

LAYERED PRINTING WITH ROLAND LEC AND VS SERIES PRINTERS



This article explains how to perform layered printing using the Roland LEC and VS series printers.

The LEC-300 printer supports the use of ECO UV, ECO UV3, ECO UV4 and ECO UVS inks. Furthermore, both printer series use special inks:

- White ink (LEC and VS series)
- Clear ink (LEC series)
- Metallic ink (VS series)

They also provide a “return to origin” feature as well as cutting settings. The latest printer driver lets you take full advantage of these functions.

Print modes

The printers have three different printing modes:

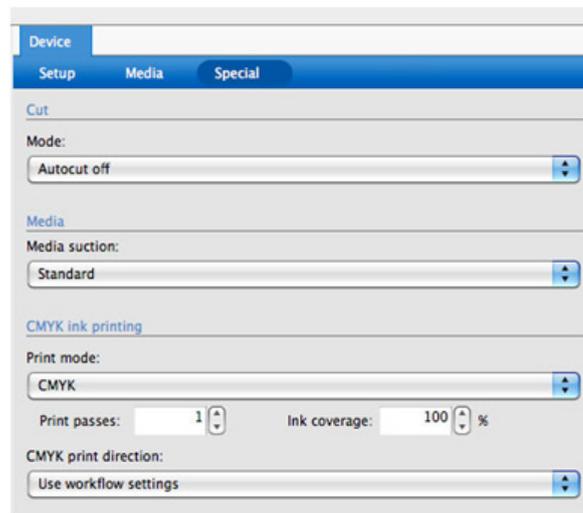
Split-head mode	<p>The printer uses half of the print head to print CMYK and the other half to print a "special ink". This makes it possible to define the order of the ink layers, i.e. White first and CMYK on top, or CMYK first and White on top.</p> <ul style="list-style-type: none"> • LEC: This mode can be used for White and colors, or for Matte Varnish and colors. • VS: This mode can be used for White and colors, or for Metallic and colors. <p>As the height of the print head is split into two, printing takes twice as long as the full-head mode. However, this mode has two major advantages:</p> <ul style="list-style-type: none"> • The first layer is already dry (or cured) before the second layer is printed. • All inks are perfectly aligned with each other, since they are printed in one single printing pass.
Mixed mode	<p>The printer uses the complete height of the print head to print both CMYK and the "special ink". This mode prints fast, but the inks all dry at the same time. When used for CMYK and White, it produces dull colors because the White ink mixes with the colors. When used for CMYK and Metallic (VS series only), the Metallic ink achieves a slightly less metallic effect than when using the split-head mode.</p>
Full-head mode	<p>The printer uses the complete height of the print head. It prints only one type of ink: White or CMYK or Metallic or Clear. Printing another ink layer requires you to "return to origin" and use the mode again with the next ink. This mode provides the highest printing speed, but can lead to alignment problems due to the media having to return multiple times to origin.</p>

Settings in System Manager

On the Special tab you will find groups of settings for CMYK, White, Clear and Metallic inks. These are explained in the following sections. The “Cut” and “Media suction” settings on the Special tab are self-explanatory and are not described below.

CMYK settings

CMYK settings

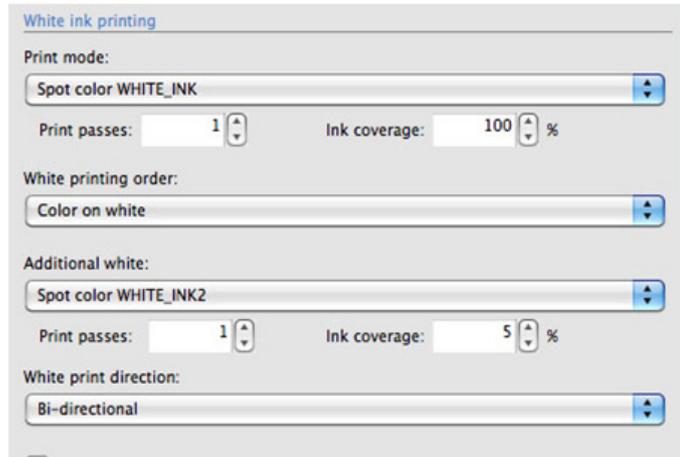


The software lets you turn off CMYK to print spot colors only, without going to the Spot Color tab. The "Print passes" setting lets you perform multiple strikes — for example, to achieve a higher density on transparent media.

