

A light blue world map is centered in the background of the slide, showing the outlines of continents and major landmasses.

# **Bring out the best in the JV3**

## **- Part II (Analysis/Corrective Measures) -**

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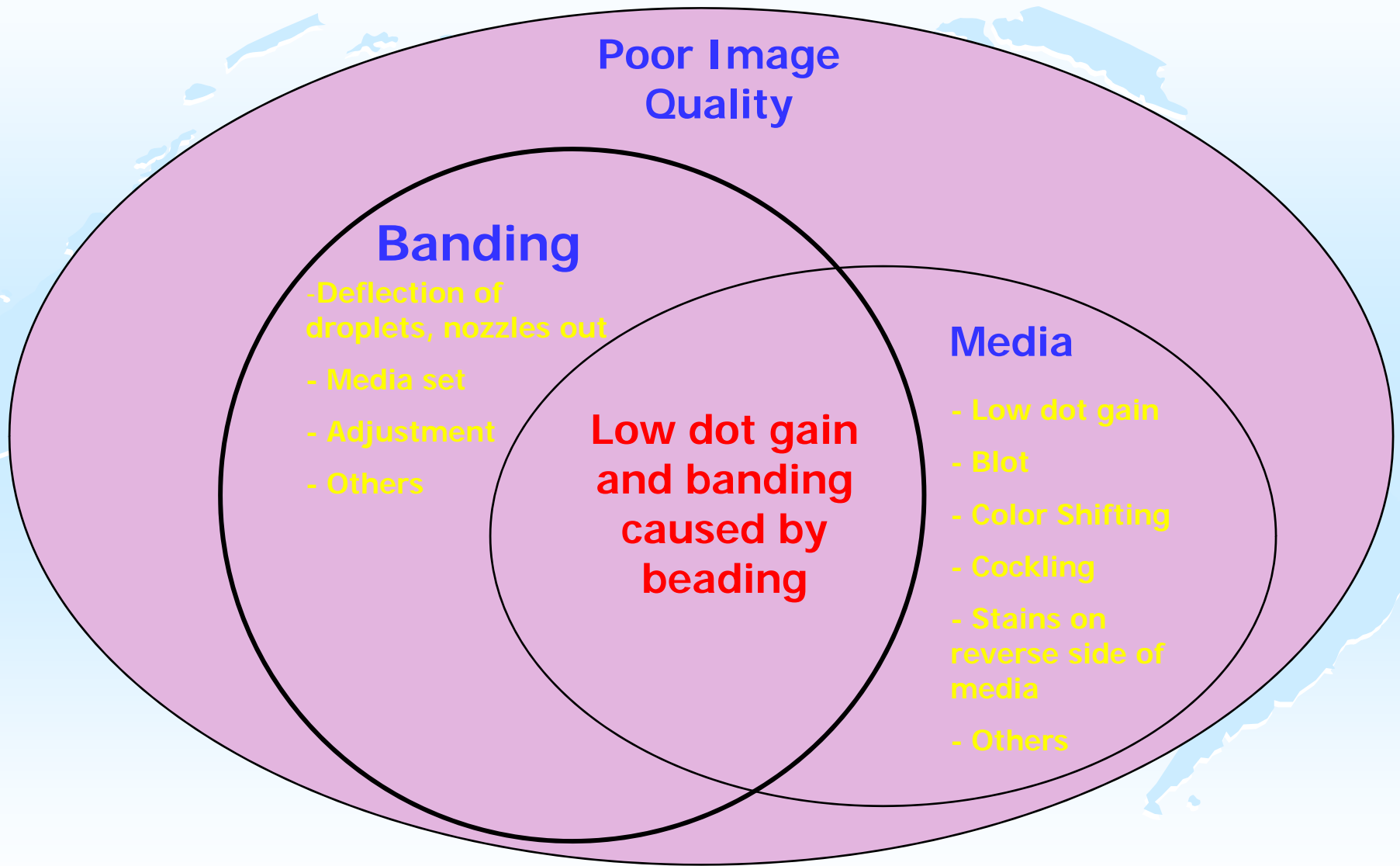
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**Reference data: File names and pattern numbers.**

# 1. Causes of Banding

- The following are the causes of banding.
  - Nozzles out, deflection of ink droplets
  - Incorrect media compensation
  - Improper media loading; warped or badly formed media
  - Heater temperature (sticking to the platen and expansion/shrinkage of media)
  - Dew condensation of the nozzle surface
  - Omission of ink and nozzle out caused by dirt and dust
  - Color mixture (dislocation of cap plates, clogged pump tubes)
  - Defective linear sensor or encoder scale
  - Insufficient dot gain
  - Beading caused by Bleeding (adjacent ink drops adhering to each other instead of the media)
- Analysis of and solutions for banding caused by low dot gain and beading are explained in this presentation.



## 2. Verifying Dot Gain and Bleeding

- In order to check dot gain and bleeding, a check pattern (GB pattern) as shown in the following figure is used.

