TECHNICAL BULLETIN 4.44

v. 1.0

MEDIA PROFILES AND PRINT PROBLEMS ON SELF-ADHESIVE MATERIALS

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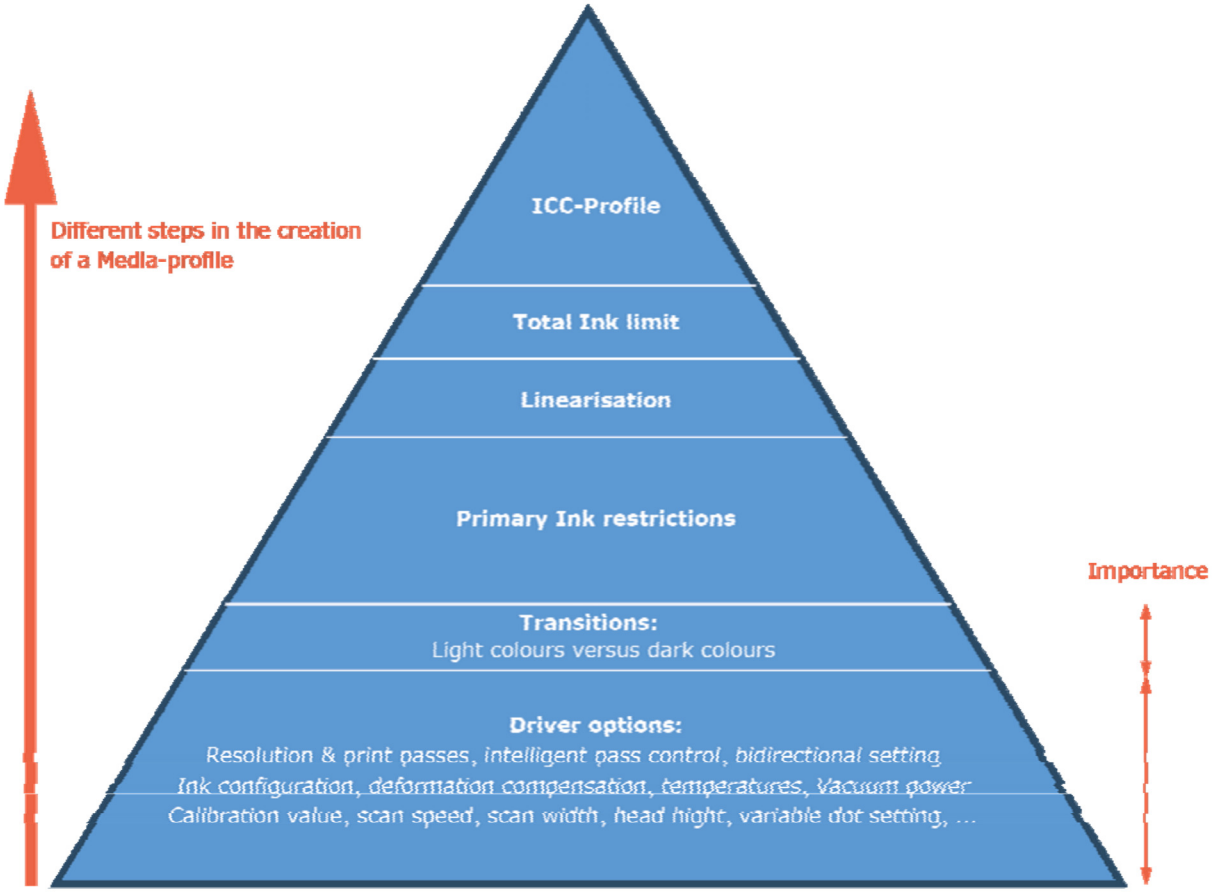
1 PRINT SETTINGS & PROFILING

1.1 MEDIA PROFILE

It is often claimed that the quality of the ICC-profile is VERY important and may change the print quality a lot. In fact, this is not 100% true. The ICC-profile takes part of the media (device) profile, and makes sure colours are printed as correct as possible. But the ICC-profile will, in most cases, not help with the prevention of general print problems.

Other settings (Driver options, primary ink restrictions, linearization etc.) also make part of the media profile (Not the ICC-profile) and are very important when it comes to achieving a consistent good print quality free from print problems caused by excessive ink use, wrong dot size and wrong resolution.

The figure underneath shows what is inside a good media (device) profile:



1.1.1 Driver options:

In the software, which is piloting the printer, several print settings can be adjusted. These settings are printer/driver dependent and will define the print speed, heating and print quality. Underneath, some driver options are listed:Print resolution:

This is the number of dots (ink drops) within a unit of distance on the material. (The industry standard is dots per inch). In most cases, there is a vertical and horizontal resolution.

Horizontal resolution: Defined by the resolution of the print head.

Vertical resolution: Defined by the resolution of the print head and (vertical) media feed.

1.1.1.1 Print passes

Usually, the image is not printed in one print pass. This means the print head will not create the image by passing once. In practice, even on the most recent printers, the print head will fire ink drops multiple

(6,8,4,12...) times on the same area to create the image. This print method helps to prevent print problems and hides the defaults of the print head.

1.1.1.2 Bidirectional printing

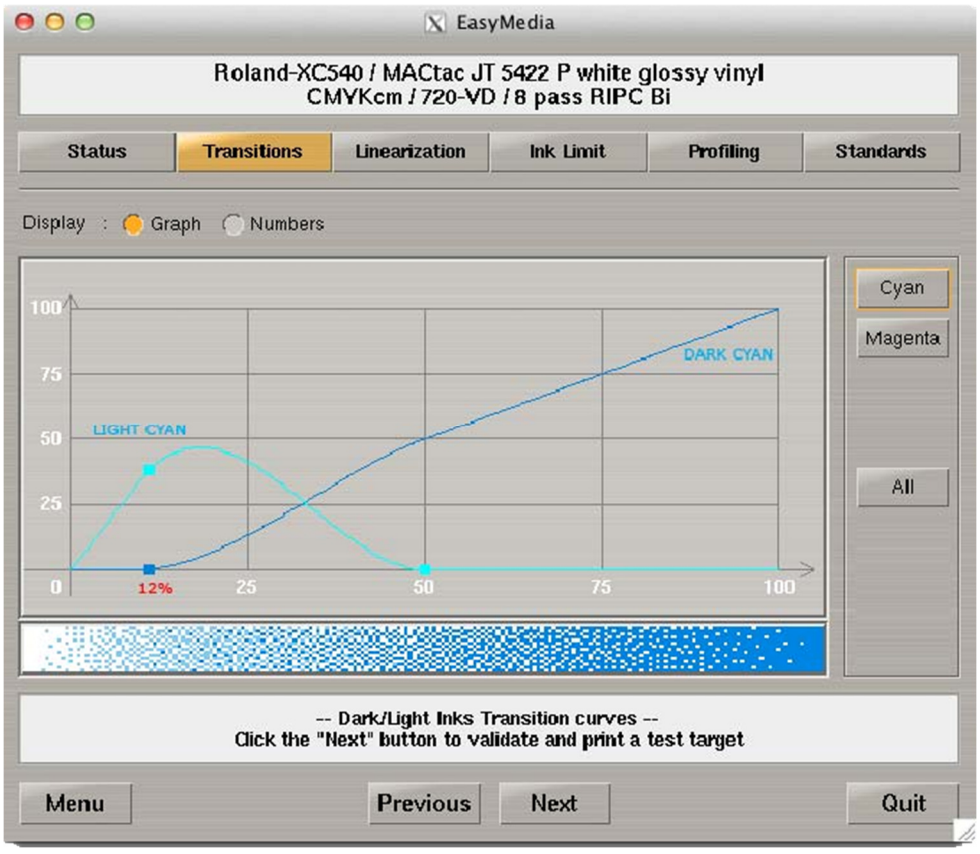
When a printer is printing bidirectional, the print head fires ink when it is moving from left to right and form right to left. This means the printer will print faster but will be less accurate. When a printer is printing unidirectional, the print head only fires when it's moving in one direction. This means the print speed is reduced with +-50%. (This depends on the speed of the carriage during the 2 movements). This setting doesn't influence the ink usage.

1.1.1.3 Ink configuration

Besides CMYK, light colours (light cyan, light magenta, light black...) are often used to improve the print quality. This is only interesting when a low resolution is used. When light inks are used, the ink usage increases dramatically.

1.1.2 Transitions

When light inks are used, the transitions will determine how much and when they are used. This can be done using numbers and figures, but most of the time it is visualized by a mathematical curve.



According to the cyan and light cyan curve above, when a gradient from 0% to 100% is printed:

- From 0 to ± 12%, only the light cyan is used.
- rom ± 12% up to 50%, light cyan and dark cyan are mixed.
- From 50% to 100%, only dark cyan is used.

1.1.3 Primary ink restrictions

According to the resolution and print passes, the printer can fire a certain amount of ink from 0% to 100%. It is strongly advised to limit at a certain percentage to prevent several print errors due to an excessive ink usage.

1.1.4 Linearization

The linearization curves are compensation curves and make sure that the printer has a linear output.

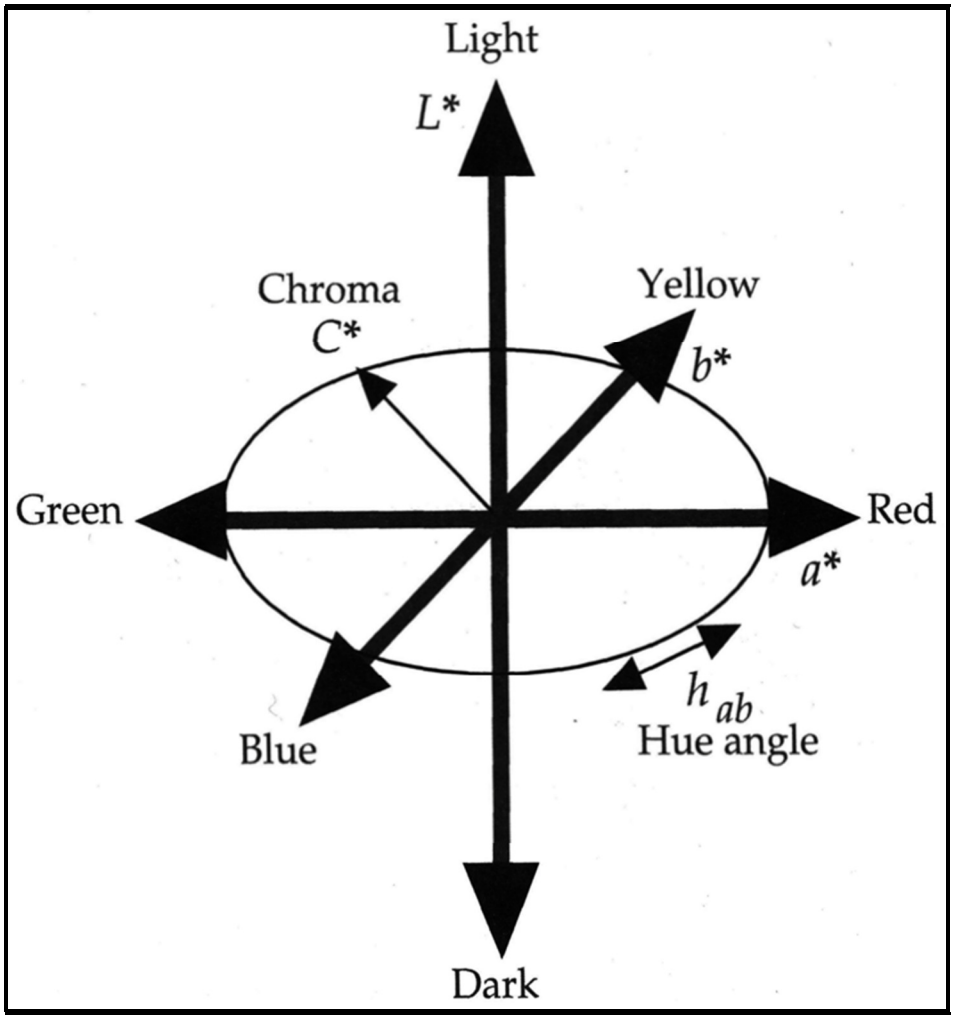
1.1.5 ICC-Profile

A Colour Profile is a way of describing how a particular system displays colour. Arguably, every individual device requires a colour profile in order to display colour accurately. The profile is some sort of look up table that links a subjective value like “red” with an objective value from the LAB- color space which is the one and only objective standard.

Example:

100% red, 0% green, 0% blue on a camera/laptop/iPhone converted with the sRGB colour profile results in a Lab-value of: L:54 a:81 b:70

This Lab-value is 100% objective and can be used to convert to another colour profile. This is how multiple systems can communicate with each other when it comes down to colour.



1 - The 3-dimensional Lab-Color space.

Device Independent Profiles

These well-known device independent profiles, basically speaking, are just different ways of describing how to convert CIE colours into RGB and CMYK values.