For each type of ink, you can specify the CMYK print direction. "Use workflow settings" applies the print direction defined in the epl or for the workflow. Alternatively, select "Bi-directional" or "Uni-directional".

White ink settings

White ink settings



Even though the printers have only one White ink channel, EFI XF provides you with the possibility to print two layers of White:

- If you select the white printing order "Color on white", the first White layer is printed under all other inks, i.e. under CMYK and Clear ink in the case of LEC printers, and under CMYKcm and Metallic ink in the case of VS printers.
- The "Additional white" setting enables you to print a second layer of White on top of all other inks.

Each of the two White layers can vary in intensity, and multiple passes are possible. For this reason, Color Editor now has two settings for White: WHITE_INK and WHITE_INK2.

You can change the order for printing White ink, if required:

Mix white with color	Mixing white with color means that both White and colored inks are printed at the same time using the mixed mode. The result is dull colors, output at a reduced gamut but at high speed.
White on color	Printing white on color reverses the printing order, i.e. additional White (if any) will print first, then the colored inks, then White. The job is automatically mirrored, since this setting is intended for printing on the back of transparent media. However, note that this setting does not affect the cut data, i.e. the cut data is not mirrored.

If your files do not have a White layer, you can use the print mode setting for each to create an "inked image" or "bounding box" from your file.

The additional White setting was originally intended to help you simulate "milky" transparent media. For this reason, it is deselected by default. The default ink coverage is set to a very low percentage (5%).

On LEC series printers, you can use the additional White setting "bounding box" to apply an extra layer of matte varnish. However, be aware that this affects the color output. When set to "Spot color WHITE_INK2", it acts as a spot color on top of all other colors.

Since White is very often a solid color, you can select a print direction specifically for this color. Bidirectional printing is the correct setting to use in most cases.



To use the split-head mode, the White ink and all other colors must print in the same direction. The split-head mode results in slower output, but better alignment. If different print modes are selected for one job, the full-head mode is automatically used. This means that White is printed first, after which the media is rewound to enable the other colors to be printed.

Clear ink settings

Clear ink settings

The LEC series printers also have a Clear ink channel, which can be used to create a Gloss Varnish finish, a Matte Varnish finish or an embossed finish. To enable you to print complex jobs with all three finishing effects, Color Editor provides three different settings for Clear ink: CLEAR_INK, CLEAR_INK2 and CLEAR_INK3. You can assign a different finishing effect to each. All three finishing types can be set up for multiple print passes.

Presets with a 40% ink coverage are provided for the Matte and Gloss Varnish layers. The default settings achieve the best results when printing at 1440 x 720 dpi. The optimal settings can vary slightly according to the media and depend greatly on the resolution. It is advised that you increase the values when printing at a low resolution (720 x 360 dpi).



The Gloss Varnish layer requires a different type of curing (one lamp only), and cannot be created using the split-head mode.

Embossing is a particularly interesting feature: it lets you create a relief image from one of the layers. To achieve a reasonable effect, the Matte Varnish channel must be set up for multiple passes and a matte coverage of 100%. The preset number of passes is four; the maximum is set to 15. However, be aware that, depending on the resolution, a high number of passes can result in a relief image that is so thick that it is hit by the print head. EFI does not accept responsibility for any damage caused to the printer in this way.

Printing with Matte Varnish at 100% coverage gives a structured effect to the relief image. You can seal the embossed part with a small amount of Gloss Varnish to make the surface smoother. However, this means that one more layer has to be printed.