360x360dpi ... MonoBleed3636.Prn MTP200

360x540dpi ... MonoBleed3654.Prn MTP210

360x720dpi ... MonoBleed3672.Prn MTP220

720x720dpi ... MonoBleed7272.Prn MTP230

- Select the pattern that best fits the printing conditions. (These are direct output files)

Dot Gain check pattern



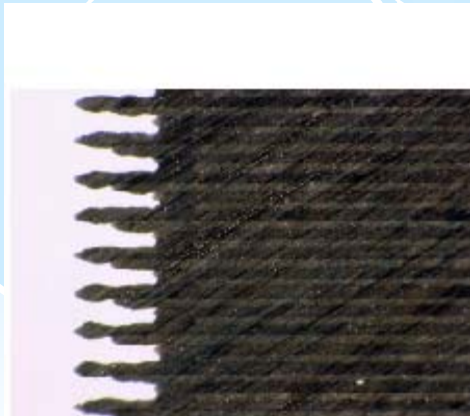
Beading check pattern

### 3. Analysis & solution for Low Dot Gain - 1

- Dot Gain for each color can easily be checked using the test pattern shown on the right. Vertical test blocks can be used for direct dot gain measurement.

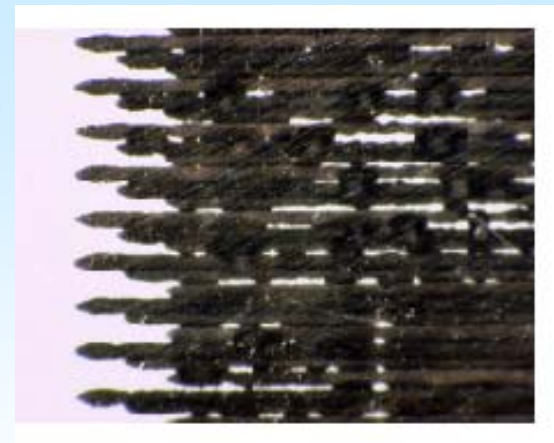


The examples below are for black (K).



Dot gain is too low

**Enlargements**



White spaces can be seen when dot gain is too low

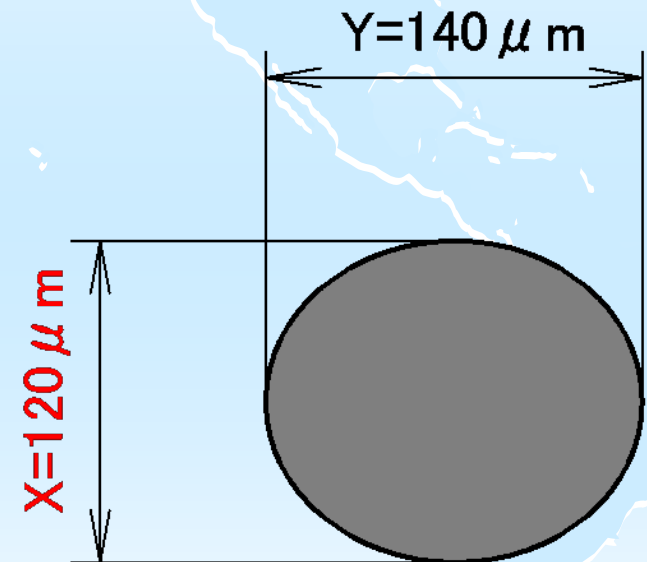
### **3. Analysis & solution for Low Dot Gain - 2**

- **If the dot gain is not sufficient for coverage, increase the resolution and check the pattern again.**
- **If the dot gain is borderline, check the results of the synthesized pattern explained later in this document. Check the actual printed output for errors.**
- **If the resolution and pass mode can not be changed because of print speed etc, then another media with a higher dot gain will have to be selected.**

## 4. Dot Gain – 1

### Dot Gain

- Dot gain is the final diameter of an ink droplet on the media once it has dried fully.
- In the JV3 series, dot gain will form an ellipse in the direction of print head travel (Y direction).
- Dot gain varies according to the print mode selected or type of media.
- Low dot gain will create banding and color shifting effects in the final output.



An example of a dot gain

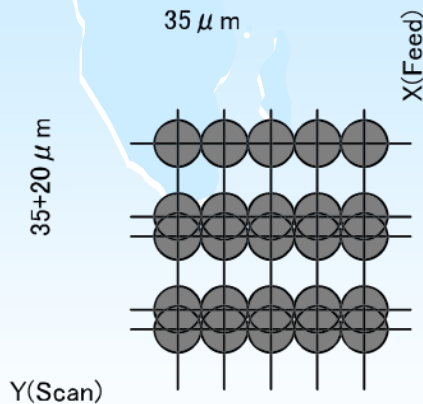
## 4. Dot Gain - 2

### 720dpi Dot Gain

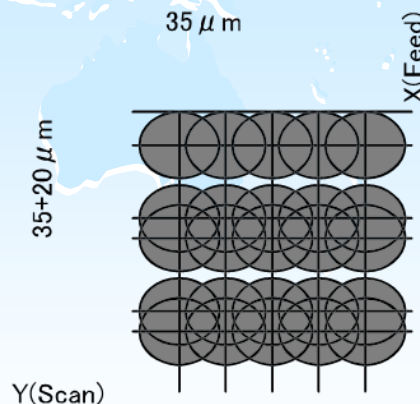
$720\text{dpi} = 35\mu\text{m} \pm \text{feed accuracy of the printer}$

**The diameter of the X direction dots:**

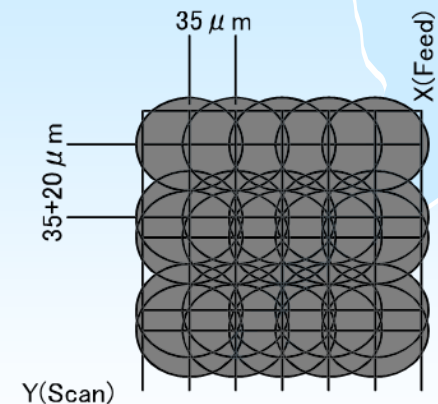
At  $35\mu\text{m}$ , the dot gain is too low to provide a kind of ink coverage. This will result in banding.