Examples:

- Device independent profile often used in photography and on the internet: sRGB Profile
- Device independent profile often used in the print industry: Fogra 27 CMYK Profile

Device Dependent Profiles

These profiles hold certain values linked to a certain device. A profile created on a large format inkjet printer, will be device dependent, but in most cases also media dependent, print mode and ink dependent.

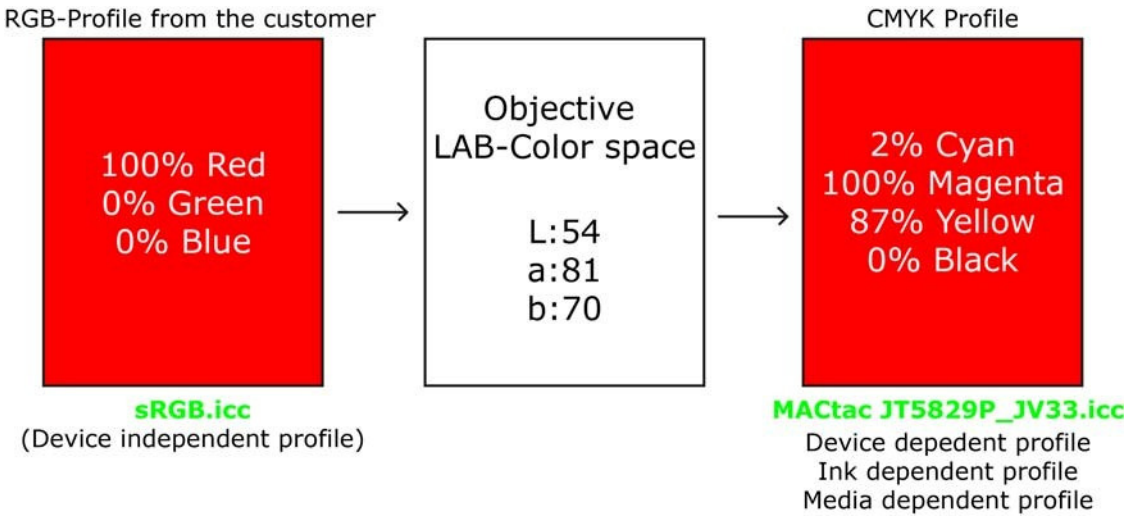
Conclusion for the large format industry:

Companies who have a large format inkjet printer will need colour profiles to reproduce the colours their customers desire.

Example:

- A customer creates a logo in Adobe Photoshop which is 100% red and creates a PDF-file.
- He sends the PDF-file to his convertor and asks him to print the logo on a piece of Mactac self-adhesive PVC film. (The customer wants to apply the logo on his minivan for example).
- The print operator opens the PDF–file in their RIP-software and prints the file using the JT5829P
- profile on a Mimaki JV33 printer.

This is what happens:



In a perfect world:

- The RIP-software recognizes the used input-profile and converts the “red” colour from the customer to the LAB-color space. Then the software uses the objective LAB-value to convert it to the printer’s CMYK value using the “Mactac JT5829P_JV33.icc” profile.

- The printer will use 2% of its cyan ink, 100% of its magenta and 87% of its yellow to simulate the red of the customer. (As accurate as possible of course.)

1.2 EXTENSION MEDIA PROFILES

A media profile is not universal. It is 100% RIP-dependent. That means a media profile created in one type of software will not work with another software. The extension also differs from one software to another:

Some examples:

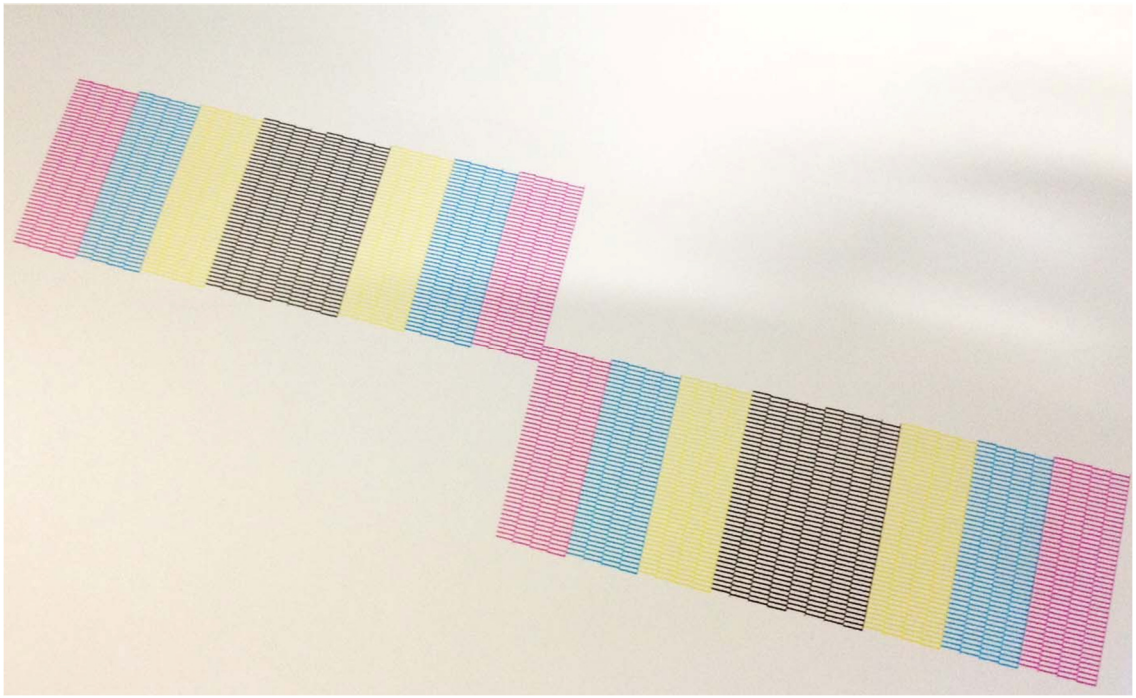
- Roland Versaworks: .RML (Roland media library) Onyx: .OML (Onyx Media library)
- Caldera: .calpatch
- Mimaki Rasterlink: .ICC (But be aware! There is much more in this file than just the ICC-profile!)

2 POSSIBLE PRINT PROBLEMS

2.1 BANDING

2.1.1 What is banding?

Banding issues, commonly called pass banding, can be a significant problem in wide format printing. Banding is a striping effect usually seen across the width of the media. Identifying the cause of banding and resolving the issue can be a time consuming process because of the various reasons for banding.
Before trying to pinpoint causes of banding issues, eliminate the most obvious cause first. If the print head is missing nozzles, (confirmed by performing a nozzle check or nozzle test from your printer panel) or the print heads are out of alignment, you will likely see banding. Having nozzles out will appear as either a white line or a line of colour that is incorrect (due to ink colours not mixing correctly). Nozzle tests should be completed daily (first thing in the morning) or after the printer has been sitting for a period of time. Head alignment should be verified often as well. All printers have test prints that aid in nozzle check and head alignment and can be performed from the printer panel. See your printer manual or contact your printer manufacturer for additional instructions on nozzle checks and head alignment.



2 - Test print (nozzle test) on Mimaki JV300.

2.1.2 Different causes of banding

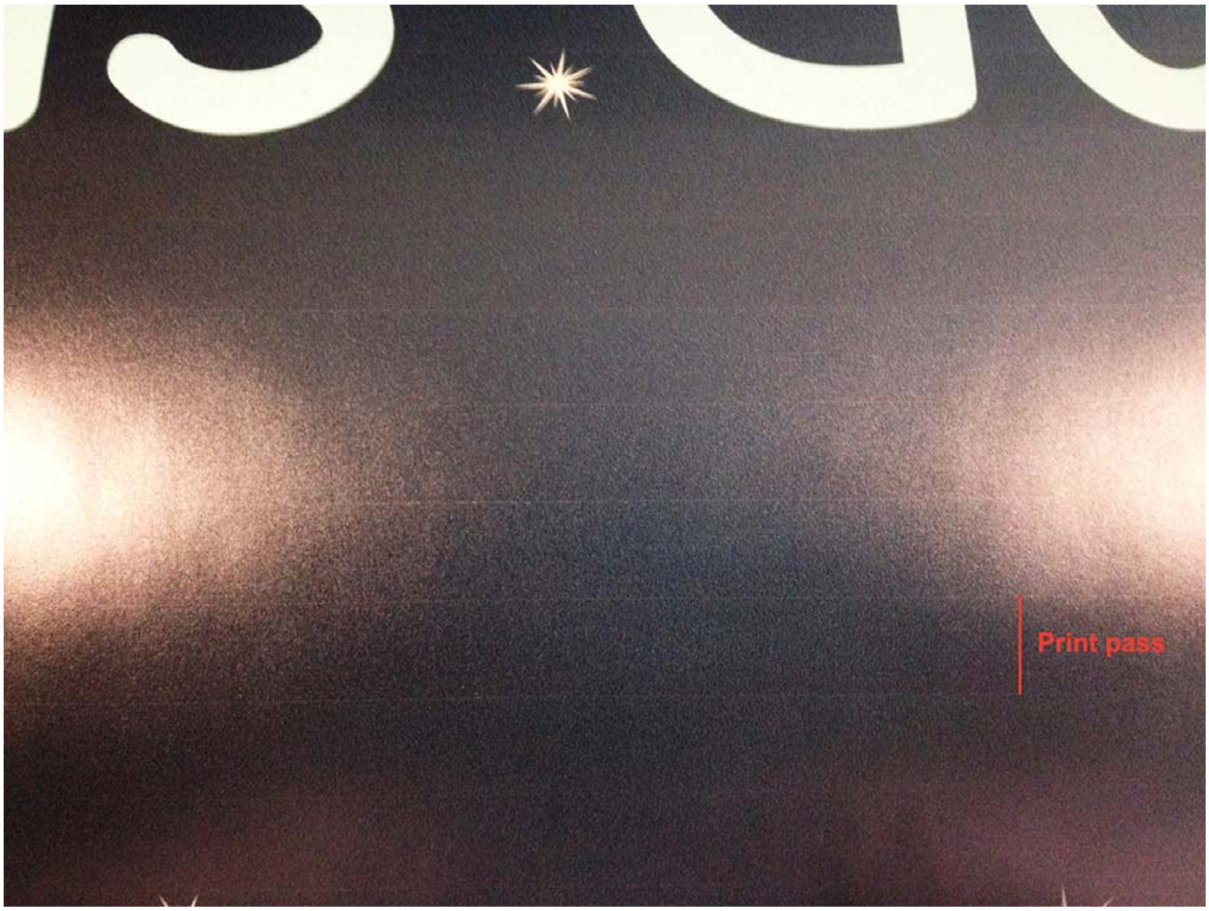
Once the print heads seem 100% correct and perfectly aligned, the printed result must be perfect as well. However, in many cases banding still appears:

2.1.2.1 Horizontal "Banding" caused by the advancement of the media:

Media adjustment, also known as media correction, correction factor, feed compensation, and others, is the ability of the software and/or the printer to compensate the advancement of the media in a positive (forward) or negative (backward) way. If the media advances too slowly in the printer, the print passes are not printed exactly next to each other but on top of each other instead. **This phenomenon exists on solvent printers, UV printers and latex printers.**

The media advances too slowly: A black hairline between the print passes can be noticed. Solution: Increase the correction factor to increase the media advancement in the printer.

The media advances too fast: A white hairline between the print passes can be noticed. Solution: Decrease the correction factor to slow down the media in the printer.



Example Mimaki JV33/CJV:
Function / Type / Type “x” / Media advancement
This setting will allow the user to set up the media advancement before printing. It is a general setting. During printing, when the machine is in Remote mode, the operator can adjust and pinpoint the media advancement by using the “Function” button.

Example Roland:
Menu / Calibration

The advancement of the media is important and can often be adjusted in the software (RIP) as well. This depends on the software and printer driver.

When the media is not properly loaded, the dark or white lines will only be noticed on the left or right media border.

2.1.2.2 Horizontal dot gain “Banding”

Dot gain banding occurs on **solvent printers** and is caused by the solvent not evaporating quickly enough, causing the pigment to “spread”. The leading edge of the current printing pass can bleed 1-3 mm causing an uneven, fuzzy edge that will bleed into the preceding pass causing the banding issue.

Less solvent in the ink, means more dot gain banding.

Directly related to dot gain banding:

- A bad media profile. (Excessive ink use)
- Temperatures that are set too low.
- A dry time between the print passes that is too short. Often caused by a scan width that is too small.
- A print speed that’s just too high for the media that’s used.

TEMPERATURE<<<>>>PRINT SPEED<<<>>>INK USAGE

Media Profile & Ink usage
A good media profile will optimize the ink usage to minimize the dot gain banding. (This is done in the transitions, primary ink restrictions, linearization, total ink restriction and ICC-profile settings.) A good media profile can use up to 50% less ink in comparison to a bad media profile. In many cases, this means the print speed can be doubled.

Temperatures on a small solvent printer with 3 heating zones

A good temperature to print self-adhesive film is situated around 38°C, 36°C, and 45°C. But this is something which needs to be verified by the operator because there are many exceptions and variables.

