MURAKAMI

July 2010

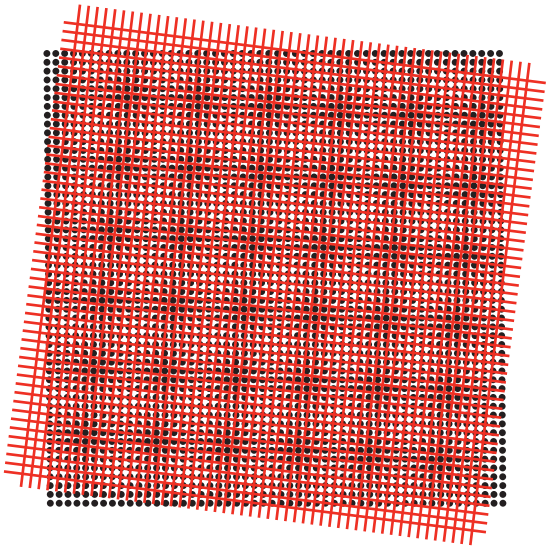
Technical Newsletter

MURAKAMI SCREEN U.S.A., INC. *745 Monterey Pass Rd. Monterey Park, CA 91754 Tel 323.980.0662*

Moire

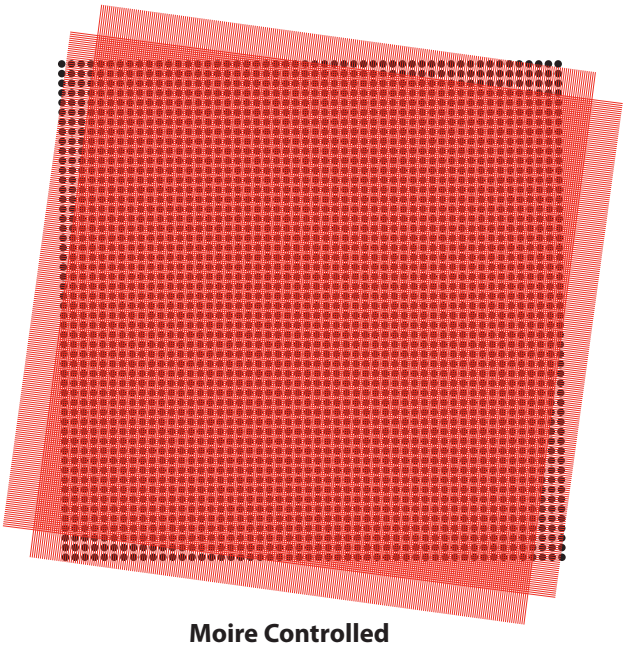
How to prevent Moire from appearing in your print especially your textile base plates.

Moire is the interference of halftones and mesh. This interference is the result of mesh or mesh knuckles blocking some or part of the halftones in an image. Generally moire is controlled by placing halftones on a specific angle when creating film via a RIP program and having four or more mesh open areas per half tone dot.



Moire Example

In this extreme example both the mesh (shown in red for visual purposes) and the halftone were set to 55 lines per inch. Normally in screen printing we would multiply the halftone count by 4 or 4.5 to know what mesh count to use. this would require a 240 thread per inch mesh to prevent moire from appearing. Example 2 shows no moire, however this is one tonal value, a gradation halftone from 0-100% can still exhibit spot moire in certain tonal areas. Smartmesh has very precise square openings when stretched to prevent spot moire issues.



Moire Controlled

Using the 4.5 x Halftone Count Math

This example shows no moire since the mesh (shown in red) has at least 4 threads or mesh open areas per halftone dot resulting in no blockage of the halftone print. This formula of multiplying halftone line count by 4 or 4.5 yields good results providing we output the film with the halftone on a specific angle. Not all angles work at preventing moire. We have included charts in this article to show what angle works for various Smartmesh thread counts.

The math above works fine for graphics where printing with high mesh counts is the norm, but what about printing halftone base plates for textile? White textile base plate ink on 250 to 300 mesh simply won't print well. So how can you print bright white base plates with good halftones and no moire? S-thread mesh answers this question and also prints base plates much better than conventional T thread mesh.

S-thread mesh with it's larger open area can use 45 and 55 line count halftones and produce incredibly bright halftone base plates using mesh counts lower than the mesh count achieved by multiplying by 4 or 4.5. These combinations of mesh and angle work!

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Bright Halftone Base Plates

Notice the use of the word 'bright'. Too often printers settle for a halftone base plate for simulated process or index printing that is anything but bright. We thin the white base plate ink with viscosity reducers, halftone base, softeners, all in an attempt to get it to print well through a fine mesh due to the math described on the previous page. A bright white base plate simply allows the printer to massage the overlying colors by increasing transparency to obtain secondary and tertiary colors that develop as the overlay colors mix during print.