At  $50\mu\text{m}$ , the coverage is much better. However banding still appears due to the feed error of the printer.



At  $80\mu\text{m}$ , gaps and feed errors of the printer will be completely painted out.



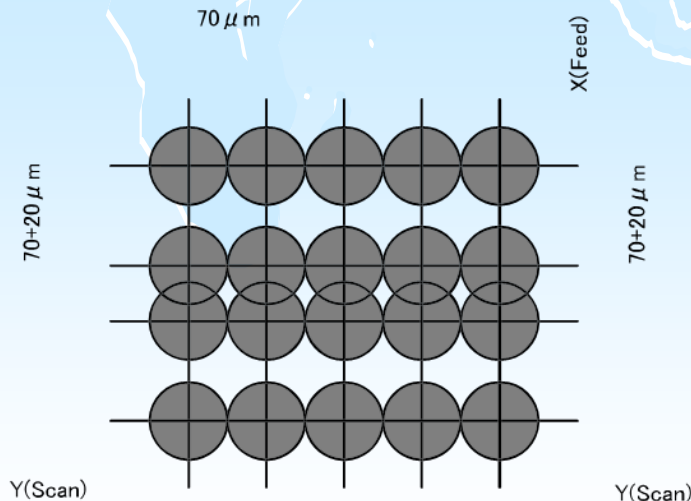
## 4. Dot Gain - 3

### 360dpi Dot Gain

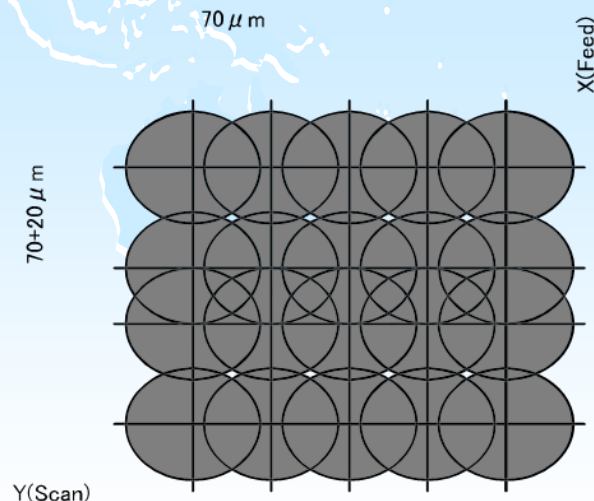
$360\text{dpi} = 70\mu\text{m} \pm \text{feeding accuracy of the printer}$

**The diameter of the X direction dots:**

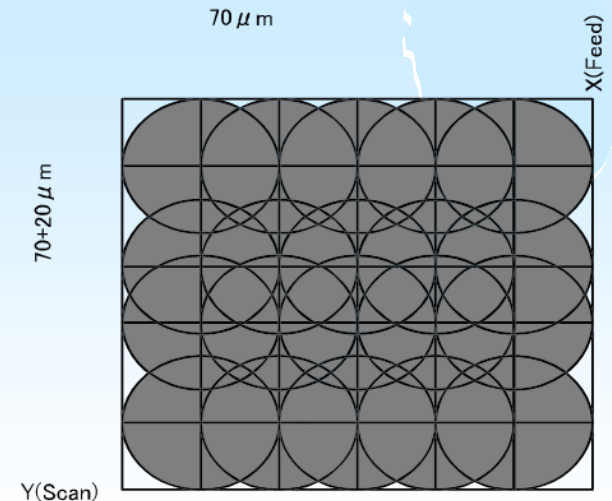
At  $70\mu\text{m}$ , the dot gain is too low to provide and kind of ink coverage. This will result in banding.



At  $100\mu\text{m}$ , the coverage is much better. However banding still appears due to the feed error of the printer.



At  $120\mu\text{m}$ , gaps and feed errors of the printer will be completely painted out.



## 5. Analysis & Solutions for Bleeding - 1

- When the ink limit (absorption rate) of a media is too low, blotting will occur.
- Check the ink limit of the media to be used with the pattern in the following figure.
- This pattern consists of ink densities from 10% to 100% in 10% intervals.
- The patterns are the four monochromes, Y, M, C, K and mixed colors of R, G, B, and CMY.



## 5. Analysis & Solutions for Bleeding - 2

- 240% in this figure is the total combined amount of CMY in this print.
- Look for ink bleeding into the small point text. Also check for banded lines caused by ink beading on the media surface.