- If the print speed increases, the heating needs to be increased because the media is moving faster over the heater platen.

- If the media has a thick backing paper, the heating needs to be increased because the PVC needs to heat up as much as the paper.

- As the printer gets older, the heating often needs to be increased in the software or firmware.

- If the media curls on the printer platen, the heating is set too hot or the humidity in the print room is not stable enough.

- It is not a bad idea to heat 2°C more on the pre-heating, this will prevent a temperature shock underneath the print head. This will help to prevent head strikes as well.

- Be careful with air conditioning systems, they often cause a temperature shock on the media. An air conditioning may never be installed on the wall in front of the printer.

The Scan width

The scan width determines the movement of the print head during printing. Usually 3 options are available:

- Scan width= printer width
  The print head moves to the end of the printer at each movement. No matter which type of image is printed.

- Scan width=media width
  The print head moves to the end of the media at each movement. No matter which type of image is printed. When a small media width is used (<=100cm), the dry time between the print passes might be too low. This will cause dot gain banding.

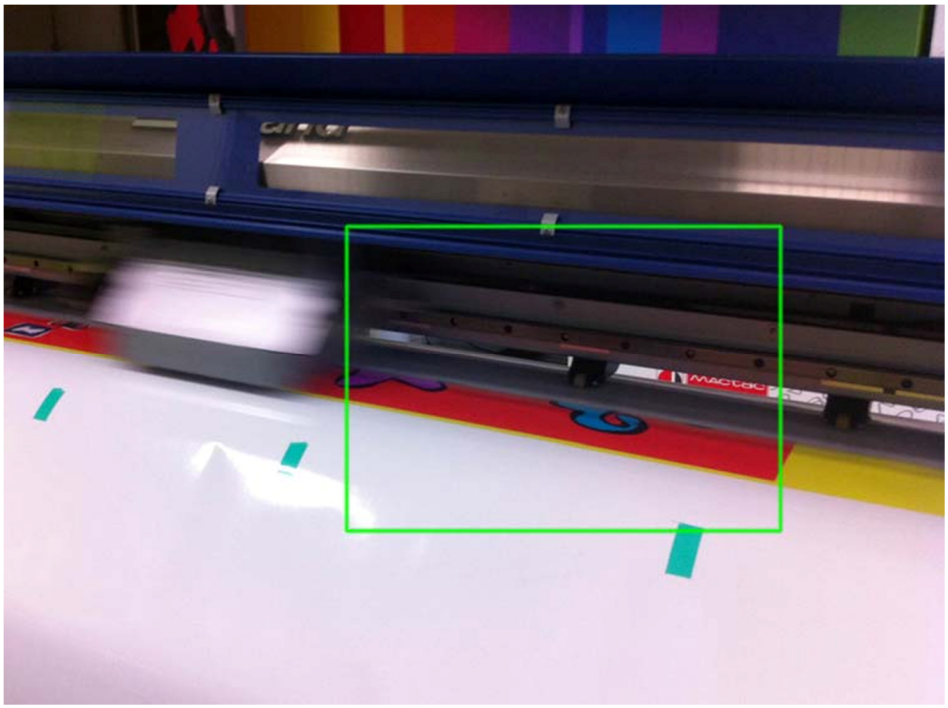
- Scan width=image width
  The print head moves to the end of the image at each movement. When a part of the image is quite small (<=100cm), the dry time between the print passes might be too low. This will cause dot gain banding.

When the movement is not regular, colour shifts are possible because of different drying times.

2.1.2.3 Vertical "Banding"

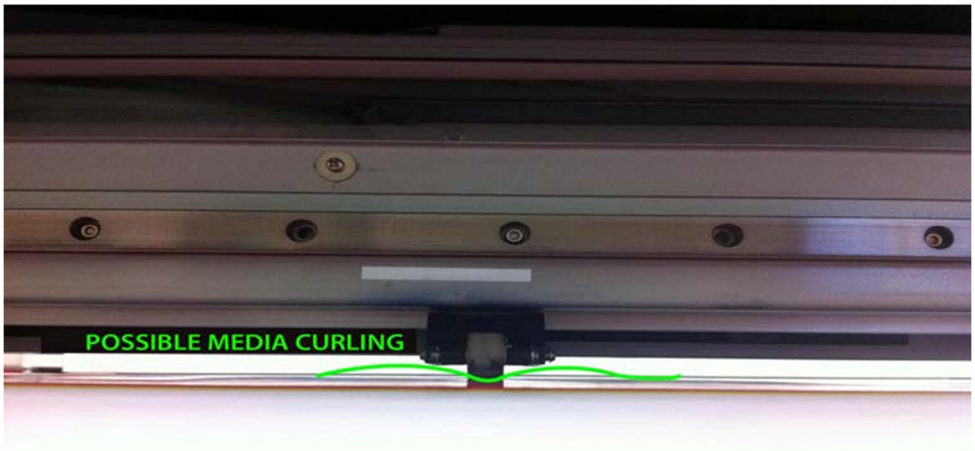
Vertical Banding due to media lifting

Vertical banding occurs on **solvent printers, UV printers and latex printers**. Vertical banding can occur when the heaters are set too high. This causes the media to "ripple" next to the pinch rollers. (This often happens on print & cut systems)



3 - Roland XC-540 Eco-Solvent printer

A closer look: Next to the pinch roller the media might curl during printing because of a high platen temperature in combination with the pressure of the pinch roller. A vertical colour shift will be visible in the print. (Especially in solid colours.)

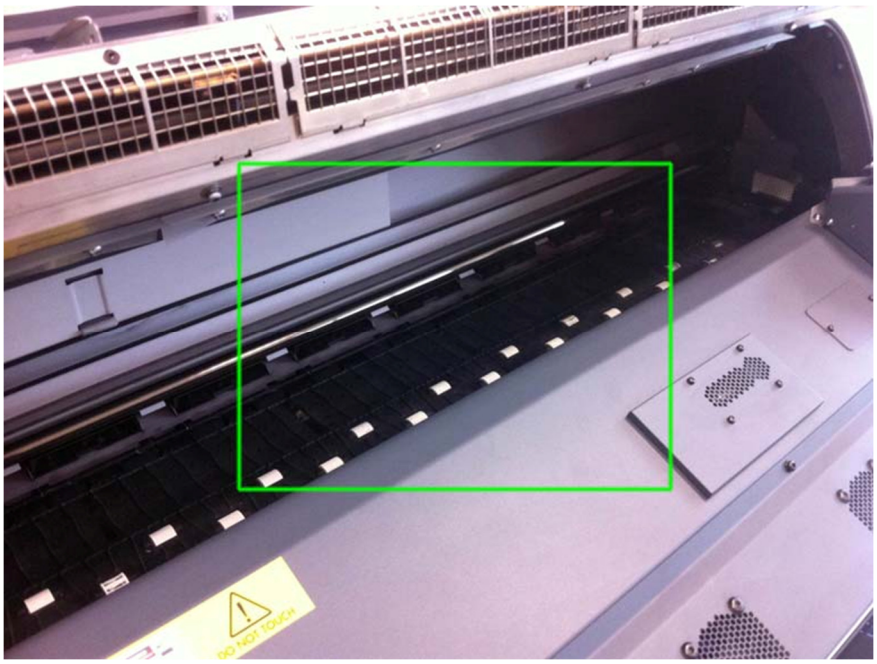


Possible solutions:

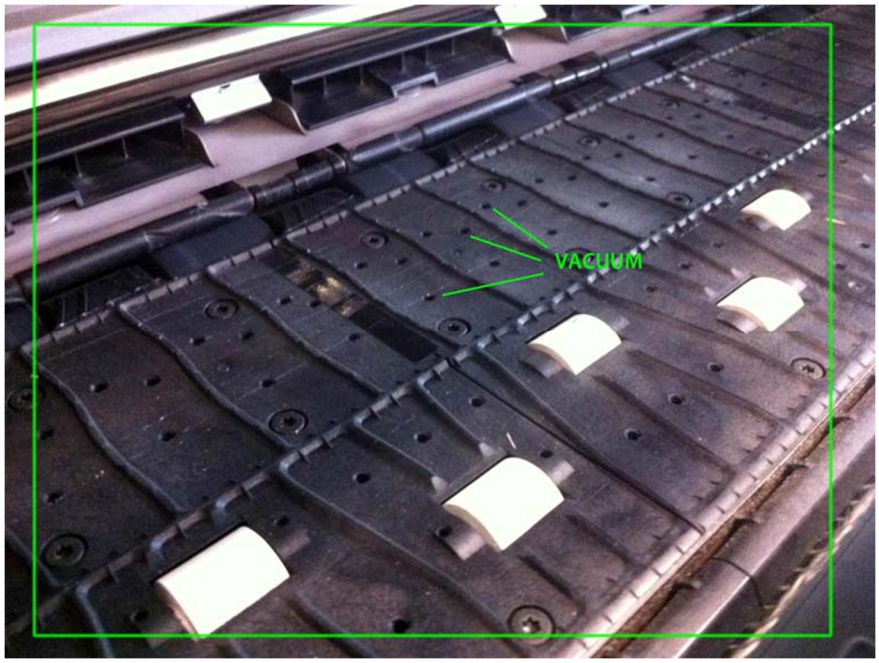
- *Print unidirectional instead of bidirectional*
- *Increase the Vacuum*
- *Remove the pinch rollers in the middle of the media. Be aware that the printer will print less precise with fewer pinch rollers because the media advancement will be affected*

Vertical banding due to a strong vacuum

On certain printers, vertical banding can also occur because the vacuum is set too high. In that case the ripples of the print platen will be visible in the print. See images underneath.



4 - The print platen of a HP 25500 latex printer



5 - A closer look to the print platen of a HP 25500 latex printer

When the vacuum is set too high, the “wave forms” of the print platen will be visible in the print.

2.1.2.4 Horizontal gloss "Banding"

Gloss banding, also known as the "soccer field effect", occurs on **UV-printers** when bidirectional printing is used. However, on new printer types, this problem is quite rare.

2.2 CURLING AND DEFORMATION

2.2.1 Curling on solvent printers

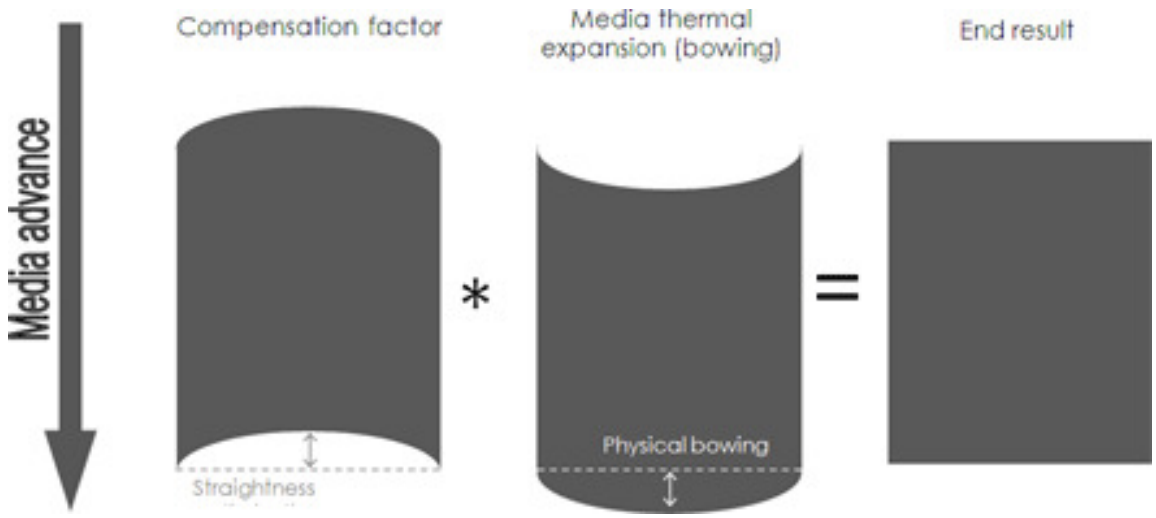
On solvent printers, self-adhesive film can curl on the print platen when the printer is heating up due to a temperature shock.

Possible solutions:
- Lower the print temperature if possible. (This may affect the print speed.) A low print temperature would be around 34°C/32°C/45°C.
- Use a self-adhesive film with a PE-coated backing paper. When a PE-coated liner is used instead of a Kraft liner, the humidity of the paper fluctuates less. This means the paper will curl less on the print platen. In certain countries, it can be interesting to use a PE-coated liner because of the remarkable differences in humidity and temperature during day and night.

2.2.2 Media deformation on low-volume latex printers

On some small latex printers, media deformation is possible. This deformation, also known as the "bowing-effect", is caused by the high curing temperature.