Emboss can be printed before or after the colors. "Color on emboss" does away with the need for a final glossy layer so, in this case, you can set the gloss coverage to 0%. If you use "Emboss on color", you need approximately 40% gloss coverage. However, be aware that the Clear ink is slightly yellowish and can affect the colors underneath. By setting up the linearization device correctly (CLEAR_INK out of the bounding box), you can create profiles that take this effect into account.

Metallic ink settings

Only printers of the VS series support Metallic ink. Metallic ink is actually silver colored. You can achieve very nice metallic tints either by printing CMYKcm on top or by mixing the metallic ink with other ink colors. The available settings are very similar to the settings for White and do not require further explanation. However, bear in mind that setting a different print direction from the one used for CMYK might prevent the use of the split-head mode

The ink coverage has been preset at 40%. This figure is based on the results of tests performed at 1440 x 720 dpi. If you are using a different resolution and media, you may achieve a better result if you change the percentage of ink coverage. You should also be aware that the metallic effect of the ink is also greatly affected by the gloss of the media itself. The glossier the media, the more "metallic" the effect.

Despite the split-head mode, you can achieve the best results with "Color on metallic". The mixed mode achieves reasonably good results.



Using the mixed mode for White and color gives very poor results in areas where white and color overlap.

Printing order

Once you have made your ink settings in System Manager, you can view the order in which the layers will be printed in the “Printing layers” section.

The LEC-330 example below shows that the printer will print six different layers, and will return five times to origin automatically. CMYK and Matte Varnish will be printed one after the other in separate passes, but cannot be combined in the split-head mode because of different print directions.

Layer information: full-head mode

Printing layers

#1:White, #2:Emboss-matte, #3:CMYK, #4:Matte, #5:Gloss, #6:Additional white

However, if Clear ink is switched back to unidirectional, CMYK and Matte Varnish are combined into one single layer and will be printed in the split-head mode.

Layer information: split-head mode

Printing layers

#1:White, #2:Emboss-matte, #3:CMYK + Matte, #4:Gloss, #5:Additional white

This information displays the expected layers. However, if EFI XF detects that any layer data is missing from the job, that layer will be deleted, i.e. the printer does not perform an “empty pass”.

The layer information is also displayed at the printer:

Displaying layer information at the printer



The printer control panel in the image above shows that the printer is currently printing layer two out of a total of three.

Setting up a job for the Roland LEC-330 printer

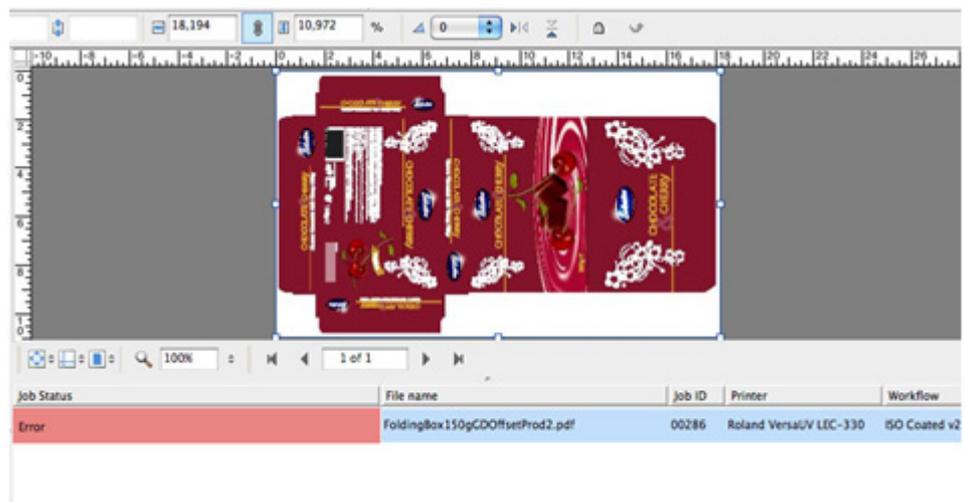
The following are practical examples of how to output a multi-layered job. The sample file "FoldingBox150gGDOffsetProd.pdf" is provided for this purpose. You can download it from ftp.bestcolor.com. The login details to the website are:

User name: efixcustomer

Password: kaLZsxiX

The job contains six spot colors, three of which are undefined. Therefore, the job generates an error status when loaded in EFI XF.