2point:ABCabc  
4point:ABCabc  
6point:ABCabc  
6point:ABCabc  
2point:ABCabc  
4point:ABCabc  
6point:ABCabc  
6point:ABCabc  
7p:日本  
8p:日本

CMY  
240%

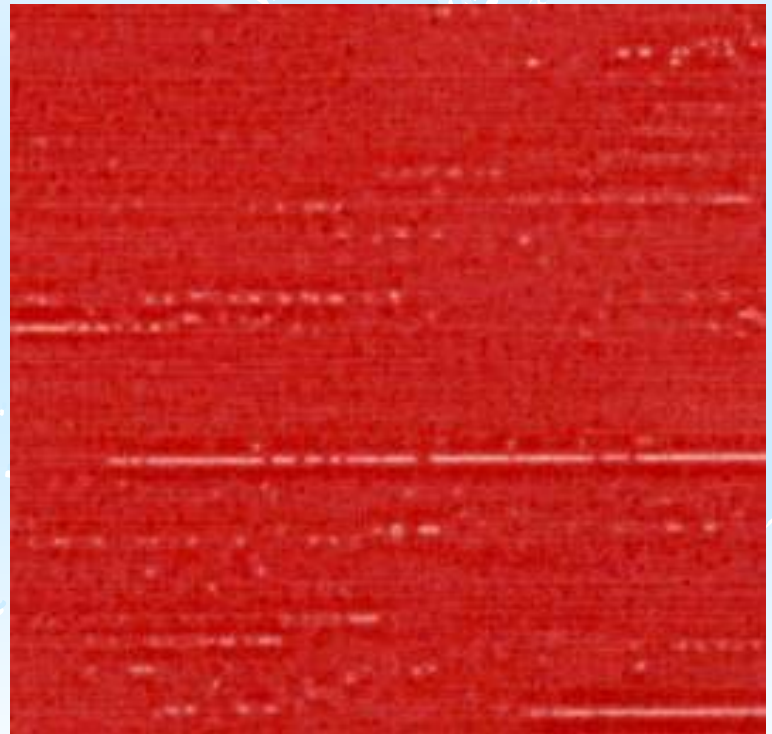
## **5. Analysis & Solutions for Bleeding - 3**

- **When blotting or beading occur, they can be corrected in the following ways:**
  - **Change Print mode**      **Increase number of passes.**
  - **Control ink amount by RIP**      **Concentration is reduced.**
  - **Logical Seeking**      **off**
  - **Heater Temperature**      **Raise**
  - **Scanning waiting Time**      **Increase**
- **If these methods are not able to correct the errors then an alternate media with a higher ink absorption will have to be selected.**

## 6. Examples of banding caused by Bleeding

### About banding by "Beading"

- Beading means that the media has fully saturated at that temperature and can hold no more ink. The overflow ink then adheres to neighboring ink droplets instead of the media. This also reduces scratch resistance.
- This will result in low and high areas of ink concentration as in the picture on the right. If the media is severely over its ink limit, dark lines will be present. Beading may occur in only 1 or 2 colors; feed errors will be consistent across all colors.



An example of banding caused by Beading

## 7. Synthesis Image Quality Check - 1

- In order to check comprehensive image quality, output the pattern shown on the bottom.
- This pattern has ten check points.
- There are three types of files for direct output:

For 4 color printers: TestPrint4C.prn

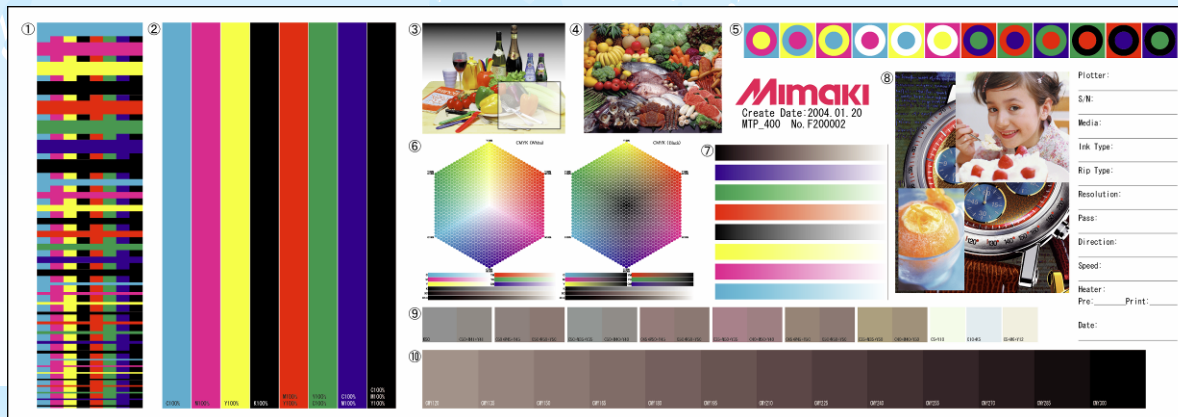
MTP-300

For 6 color printers: TestPrint6C.prn

MTP-310

For 8 color printers: TestPrint8C.prn

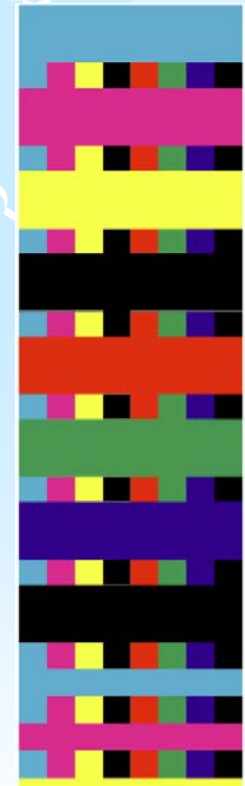
MTP-320 (under preparation)