Without a bright base plate the image is muted, or needs to have overlay colors be as opaque as possible to keep color intensity in the design. However many subtle color transitions are lost as either opacity of overlay colors blocks the color transitions, or the thinned base plate lowers the color quality of the transparent overlay colors.

Base Plate: 150/48 Yellow
Colors: 225/40 Yellow

Print Courtesy of Ink Throwers
Baja California

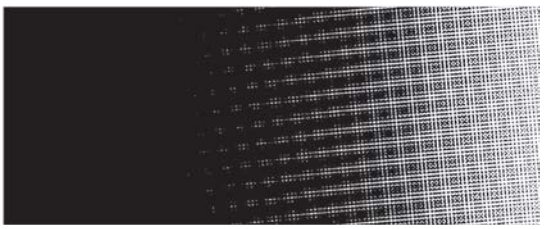
The Solution?

S-thread or the new LX Mesh from Smartmesh sold by Murakami is the answer in achieving brighter base plates. Both have a higher percentage of open area than typical mesh and allow the printer to lay down an opaque base plate with unmodified inks right out of the container. No need to lower the opacity of your white base plate ink, just switch to a better mesh.

S mesh and LX Mesh sold by Murakami USA allows the ink to be printed on the surface of the shirt. The squeegee needs less pressure to print the thick base plate ink. This results in less dot gain and more opacity in the base plate and achieves more vibrant prints. Secondary and tertiary colors can improve since the overlaying colors can be thinned with transparent base to mix well during the wet onto wet print process typical of index and sim process style

Testing Method to Determine Angle:

We used a 0-100% gradient in both 45 and 55 line halftones set to all angles from 1˚ to 90˚. We then exposed these images onto Smartmesh coated with Photocure PRO and evaluated the results. The example below shows the resulting moire if the angle didn't work. Some of the angles that worked were surprising. Typically 7, 22, and 61 are considered non moire angles. While they worked on some 45 and 55 line halftone/mesh combinations, other angles as shown in the following charts produced better results.



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Mesh counts that work

150/48 or commonly called 150-S mesh can be substituted for a 110 T-thread mesh when printing base plates. It has a 51% open area while 110-T only has a 43% open area. This 8% difference in open area simply equates to less squeegee pressure needed to force the ink through the ink well and onto the shirt.

The other important number is the angle of the halftone when imaged by the RIP. More angles are available using S mesh since the thread is thinner and the openings larger. T thread (thicker threads) causes moire in the 3-7% range since these halftones are blocked by the thicker threads. S thread on the other hand has thinner thread that can print these fine halftone values better with more open area. So the numbers we need for halftone printing are:

Halftone Line Count +
Halftone Angle +
Mesh Count and Thread thickness.

We've done the work for you, just look at the charts on the following pages to determine what angle and mesh work for 45 or 55 line halftones. These angles are highlighted in green. Choosing one in the middle of a block of good angles helps to absorb any irregularities when placing film on the screen.

Waterbase

Halftones for waterbase tend to be coarser than a plastisol base plate to prevent the ink from drying in the screen. With S thead mesh it is possible to use higher halftone counts on a 150-48 to achieve more subtle tones and still achieve good ink saturation on typical t-shirt fabric weights due to greater open area of S mesh..

Base Plate: 150/48 Yellow
Colors: 225/40 Yellow

Print Courtesy of Ink Throwers
Baja California

Base Plate: 150/48 Yellow
45 line halftone

Print Courtesy of Ink Throwers
Baja California

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Halftone Angles for Smartmesh
45 line Halftone Chart

The following charts show which halftone angles to use with Smartmesh. Our tests were conducted using a 0-100% gradient using both 45 line (this page) and 55 line halftones (next page), with a round dot, real film. All screens were stretched with Smartmesh.

Which is the best dot shape? Round dots are the default dot in most RIP programs. However a 70/30 ellipse can avoid moire a little better as well as resolving tonal values above 70% and below 30%. Square and diamond shaped dots can print sharper images. Both control dot gain as do many of the exotic dot shapes offered by major RIP software providers. We use Filmgate RIP by Colorgate for our ink jet films that offers many controls of dot shape, frequency and angle selections..