Job loaded in EFI XF

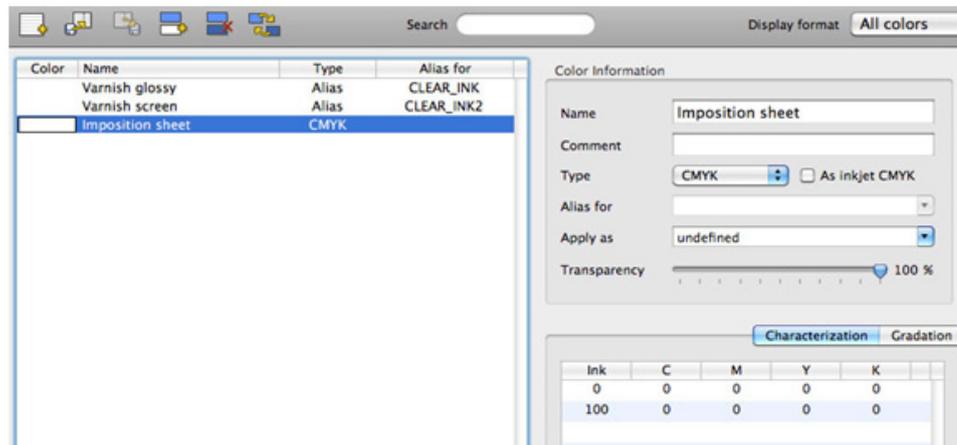


The three undefined spot colors are:

- “Varnish glossy” (a glossy varnish finish, defined for the cherries)
- “Varnish screen” (a matte varnish finish, defined for the center of the white flowers)
- “Imposition sheet” (a technical color that will not be printed)

To print the job, the first step is to define these three spot colors in Color Editor.

Defining spot colors in Color Editor



Use the “Apply as” setting to define the spot colors. This ensures that the job can be spooled without generating an error message:

- “Varnish glossy”: CLEAR_INK
- “Varnish screen”: CLEAR_INK2
- “Imposition sheet”: CMYK 0, 0, 0, 0

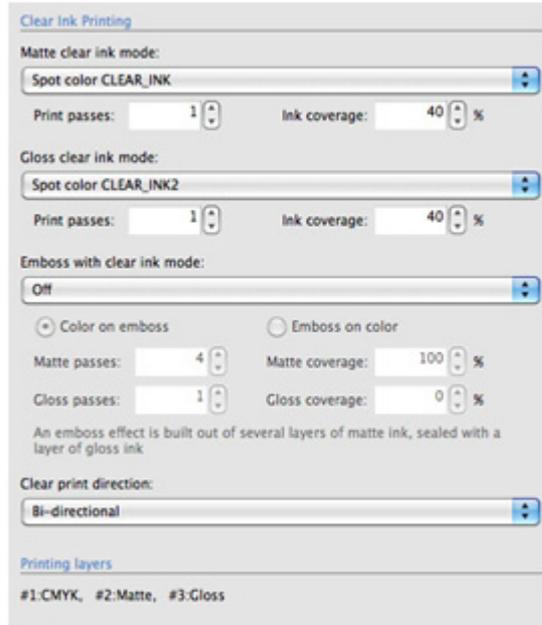
The names of the clear inks are not important — they simply indicate which ink channel to use.

The next step is to assign the required finishing effect to each clear ink channel. You do this on the Special tab in System Manager.