Possible solutions:
- Lower the curing temperature if possible. (This may affect the print speed). A low curing temperature would be around 90°C/95°C.
- Use a self-adhesive film with a PE-coated backing paper. When a PE-coated liner is used instead of a Kraft liner, the humidity of the paper fluctuates less. Substrates with a PE-coated liner are usually less sensitive to this deformation. Be careful however, when a PE-coated liner is used the maximum heating is 95°C.
- Use the "straightness optimization feature" in the menu of the printer to compensate the deformation. (For HP printers, this feature is available in the "Image quality maintenance" menu).



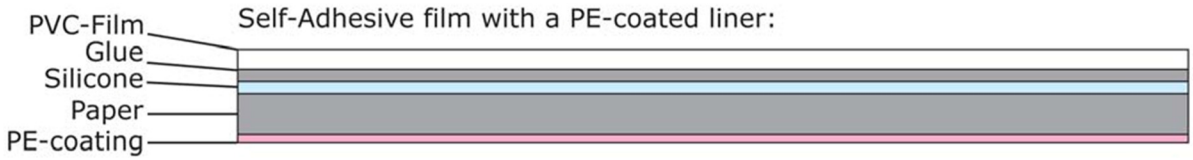
2.2.3 Media deformation on high-volume latex printers

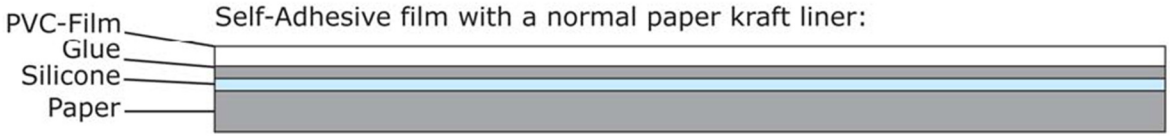
On some big latex printers, media deformation is possible. This deformation is caused by the high temperature in combination with the high tension on the substrate.

Possible solutions:
- Lower the curing temperature if possible. (This may affect the print speed.) A low curing temperature would be around 90°C/95°C.
- Use a self-adhesive film with a PE-coated backing paper. When a PE-coated liner is used instead of a Kraft liner, the humidity of the paper fluctuates less. Substrates with a PE-coated liner are usually less sensitive to this deformation. Be careful however, when a PE-coated liner is used the maximum heating is 95°C.
- Use a self-adhesive film which has a liner of at least 140g/sqm when a roll width larger than 54" is required.

2.2.4 PE-coated liner versus deformation & curling

As mentioned in the last 2 paragraphs, a PE-coated liner often offers a solution when there is too much curling & deformation of the media on the printer. The printability of a self-adhesive film with a PE-coated liner is in general slightly better than the printability of a film with a standard Kraft liner.





A PE-coated liner can't be used when the temperature on the printer exceeds 95°C/100°C. In that case, the Polyethylene (PE) will burn and create a strange structure on the back of the liner. However, this does not affect the PVC and its quality.

2.2.5 Media deformation on UV-printers

When the UV-radiation is not created by LEDs, some problems may occur. In the case of a regular UV bulb, infrared light will heat up the media during printing. If the media curls on the UV-printer, the power of the lamps needs to be decreased.

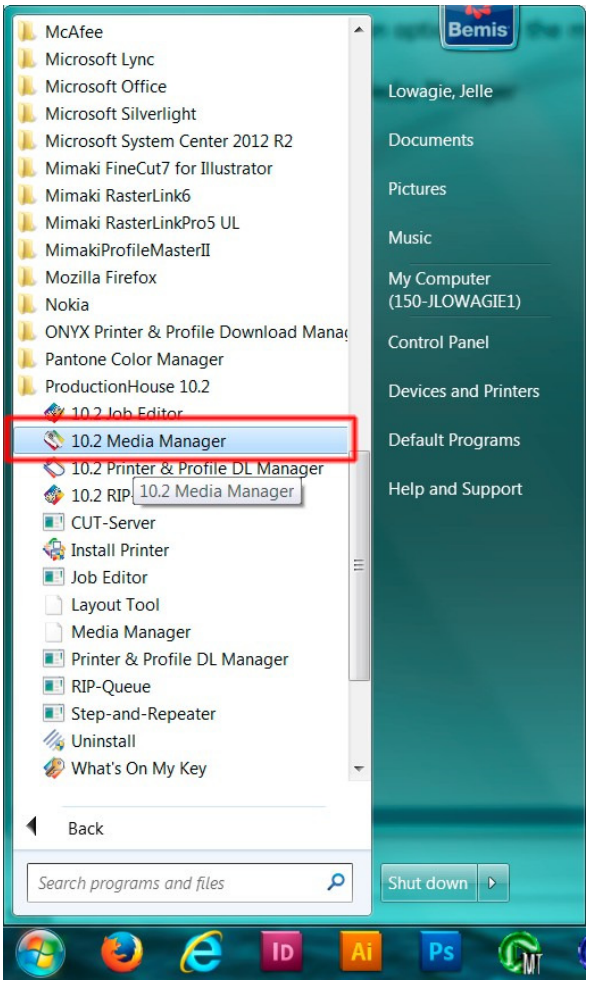
Note:
In all cases, it is important to minimize the use of UV-light during printing because it has a negative influence on the durability of the PVC.