45 line halftones:

Angle	150/48	180/48	200T	225/40	300T	350/30	350/34
1	X	X	ok	X	ok	ok	ok
2	X	X	ok	X	ok	ok	ok
3	X	X	ok	X	ok	ok	ok
4	X	X	ok	ok	ok	ok	ok
5	X	X	ok	ok	ok	ok	ok
6	ok	X	X	ok	ok	ok	ok
7	ok	ok	X	ok	ok	ok	X
8	ok	ok	ok	X	ok	ok	X
9	X	ok	X	X	ok	ok	X
10	X	X	X	X	ok	ok	ok
11	X	X	X	X	ok	ok	ok
12	X	X	X	X	ok	ok	ok
13	X	X	X	X	ok	ok	ok
14	X	X	X	X	ok	ok	ok
15	X	X	X	ok	ok	ok	X
16	X	X	X	ok	ok	ok	X
17	ok	X	X	ok	ok	ok	ok
18	ok	ok	X	ok	X	ok	ok
19	ok	ok	X	ok	X	ok	ok
20	ok	ok	X	ok	X	ok	ok
21	ok	ok	X	ok	ok	ok	ok
22	ok	ok	X	ok	ok	ok	ok
23	ok	ok	X	ok	ok	ok	ok
24	X	ok	X	X	X	ok	ok
25	X	ok	X	X	X	ok	ok
26	X	ok	X	X	X	ok	ok
27	X	ok	X	X	ok	ok	ok
28	X	X	X	X	X	ok	ok
29	X	X	X	X	X	ok	ok
30	X	X	X	X	X	ok	ok
31	X	X	X	ok	ok	ok	ok
32	X	X	X	ok	ok	ok	ok
33	X	X	X	X	ok	ok	ok
34	X	X	X	X	ok	ok	ok
35	X	X	X	X	ok	ok	ok
36	X	X	X	X	ok	ok	ok
37	X	X	X	X	X	ok	ok
38	X	X	X	X	X	ok	ok
39	X	ok	ok	X	X	ok	ok
40	ok	X	X	X	X	ok	ok
41	X	X	X	X	X	ok	ok
42	X	X	X	X	ok	ok	ok
43	X	X	X	X	ok	ok	ok
44	ok	X	X	ok	X	ok	ok
45	ok	X	X	ok	X	ok	ok

Angle	150/48	180/48	200T	225/40	300T	350/30	350/34
46	ok	X	X	ok	X	ok	ok
47	X	X	X	ok	ok	ok	ok
48	X	X	X	ok	ok	ok	ok
49	X	X	X	X	X	ok	ok
50	X	X	X	X	X	ok	ok
51	X	X	ok	X	X	ok	ok
52	X	X	X	X	X	ok	ok
53	X	X	X	X	X	ok	ok
54	X	X	X	X	ok	ok	ok
55	X	X	X	X	ok	ok	ok
56	X	X	X	X	ok	ok	ok
57	X	X	X	X	ok	ok	ok
58	X	X	X	X	ok	ok	ok
59	X	X	X	ok	ok	ok	ok
60	X	X	X	X	X	ok	ok
61	X	X	X	X	X	ok	ok
62	ok	ok	X	X	X	ok	ok
63	X	ok	X	X	X	ok	ok
64	X	ok	X	X	X	ok	ok
65	X	ok	X	X	X	ok	ok
66	X	ok	X	X	X	ok	ok
67	ok	ok	X	ok	ok	ok	ok
68	ok	ok	X	ok	ok	ok	ok
69	ok	ok	X	ok	ok	ok	ok
70	ok	ok	ok	ok	X	ok	ok
71	ok	ok	ok	ok	X	ok	ok
72	ok	X	X	ok	ok	ok	ok
73	ok	X	X	ok	ok	ok	ok
74	ok	X	X	ok	ok	ok	ok
75	ok	X	X	ok	ok	ok	ok
76	X	X	X	X	ok	ok	ok
77	X	X	X	X	ok	ok	ok
78	X	X	X	X	ok	ok	ok
79	X	ok	X	X	ok	ok	ok
80	X	ok	X	X	ok	ok	ok
81	ok	ok	ok	ok	ok	ok	X
82	ok	ok	ok	ok	ok	ok	X
83	ok	ok	X	ok	ok	ok	X
84	ok	X	X	X	ok	ok	X
85	ok	X	ok	X	ok	ok	ok
86	ok	X	ok	X	ok	ok	ok
87	X	X	ok	X	ok	ok	ok
88	X	X	ok	X	ok	ok	ok
89	X	X	ok	X	ok	ok	ok
90	X	X	ok	X	ok	ok	ok

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Which Angle to Use?

Pick an angle in the middle of a large block of 'ok' angles highlighted in green. This will insure that your placement of film doesn't have to be ultra critical to avoid moire. Also avoid 1 degree and 90 degrees since it is difficult to line up art accurately enough to avoid moire.