Example 1

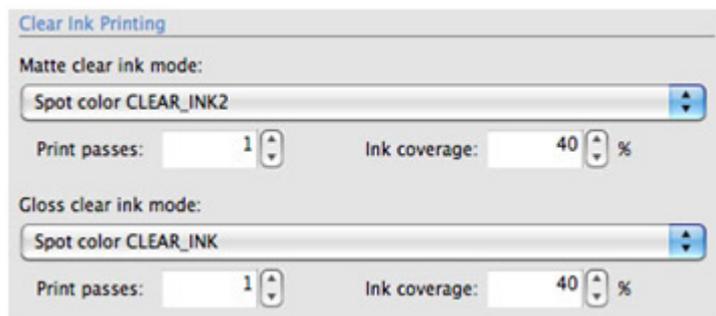
The screenshot shows that “Spot color CLEAR_INK” (Varnish glossy) will print as matte clear and “Spot color CLEAR_INK2” (Varnish screen) will print as gloss clear. (As our sample job does not have either an embossed or a White layer, the appropriate settings are set to “Off”.)

Special tab: Default settings for sample job



However, these settings will not achieve the desired effects. To print the cherries in gloss varnish and the center of the white flowers in matte varnish, you need to change the settings in accordance with the following screenshot:

Special tab: Modified settings for sample job



The job will now print the following layers:

Layer 1	CMYK
Layer 2	Matte
Layer 3	Gloss

Three layers will be printed in three passes because CMYK is set to “Uni-directional”. By switching the print direction to “Bi-directional”, you can reduce the number of passes:

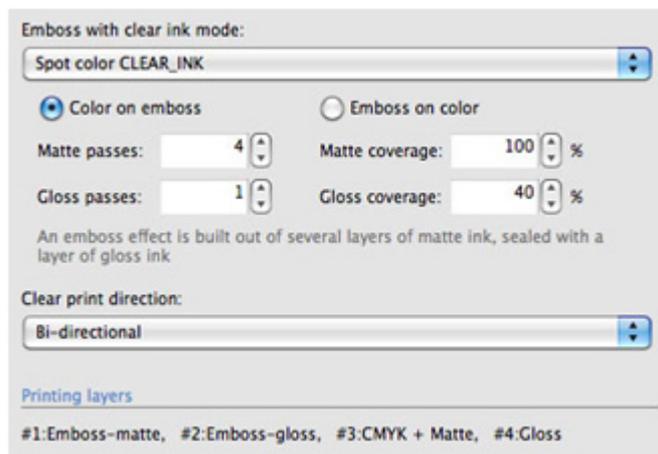
Layer 1	CMYK + Matte
Layer 2	Gloss

CMYK and Matte can now be printed in split-head mode, so only two passes are necessary. However, be aware that although the job is printed faster, the quality may not be quite as good.

Example 2

In a second example, it has been decided to print the cherries not only glossy but with an embossed effect. To achieve this, you need to select “Spot color CLEAR_INK” for the “Embos with clear ink mode” setting.

Special tab: Settings to create an embossed effect



This means that “Spot color CLEAR_INK” is now assigned to both “Gloss clear ink mode” and to “Embos with clear ink mode”. This is no problem; the same spot color can be used to create more than one effect.

By selecting “Color on emboss”, you can do away with the need to print emboss gloss, so set the gloss coverage to 0%. This means that the layer will not be printed.

Special tab: Removing the emboss gloss layer from the print job

Emboss with clear ink mode:

Spot color CLEAR_INK

Color on emboss Emboss on color

Matte passes: 4 Matte coverage: 100 %

Gloss passes: 1 Gloss coverage: 0 %

An emboss effect is built out of several layers of matte ink, sealed with a layer of gloss ink

Clear print direction:

Bi-directional

Printing layers

#1:Emboss-matte, #2:CMYK + Matte, #3:Gloss

If you print the file with these settings, the cherries will be nicely embossed, with gloss varnish as the top layer.

