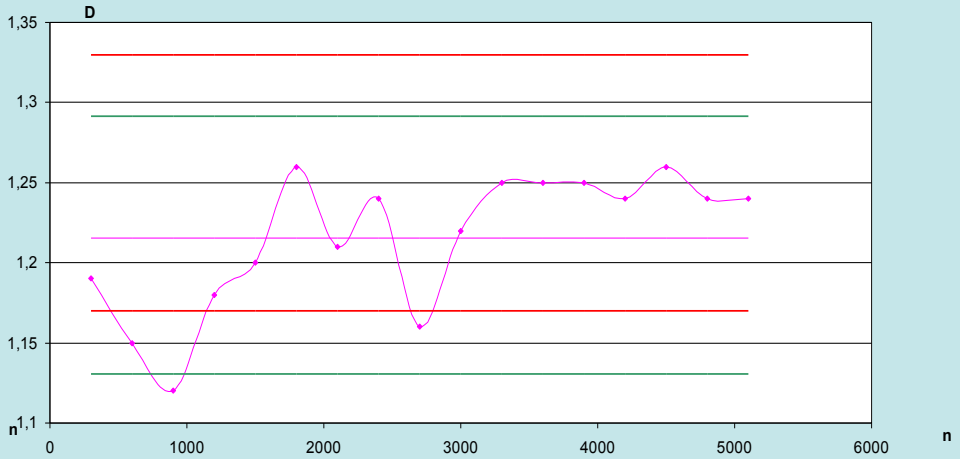
Stability evaluation of printing

Example 2

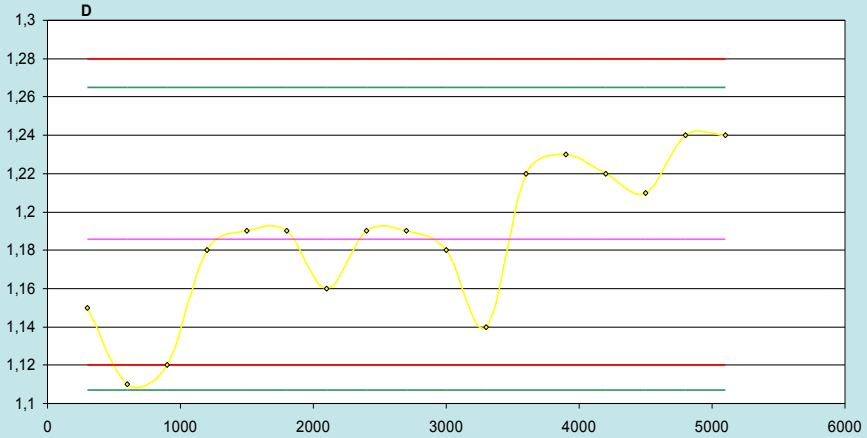
- manroland 700
- Color Pilot (off-line densitometer)
- Print Consult software

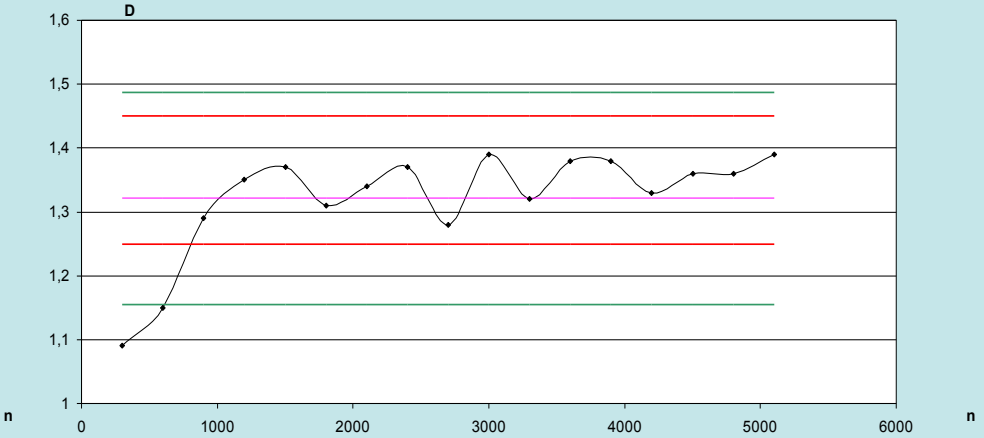
Control charts for optical density





Print runs





Print runs

Conclusions

- Importance of materials: paper – printing ink - fountain solution – blanket– plate, and its interaction
- Printing press adjustment and state
- Dynamic process control: control charts, σ
- Don’t trust authomatics only!

Thanks to:

Ph.D. Irina Shakhova (MSUPA)

My students Anna Tikhonova

Elena Ilicheva

Valentin Kantor

Maria Shmatkova

Elena Sokolova

Tatyana Rozhkova

Thank you
for your attention!