Smartmesh's print qualities help insure the results shown here. Try 150/48 mesh for your base plates to see the difference it can make in the quality of your prints. Whether it is for halftone base plates or solid spot color base plates your prints will improve.

55 line halftones:

Angle	150/48	180/48	200T	225/40	300T	350/30	350/34
1	X	X	X	ok	ok	X	X
2	X	X	X	X	ok	ok	X
3	X	X	X	X	ok	ok	ok
4	X	X	ok	X	ok	ok	ok
5	X	X	ok	X	ok	ok	ok
6	X	X	ok	X	ok	ok	ok
7	ok	ok	X	ok	ok	X	X
8	ok	ok	X	ok	ok	X	X
9	ok	ok	X	ok	ok	X	X
10	X	ok	X	X	X	X	ok
11	X	ok	X	X	X	X	ok
12	X	X	X	X	X	X	ok
13	X	X	ok	X	X	ok	ok
14	X	X	ok	X	X	ok	ok
15	X	X	ok	X	ok	ok	ok
16	X	X	ok	X	ok	ok	ok
17	X	X	ok	X	ok	ok	ok
18	X	X	X	X	X	X	ok
19	X	X	X	X	X	X	ok
20	X	X	X	X	X	X	ok
21	ok	X	X	ok	X	ok	ok
22	ok	X	ok	ok	X	ok	ok
23	ok	X	X	ok	X	ok	ok
24	ok	X	X	ok	X	ok	ok
25	X	X	X	ok	X	ok	ok
26	X	X	X	X	ok	ok	ok
27	ok	X	X	ok	ok	ok	ok
28	ok	X	X	ok	ok	ok	ok
29	ok	ok	X	ok	X	ok	X
30	ok	ok	X	ok	X	X	X
31	ok	ok	X	ok	X	X	X
32	X	X	X	ok	X	ok	ok
33	X	X	X	X	ok	ok	ok
34	X	X	X	X	ok	ok	X
35	X	X	X	X	ok	ok	ok
36	X	X	X	X	ok	ok	ok
37	X	X	X	X	X	ok	X
38	X	X	X	X	X	ok	X
39	ok	ok	X	ok	ok	X	ok
40	ok	X	X	ok	ok	X	ok
41	ok	X	X	ok	ok	ok	ok
42	X	X	X	X	X	ok	ok
43	X	X	X	X	X	ok	ok
44	X	X	X	X	X	ok	X
45	X	X	X	X	X	X	X

Angle	150/48	180/48	200T	225/40	300T	350/30	350/34
46	X	X	X	X	X	ok	ok
47	X	X	X	X	X	ok	ok
48	X	X	X	X	X	ok	ok
49	ok	X	X	ok	ok	ok	ok
50	ok	X	X	ok	ok	ok	ok
51	ok	X	X	ok	ok	X	ok
52	X	X	X	X	X	ok	X
53	X	X	X	X	X	ok	X
54	X	ok	X	X	X	ok	ok
55	X	ok	X	X	ok	ok	ok
56	X	X	X	X	ok	X	ok
57	X	X	X	X	ok	X	ok
58	X	X	X	X	X	ok	ok
59	X	ok	X	X	X	ok	ok
60	X	ok	X	ok	X	ok	X
61	ok	ok	X	ok	X	X	X
62	ok	ok	X	ok	X	ok	ok
63	ok	X	X	ok	X	ok	ok
64	X	X	X	X	ok	ok	ok
65	ok	X	X	ok	X	ok	ok
66	ok	X	X	ok	X	ok	ok
67	ok	X	X	ok	X	ok	ok
68	X	X	X	X	X	ok	ok
69	X	X	X	X	X	ok	ok
70	X	X	X	X	X	X	ok
71	X	X	X	X	ok	X	ok
72	X	X	X	X	ok	X	ok
73	X	X	X	X	ok	ok	ok
74	X	X	ok	X	ok	ok	ok
75	X	X	ok	X	ok	ok	ok
76	X	X	ok	X	X	ok	ok
77	X	X	ok	X	X	ok	ok
78	X	X	ok	X	X	ok	ok
79	X	X	X	X	X	X	ok
80	X	ok	X	X	X	X	X
81	ok	ok	X	ok	ok	X	X
82	ok	ok	X	ok	ok	X	X
83	ok	ok	X	ok	ok	ok	X
84	ok	X	X	ok	ok	ok	ok
85	ok	X	X	ok	ok	ok	ok
86	X	X	X	ok	ok	ok	ok
87	X	X	X	X	ok	X	ok
88	X	X	X	X	ok	X	ok
89	X	X	X	ok	ok	X	X
90	X	X	X	ok	ok	X	X