## 7. Synthesis Image Quality Check - 2

### 1. Bleeding Check Pattern 1

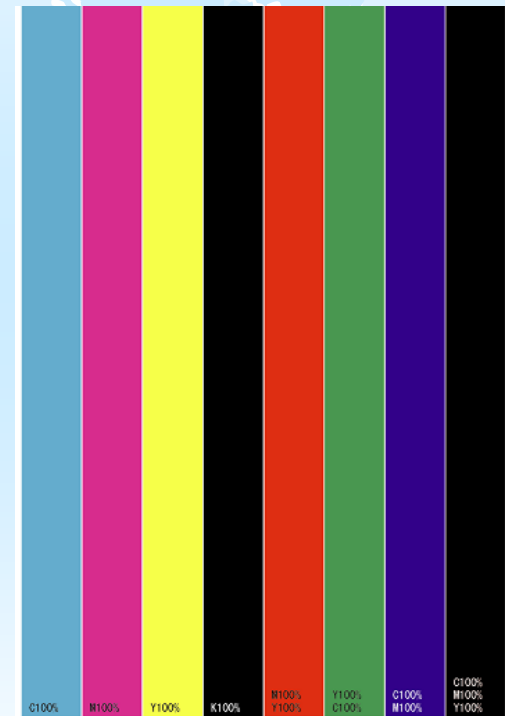
- This pattern is used to judge ink blotting between dense colors. Check for ink bleeding between the different color zones in the print.
- Example: if the yellow ink in this print has weak, unfocused outlines then the drying time or heat will have to be increased.



# 7. Synthesis Image Quality Check - 3

## 2. CMYK Banding Check Pattern

- This pattern is used to check for banding in each individual color.
  1. Media comp errors
  2. Feed errors
  3. Beading errors
  4. Nozzle errors
  5. Bleeding errors



## 7. Synthesis Image Quality Check - 4

### 3. Picture 1

- Check for bleeding between the heavy and light color density color areas.



## 7. Synthesis Image Quality Check - 5

### 4. Picture 2

- Check for bleeding between the heavy and light color density in the graduated areas.



## 7. Synthesis Image Quality Check - 6

### 5. Bleeding Check Pattern 2

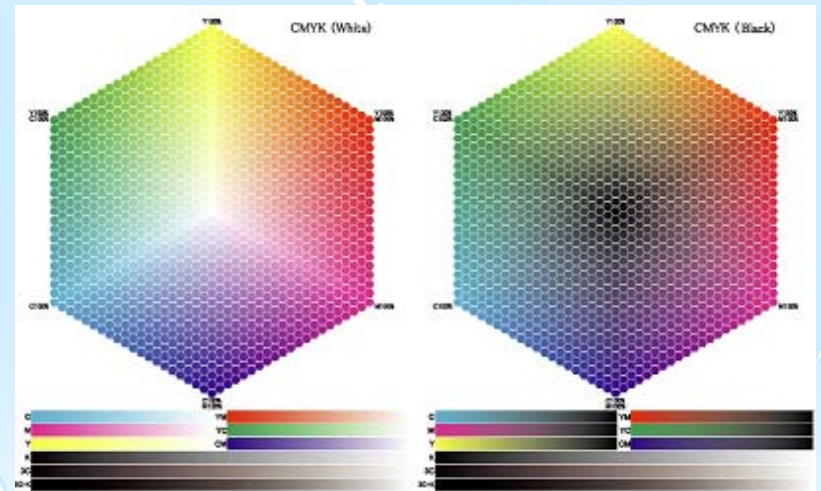
- Check for bleeding or beading in the dark circular areas.



# 7. Synthesis Image Quality Check - 7

## 6. CMYK Chart

- The range of a reproducible color is checked by the color profile to be used.



## 7. Synthesis Image Quality Check - 8

### 7. Gradation

- The reproducibility of gradation is checked by the ICC profile to be used.
- Check that there are no tone jumps in the middle of the gradation.



## 7. Synthesis Image Quality Check - 9

### 8. Picture 3

- Check for heavy ink or beading in graduated areas in flesh tones and in high density Mimaki watch print.



## 7. Synthesis Image Quality Check - 10

### 9. CMY mixed Color Pattern

- Check for bleeding / beading in the dark text areas.