3 HOW TO IMPORT MEDIA PROFILES?

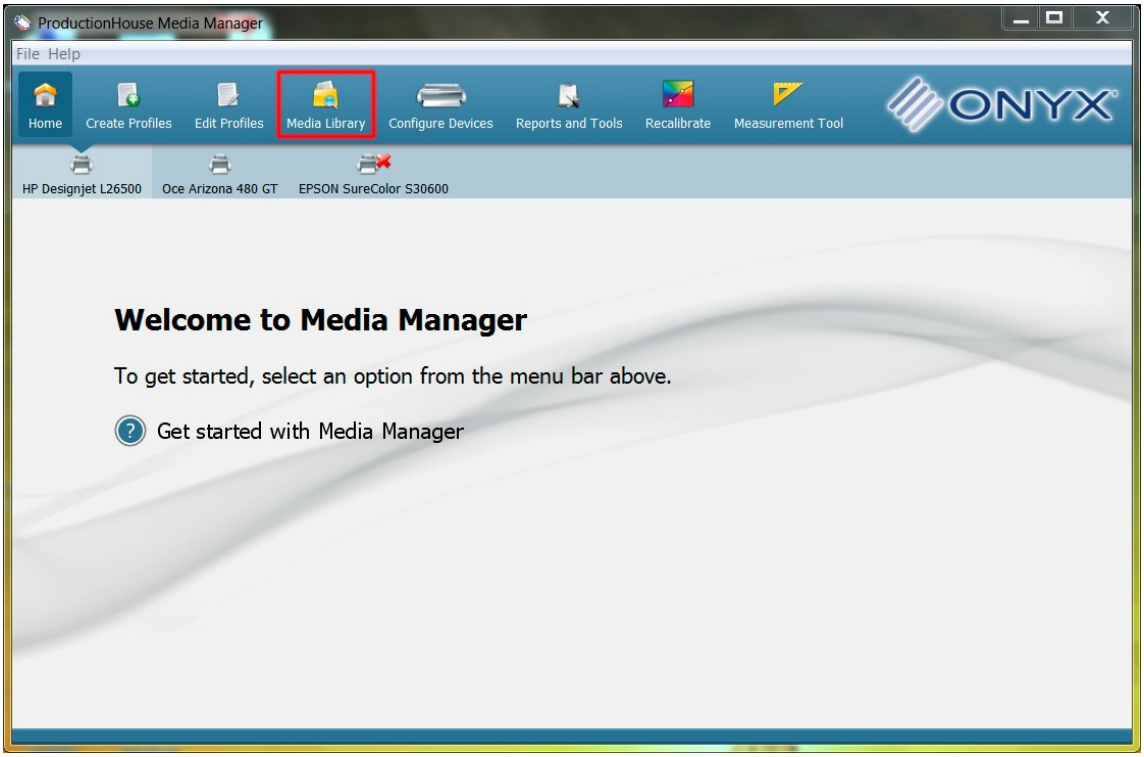
3.1 IMPORT MEDIA PROFILES IN ONYX

3.1.1 Onyx Productionhouse, Thrive, Postershop

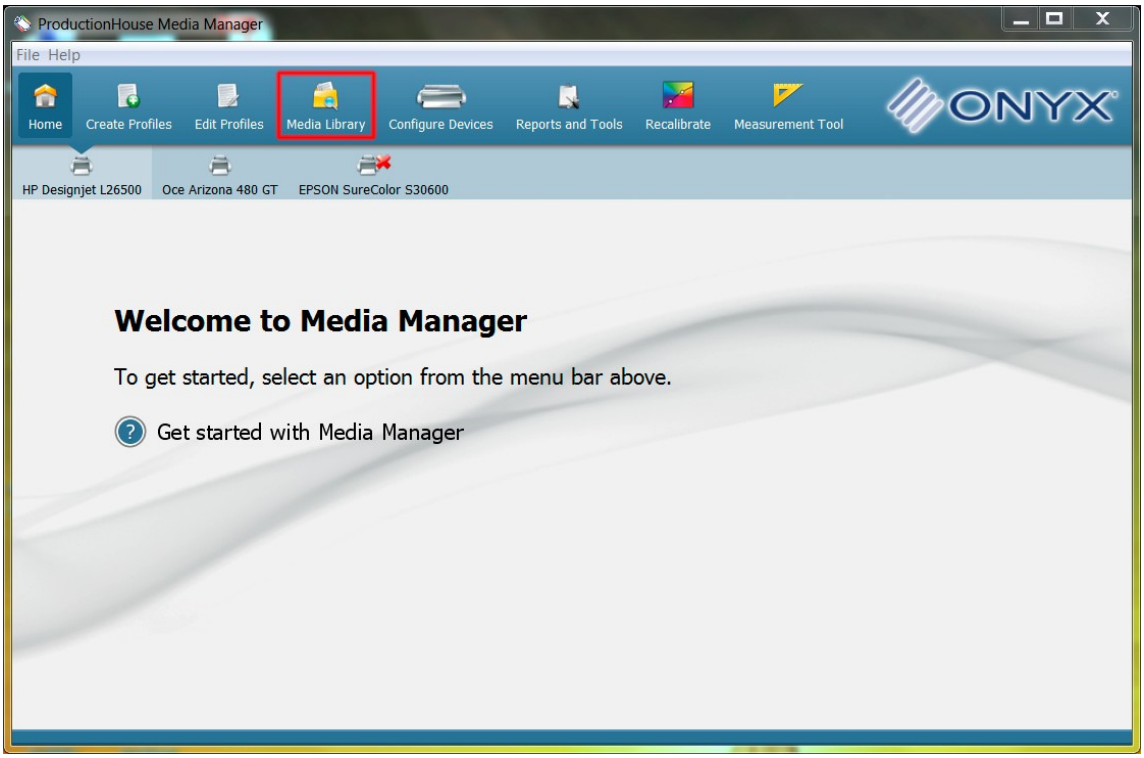
1. Open Onyx Media Manager



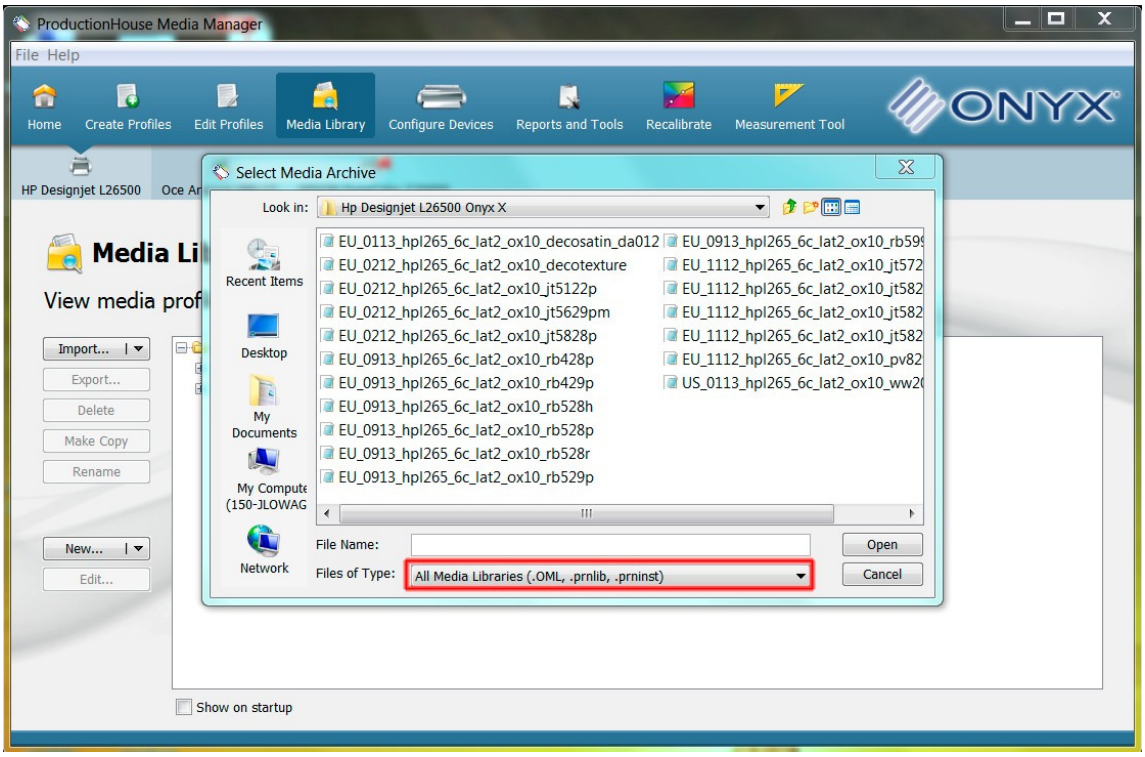
2. Open the media library



3. Select your printer type on the top of the page if you have multiple printers and click on “import”.



4. Select the .OML or .prnst file. Click on Import & OK.

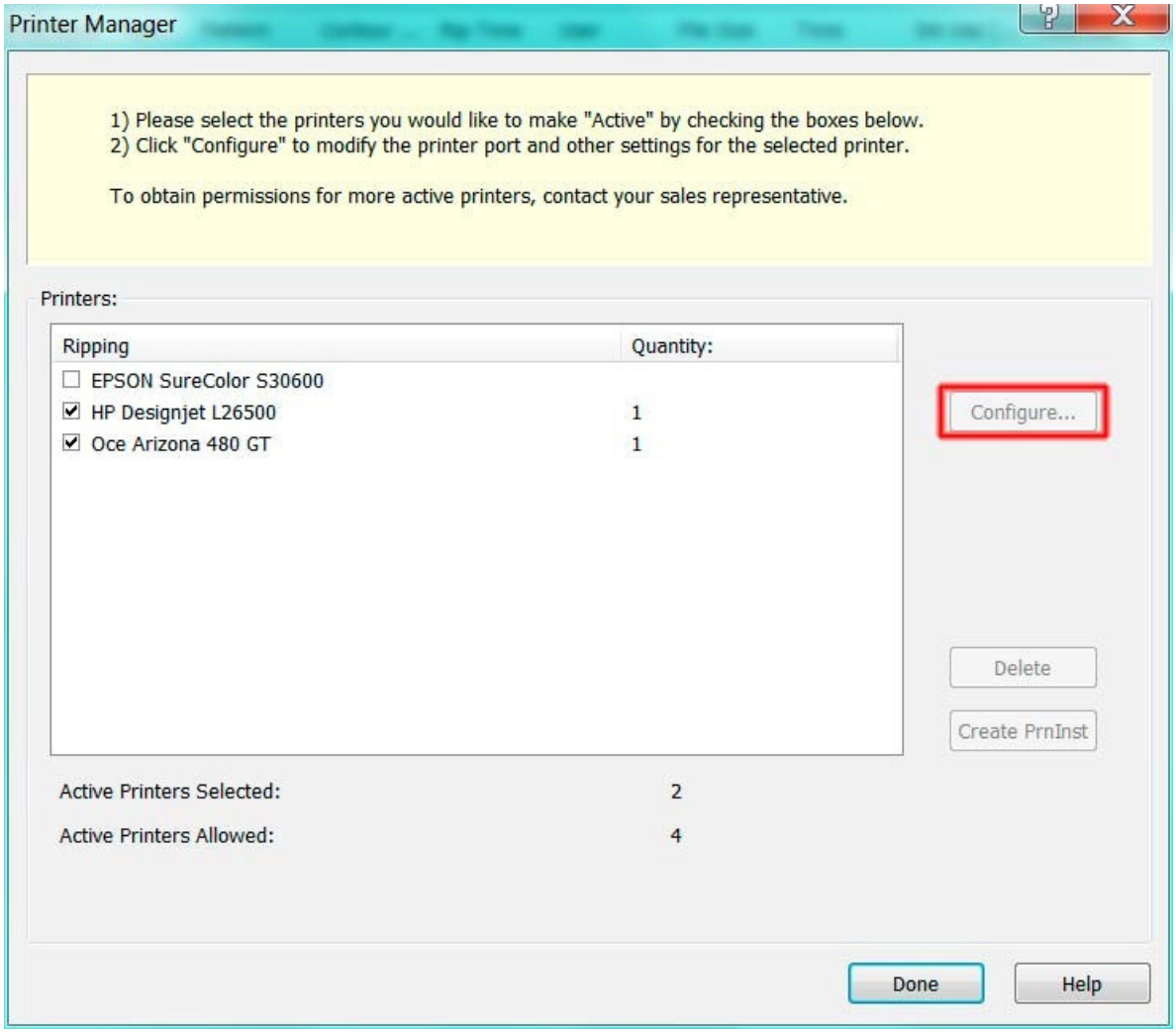


3.1.2 Onyx RIP Center

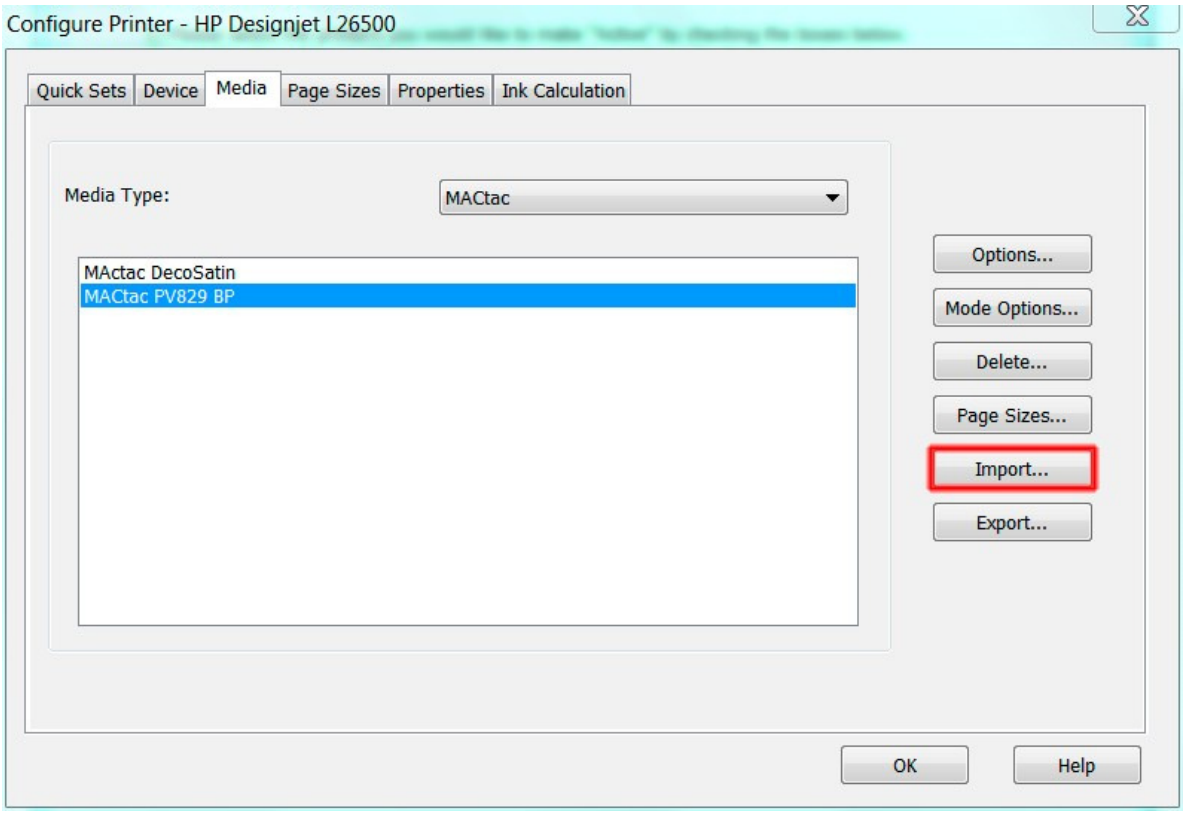
If you do not have Onyx Media Manager on your system, you must import the profiles in the RIP- queue.