Printed sample file with embossed cherries



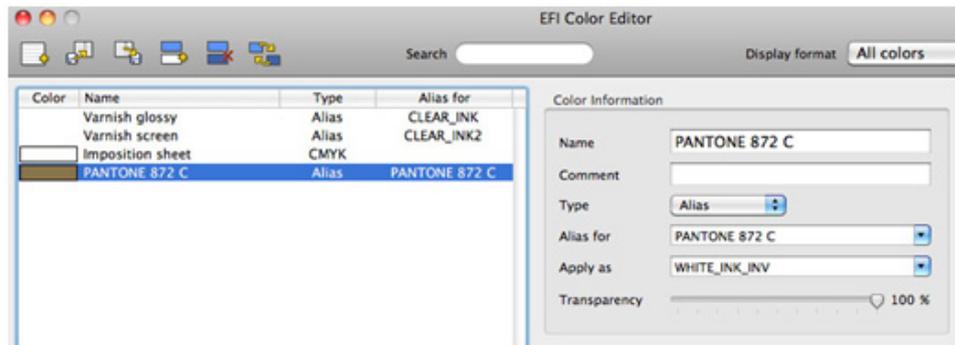
Example 3

In a third example, it has been decided to print PANTONE 872 C with a metallic look. Since the LEC-330 printer does not have a metallic ink channel, you need to use a metallic media. Roland has metallic media in its media range.

With a metallic media, you can use EFI XF to print a bottom layer of White that covers the whole substrate, except in areas where PANTONE 872 C is printed.

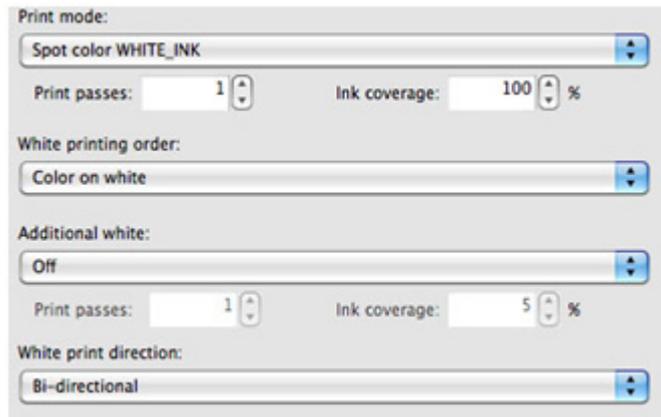
Setting up Color Editor to achieve metallic effects

In Color Editor, set PANTONE 872 C to be applied as “WHITE_INK_INV”.



Next, make the settings for White ink on the Special tab.

Special tab: Making settings to achieve a metallic effect



The job will now print the following layers:

Layer 1	White
Layer 2	Emboss-matte
Layer 3	CMYK + Matte
Layer 4	Gloss

Although this is a very complex job with metallic, emboss, matte and glossy effects, you need to click the Print button **only once**.

For jobs that are even more complex, up to **seven layers** are possible in just one “print run”. By combining the flexibility of the new printer driver with the “Return to origin after print” setting, you can produce extremely professional printouts.

Things to note

Nesting

The nesting feature is enabled for layered printing. However, you should be aware that all files in a nesting must have the same layer structure. It is not possible, for example, to apply “Colors on white” to one nested job and “White on colors” to another. Doing so will lead to unpredictable results.

For step & repeat jobs, all copies always have the same layer structure.

Head speed

The setting “Control print head at RIP”, which is located on the Special tab, is designed to slow down the print head and thus achieve a better print quality. However, this setting is ignored if you try to define a speed that is higher than permitted. The maximum allowed speed depends on the resolution — the lower the resolution, the higher the permitted speed.

Cutter settings

The cutter settings on the Special tab are currently disabled. When printing “White on colors”, the job is automatically mirrored, but not the cut data.