## 7. Synthesis Image Quality Check - 11

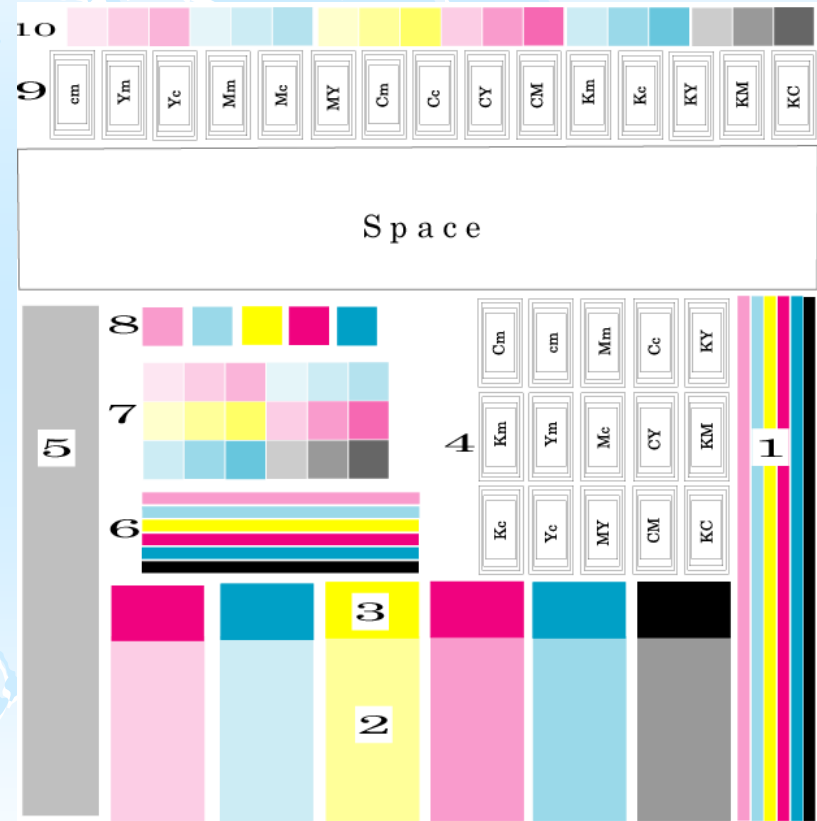
### 10. Beading Check Pattern

- Check for beading at different total ink densities.



## 8. Print Accuracy Check - 1

- After checking for dot gain and bleeding issues, it may be necessary to check the printer alignment.
- It is necessary to adjust the printer using the built in printer alignment patterns. The pattern **Dotadjust.prn MTP-100** shown on the right may be used to evaluate over all printer alignment.
- There are ten check points in this pattern.



## 8. Print Accuracy Check - 2

### Check Point 1

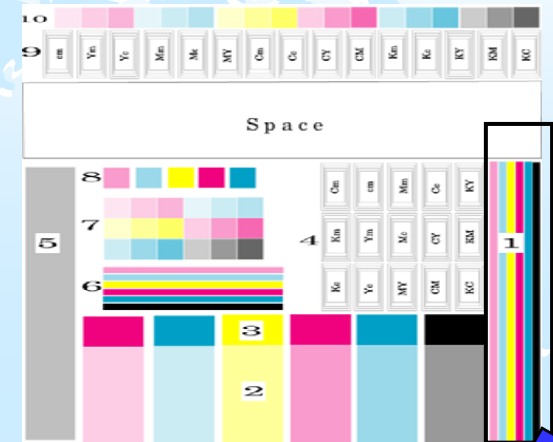
#### 720dpi monochrome Vertical Line Linearity

When adjustment is required:

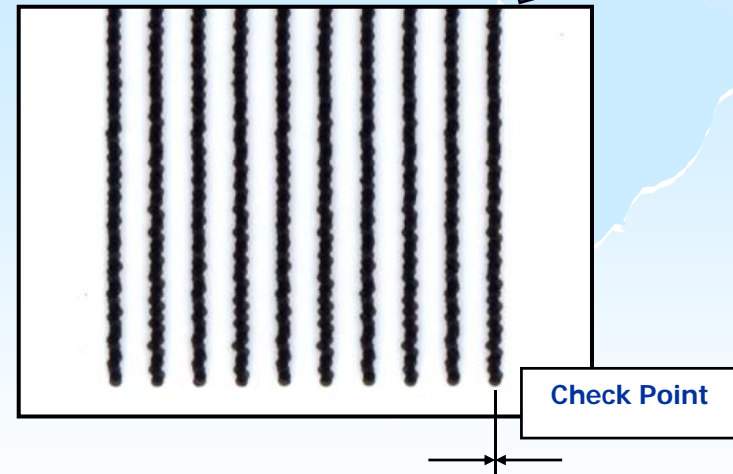
- Vertical line contains dots shifting 0.5 or more dots left or right.
- Watch for dark or light shades and color shifts in the check patterns.

The items to adjust:

- Head slant
- PRINT ADJUST 2 values



Enlarged



## 8. Print Accuracy Check - 3

### Check Point 2, 3

Point 2: 360x180 dpi

Point 3: 720dpi 100%

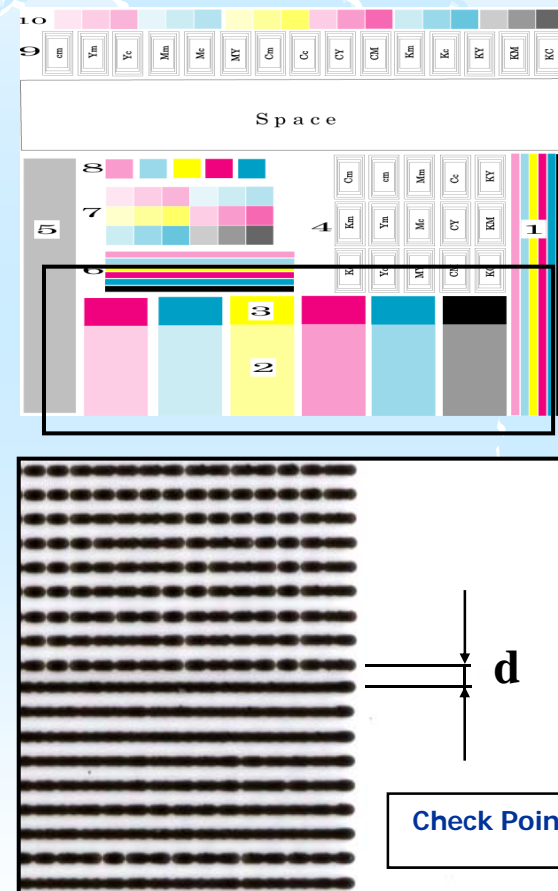
(Feed accuracy & Nozzle Check)

When adjustment is required:

- Distance "d" between passes is too far or narrow.

The items to adjust:

- The nozzle check for the head when a line occurs in a specific color. Cleaning may be required.
- Media comp



## 8. Print Accuracy Check - 4

### Check Point 4, 9

Point 4: 720x720dpi

Point 9: 360x360dpi

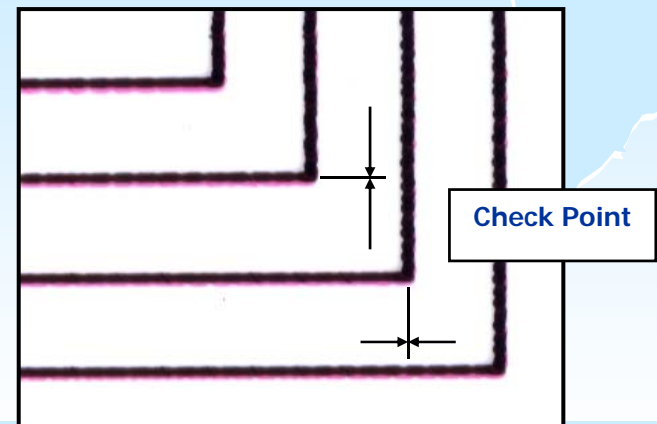
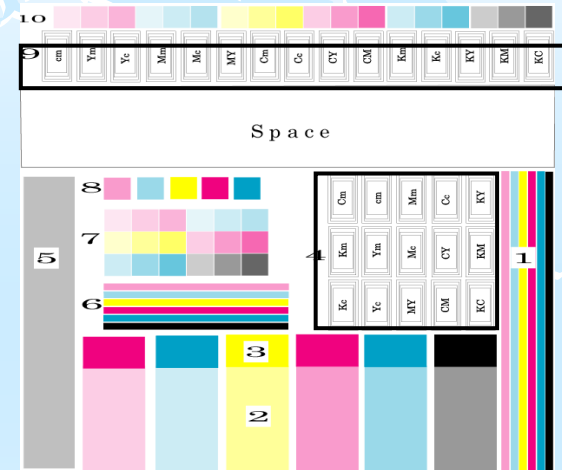
(Dot position accuracy between colors)

When adjustment is required:

- Vertical line has shifted. (more than 0.5 dot between Bk-M and more than 1 dot between Bk-Lc)
- Horizontal line has shifted (1 or more dots)

The items to adjust:

- PRINT ADJUST 2  
X-dir Y-dir



## 8. Print Accuracy Check - 5

### Check Point 5

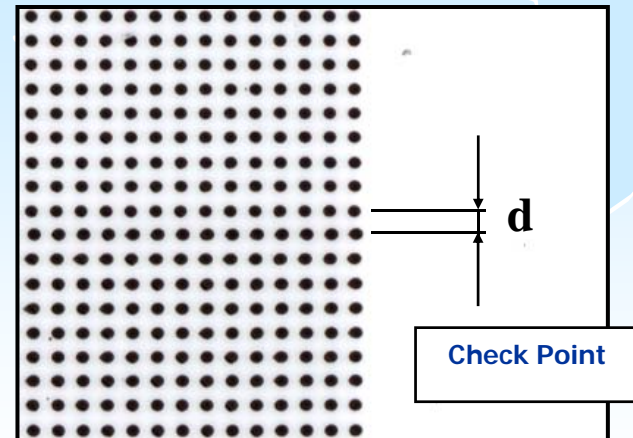
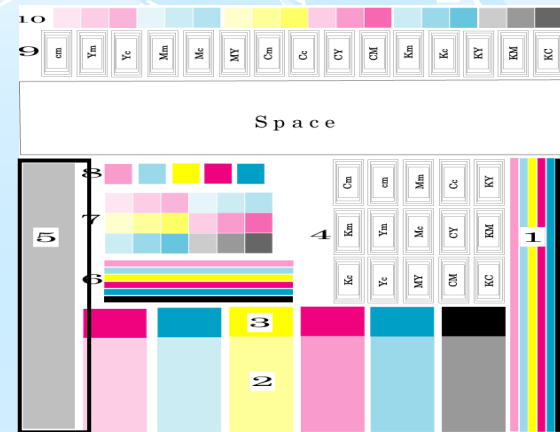
180x180dpi pitch Bk  
(720dpi 6.25%)  
Feed Accuracy

When adjustment is required:

- Distance "d" between passes is too far or narrow.