1. In Onyx RIP-queue: Click on “Manage Printers”

2. Select your printer and click on “configure”

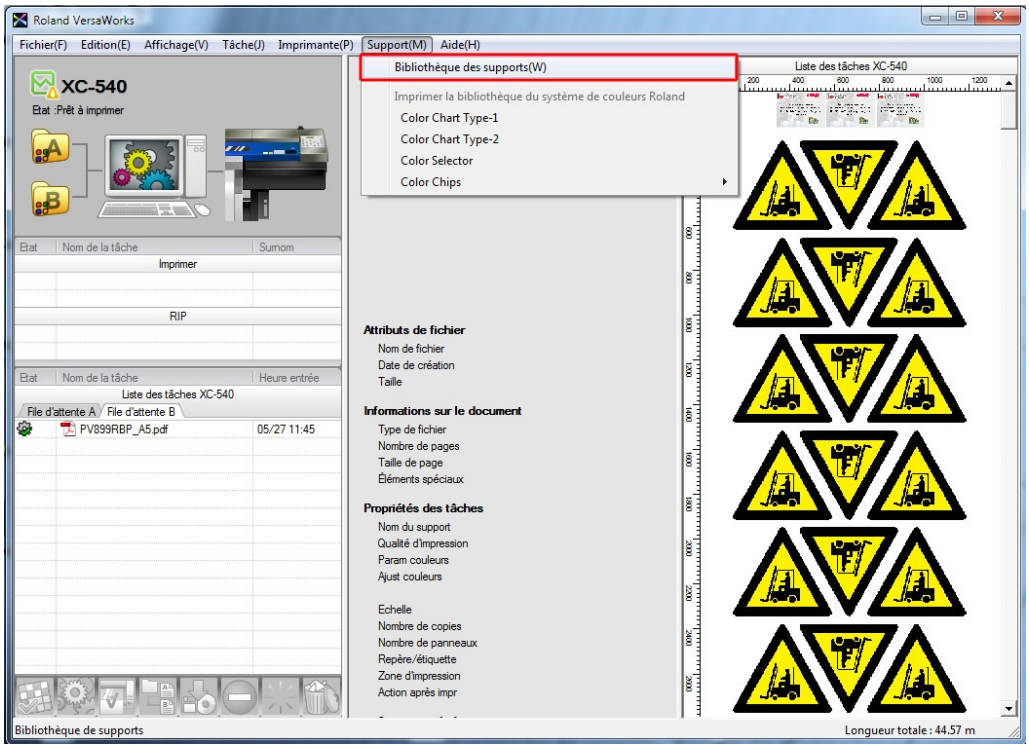


3. Go to the “Media” tab and click on import afterwards.

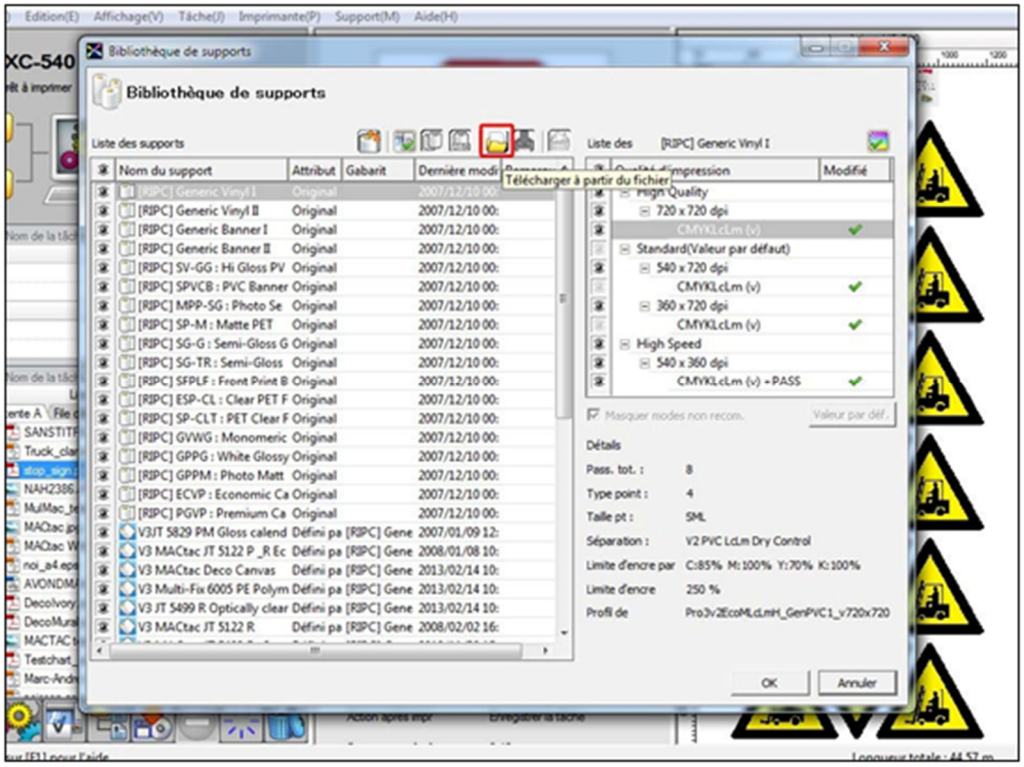


3.2 IMPORT MEDIA PROFILES IN ROLAND VERSAWORKS

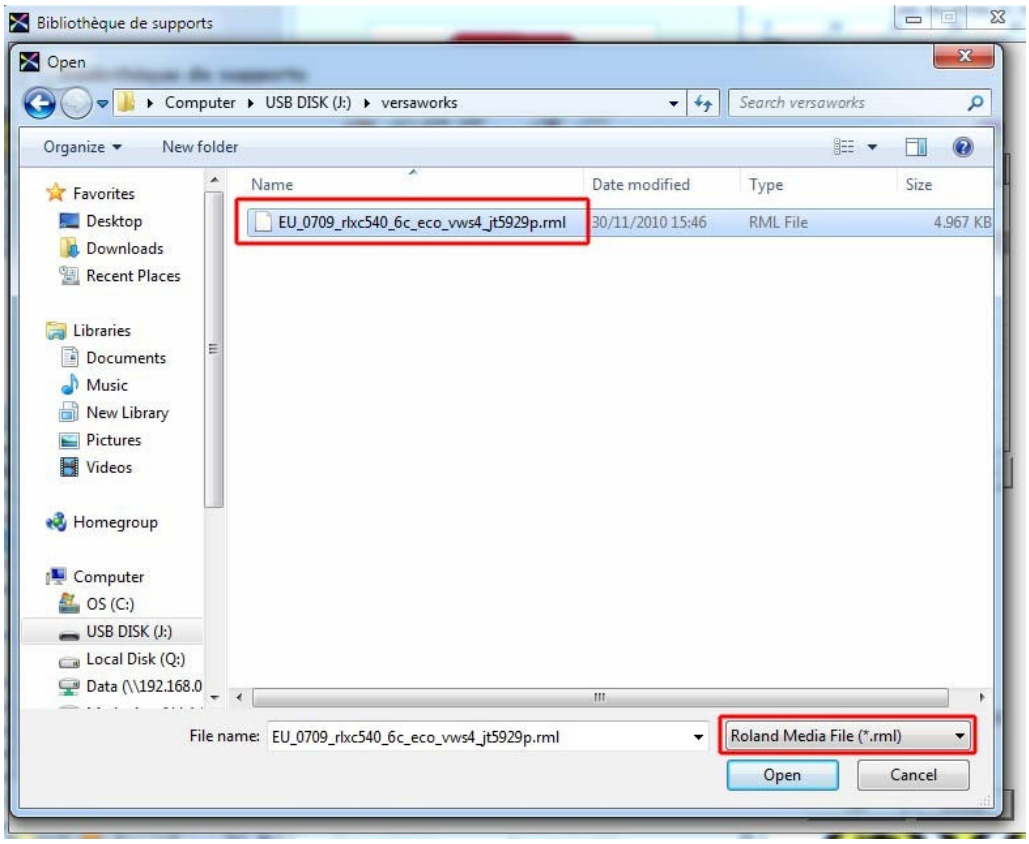
1. Open the Versaworks media manager. (Support: Media manager) In this case it is called “Bibliothèque des supports” because the software is set in French.



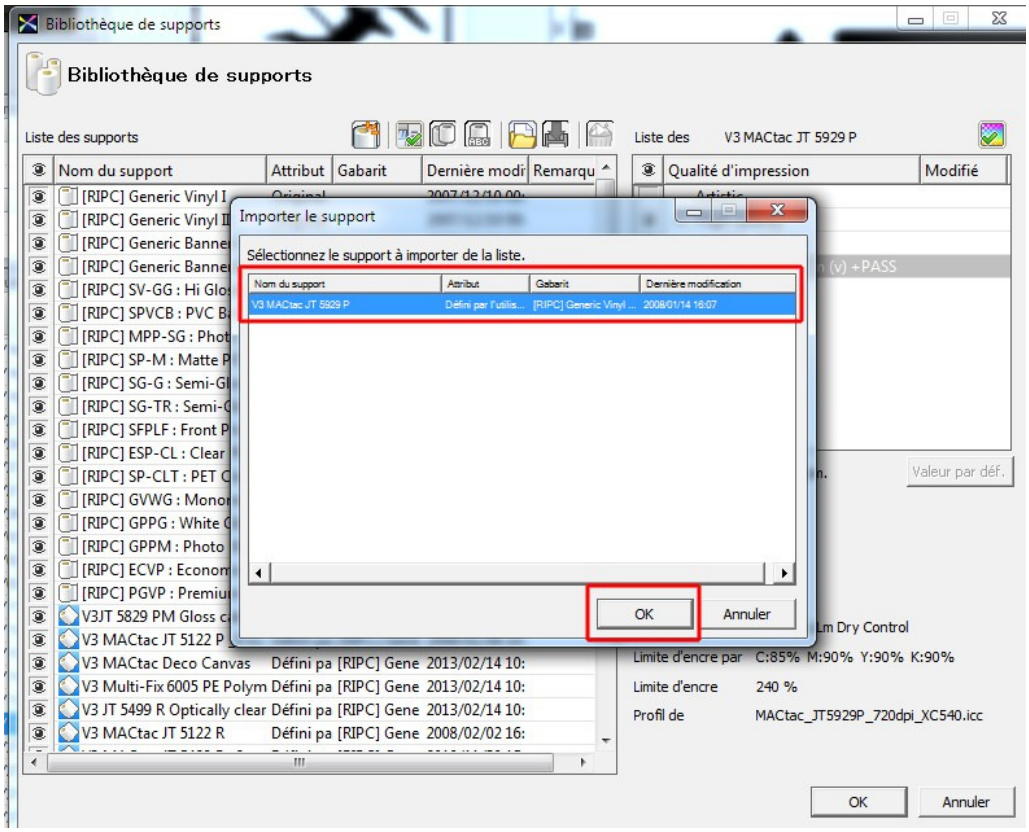
2. Click on the folder logo on top of the page to load a profile. (.RML-file)



3. Browse to the RML-file and click “open”.

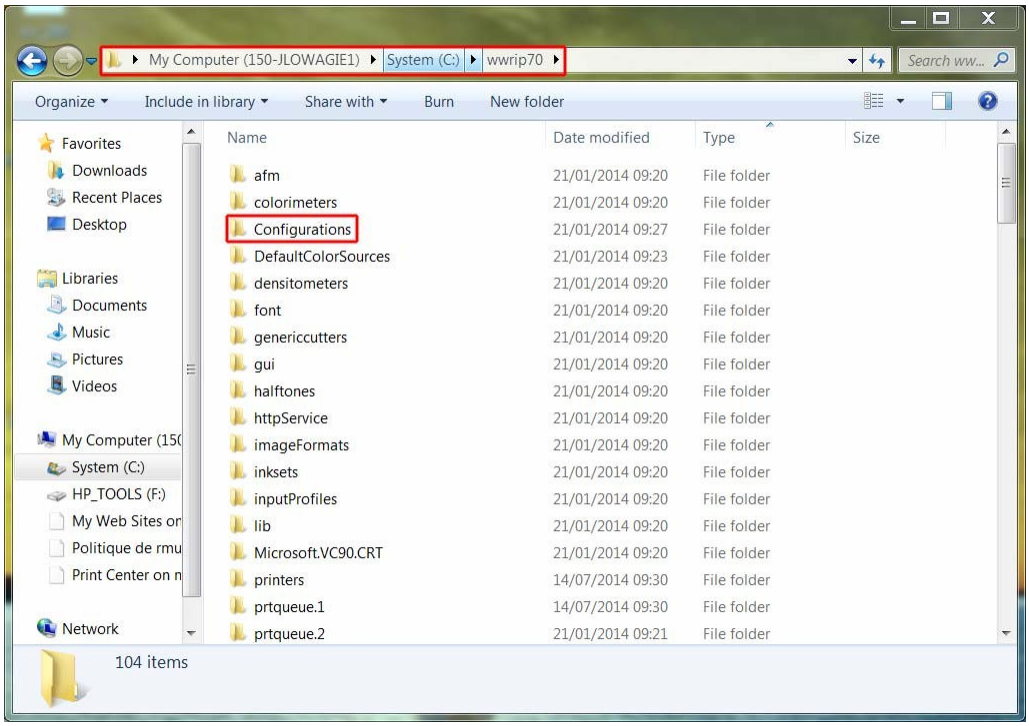


4. Select the media and click OK.

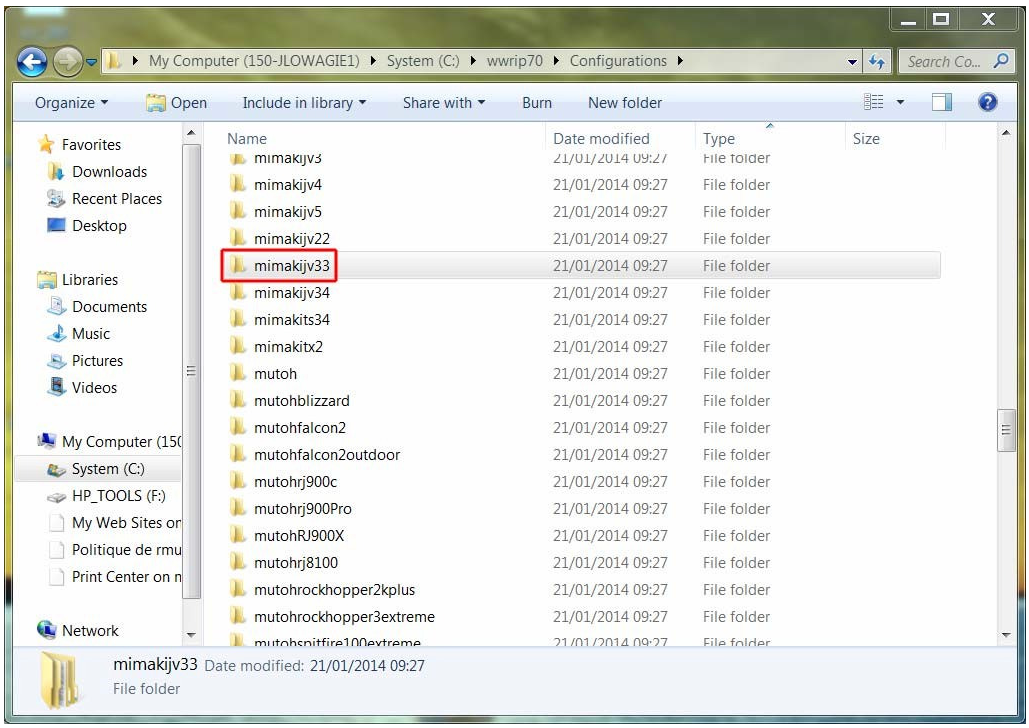


3.3 IMPORT MEDIA PROFILES IN WASATCH SOFTRIP

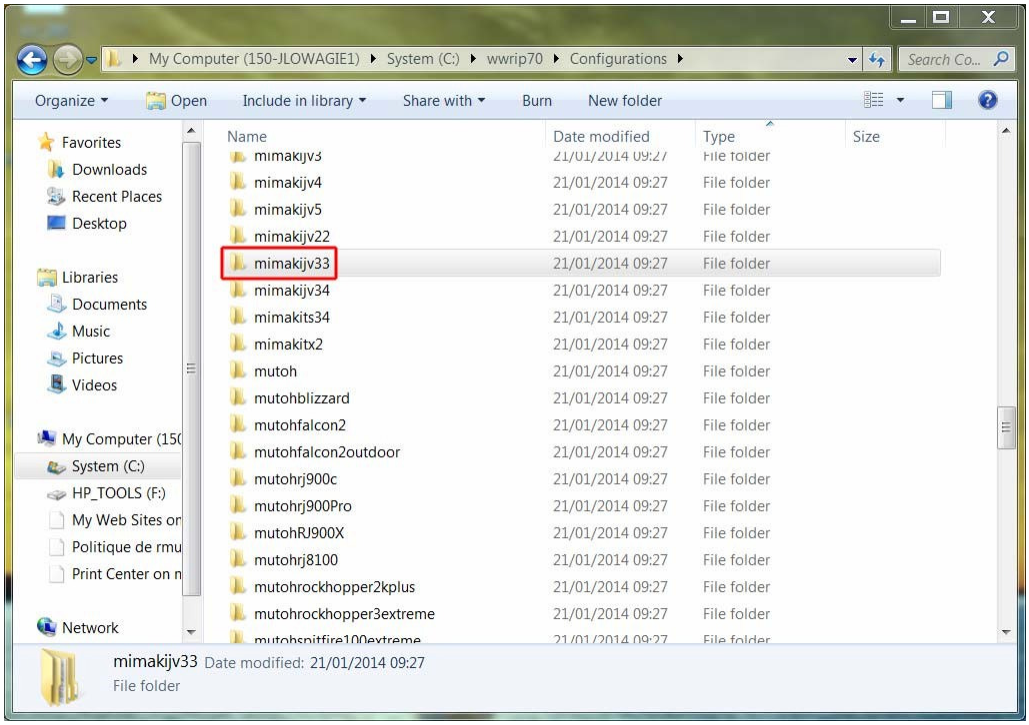
1. Close Wasatch and browse to the Wasatch folder on your computer. Open the “configurations” folder.



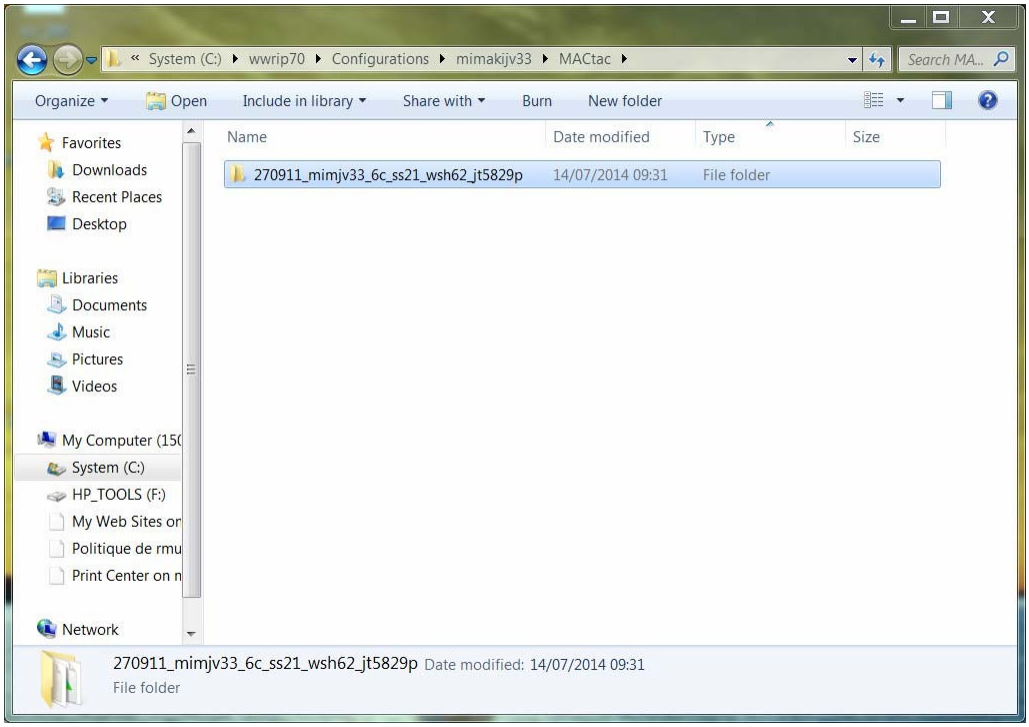
2. Select your printer type. In this case, it is a Mimaki JV33.



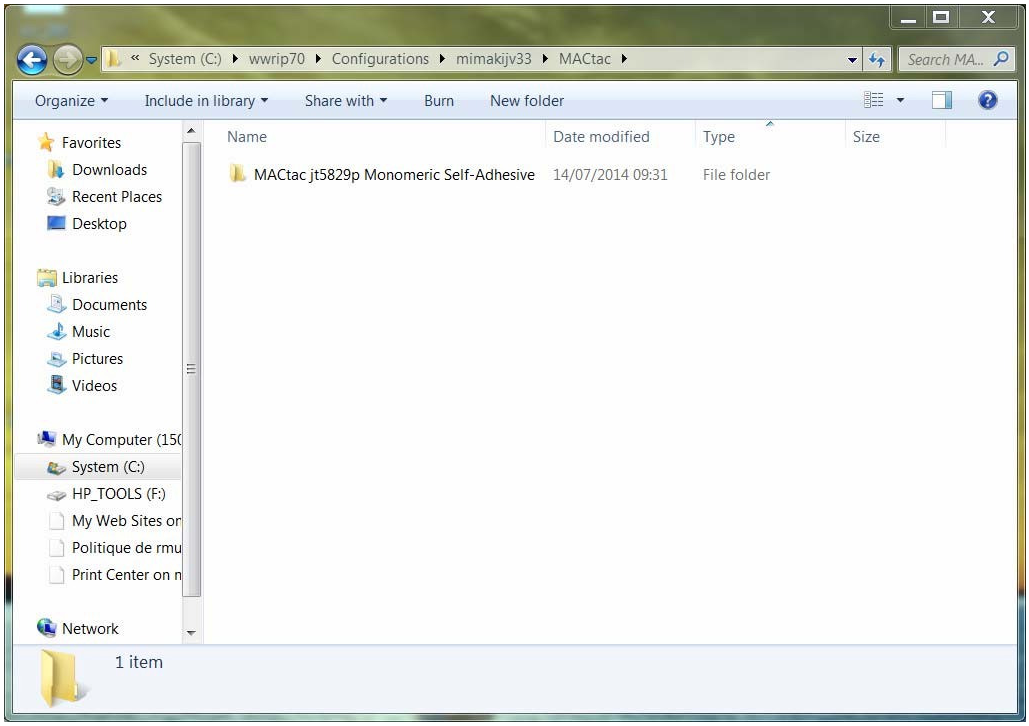
3. You might want to create a new folder now. This helps to keep everything well organized later on in Wasatch. In this example a “Mactac” folder has been created.



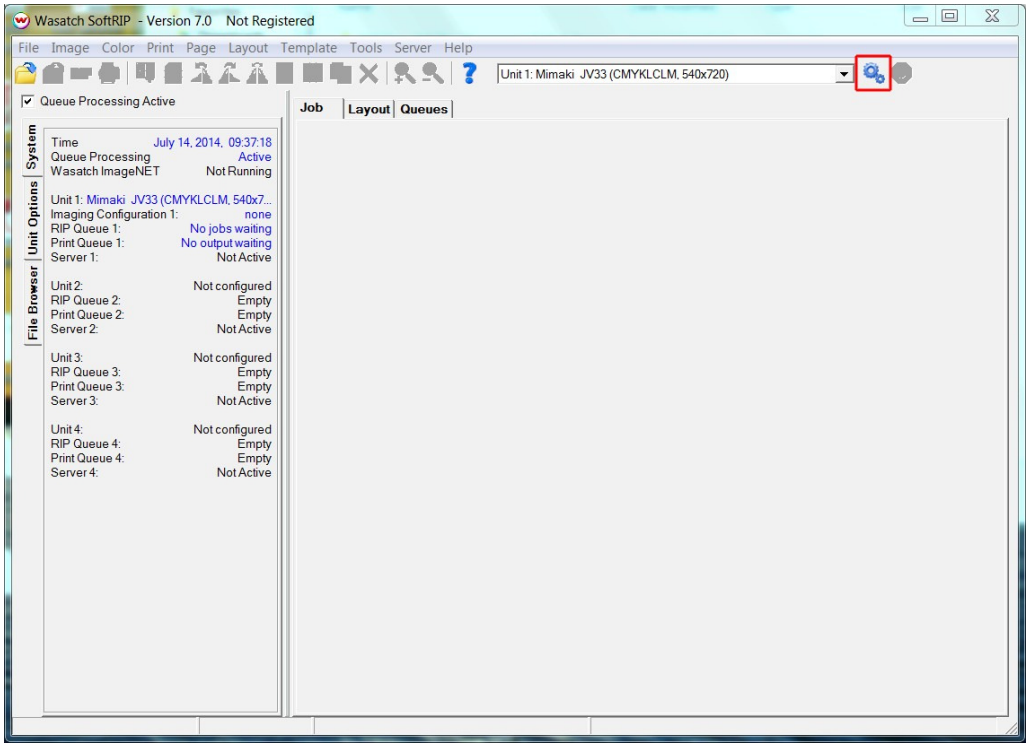
4. Extract the profile you want to import and copy the complete folder inside the folder you created.



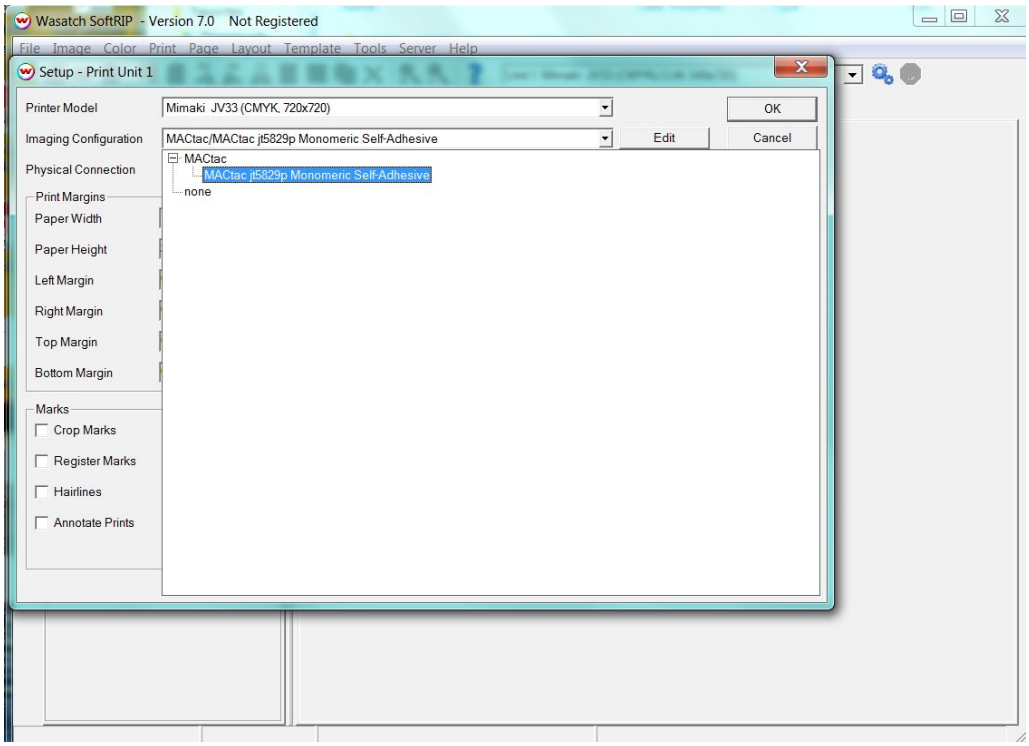
5. You can rename the folder (Media Profile) if you want. In this case, the folder has been renamed from “Media Profile” to “Mactac JT5829P Monomeric Self-Adhesive”.



6. Open Wasatch and click on the print setup button.



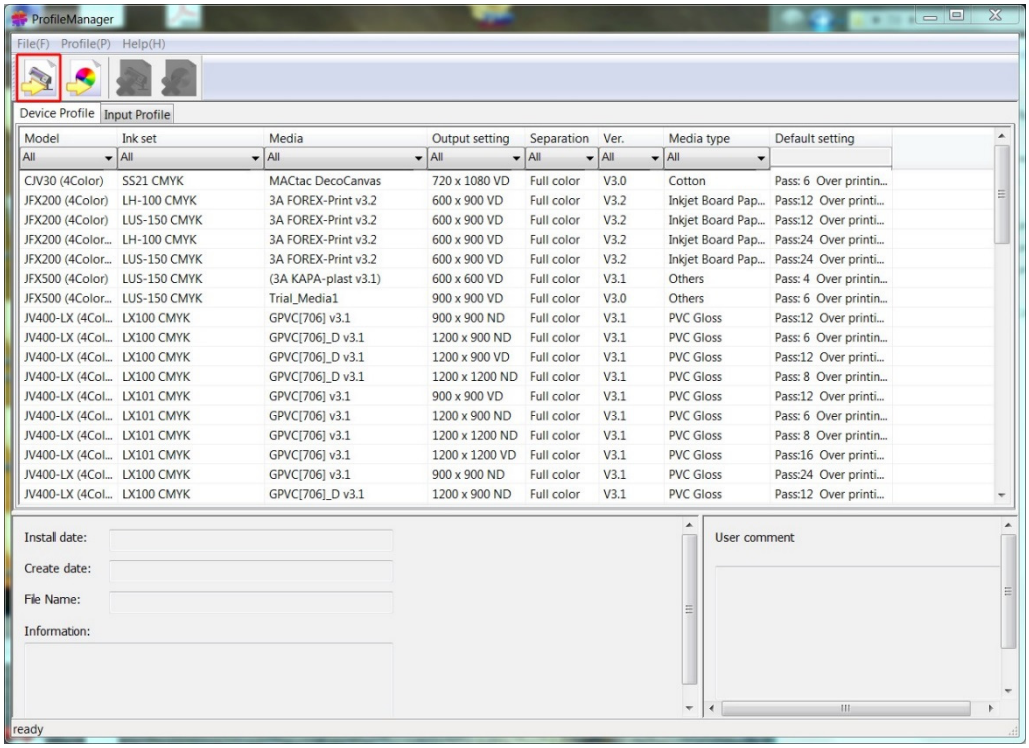
7. Select the image configuration you just installed in Windows.