The items to adjust:

- Media compensation



## 8. Print Accuracy Check - 6

### Check Point 6

720dpi monochrome horizontal line.

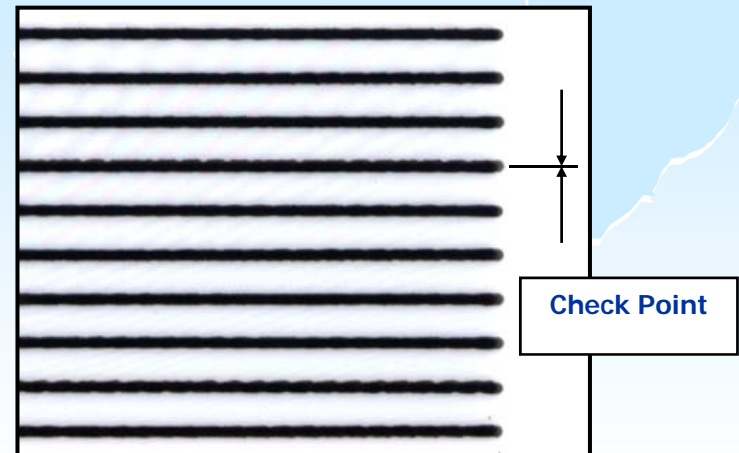
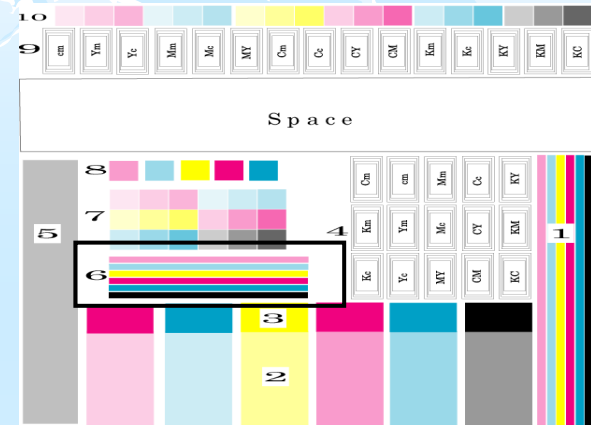
Line Linearity

When adjustment is required:

- 0.5 or more dots of horizontal lines have shifted.

The items to adjust:

- Media compensation



## 8. Print Accuracy Check - 7

### Check Point 7, 10

Dot size and shape can be measured

Pattern 7:

V2 180x180dpi pitch  
(720dpi, 6.25%)

Pattern 10:

V1 90x90dpi pitch  
(360dpi, 6.25%)

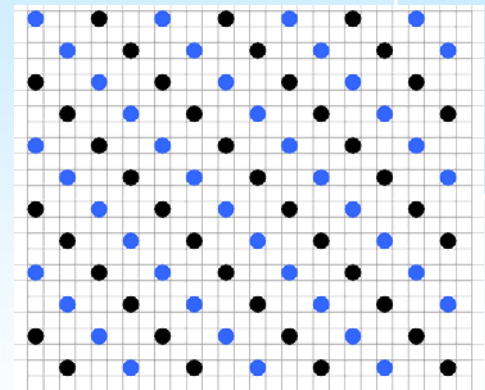
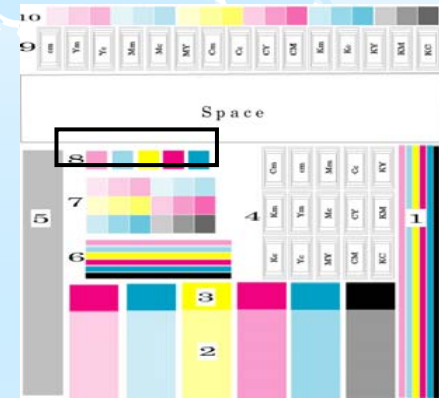


## 8. Print Accuracy Check - 8

### Check Point 8

180x180dpi pitch

(for confirmation)



# File Names and Pattern Number

Test Name	File Name	Pattern Number	Note
Output Tool			1394 output tool is used.
Dot Gain/ Bleeding	MonoBleed3636.prn MonoBleed3654.prn MonoBleed3672.prn MonoBleed7272.prn	MTP200 MTP210 MTP220 MTP230	For 360x360dpi For 360x540dpi For 360x720dpi For 720x720dpi
4color synthesis image	TestPrint4C.prn	MTP300	4 color synthesis image quality check pattern for a direct output
6 color synthesis image	TestPrint6C.prn	MTP310	6 color synthesis image quality check pattern for a direct output
8 color synthesis image	TestPrint8C.prn	MTP320	8 color synthesis image quality check pattern for a direct output
Comprehensive image for RIP	TestPrintv2.tif	MTP400	Comprehensive image quality check pattern for RIP output
Printer accuracy	Dotadjust.prn	MTP100	Printer accuracy check for a direct output

The files for a direct output are prepared in order to draw without being influenced of RIPs.