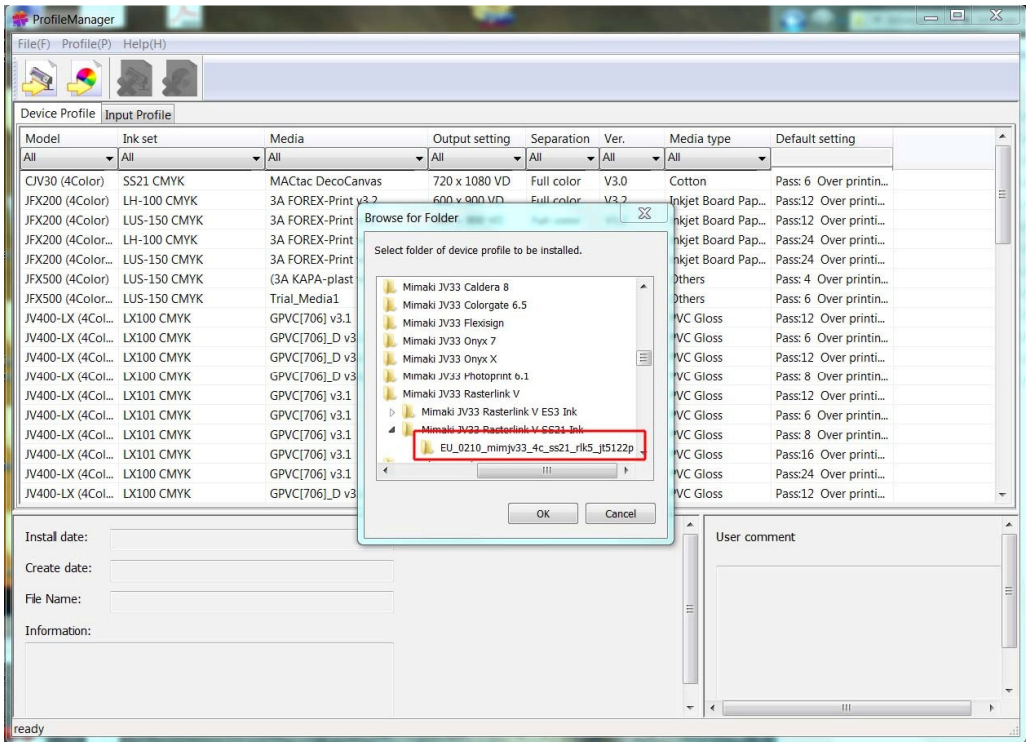
3.4 IMPORT MEDIA PROFILES IN MIMAKI RASTERLINK

1. Close Mimaki Rasterlink and open Mimaki Profile Manager

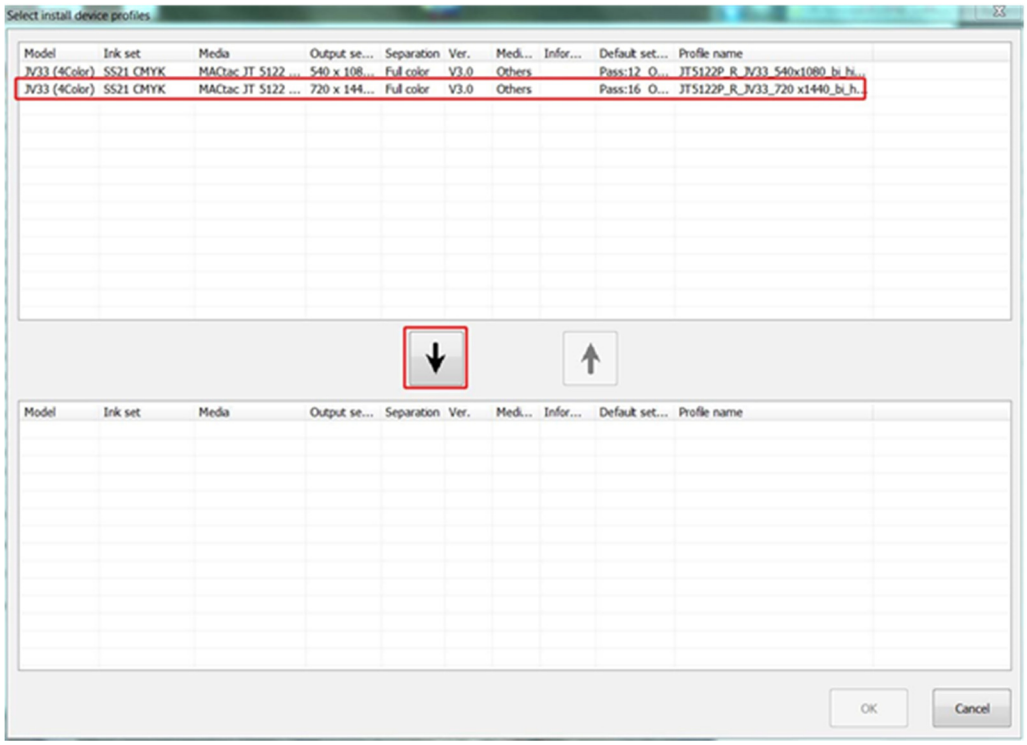
2. Click on the logo in the upper left corner to import a new device (media) profile



3. Browse to the folder that contains the new media profiles.



4. Select the print mode you want to import and click on the arrow to add the profile to the list underneath. Click “OK” afterwards to complete the profile installation.

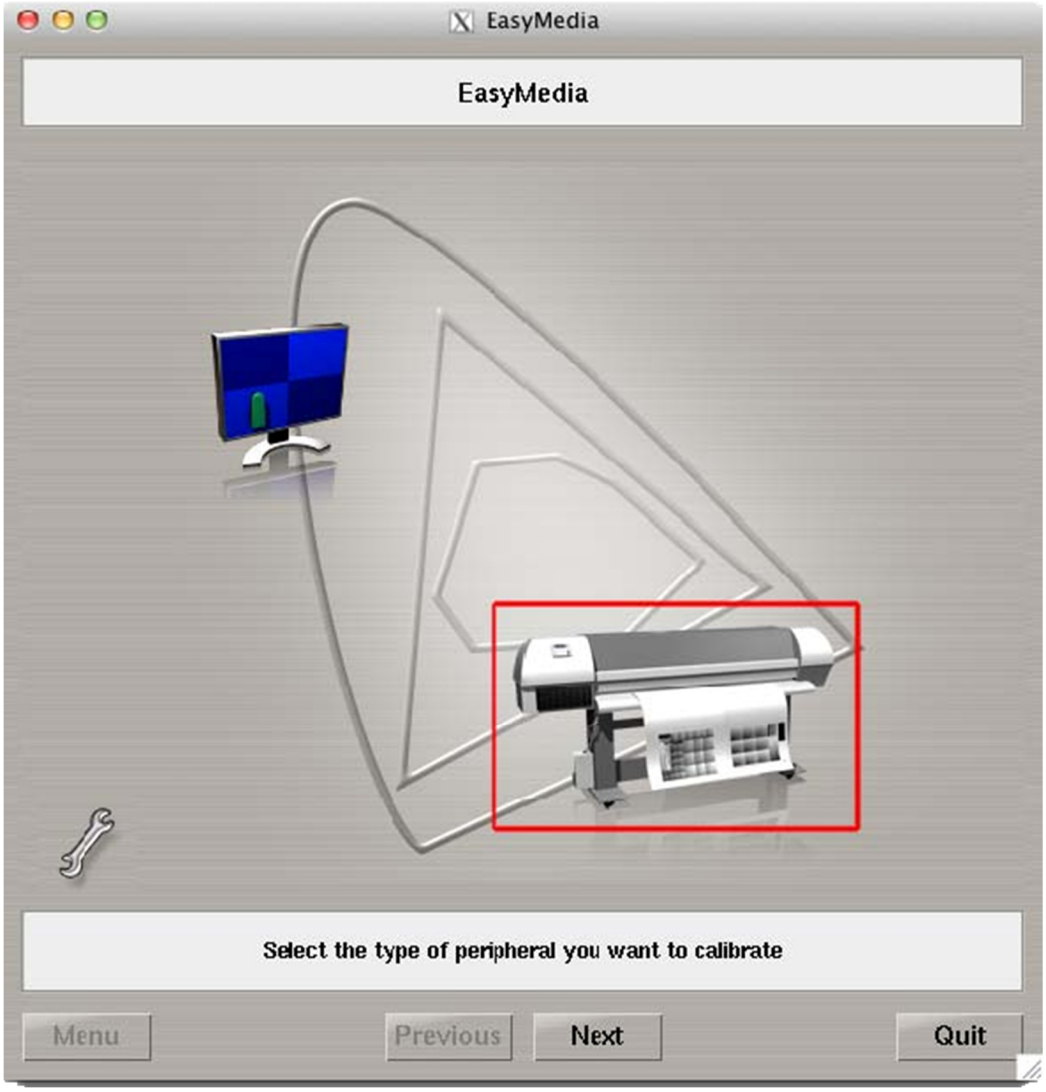


5. Close Mimaki Profile Manager and open Mimaki Rasterlink. Select the new media profile & start printing!

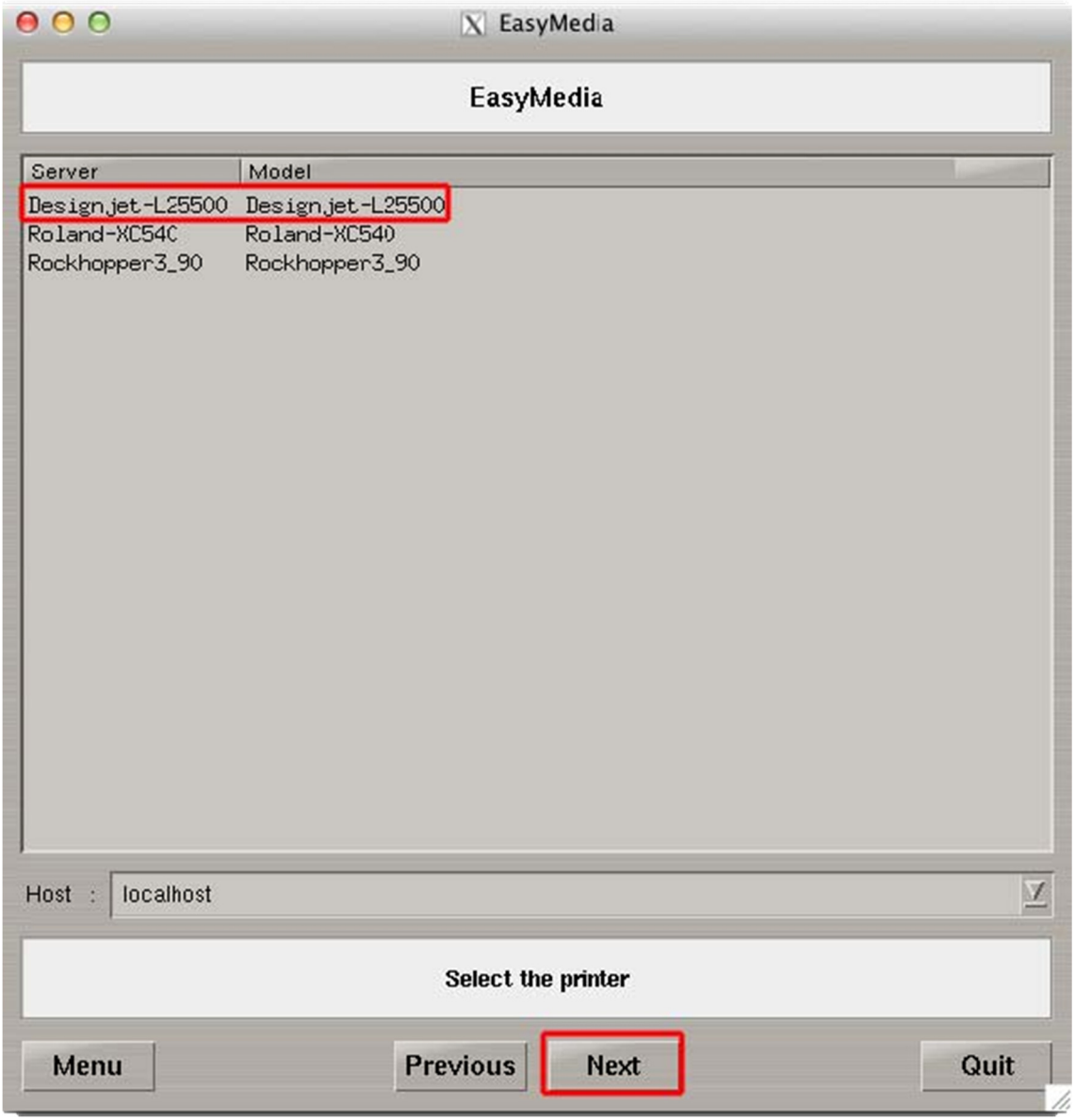
3.5 IMPORT MEDIA PROFILES IN CALDERA

1. Open the “Easymedia” module

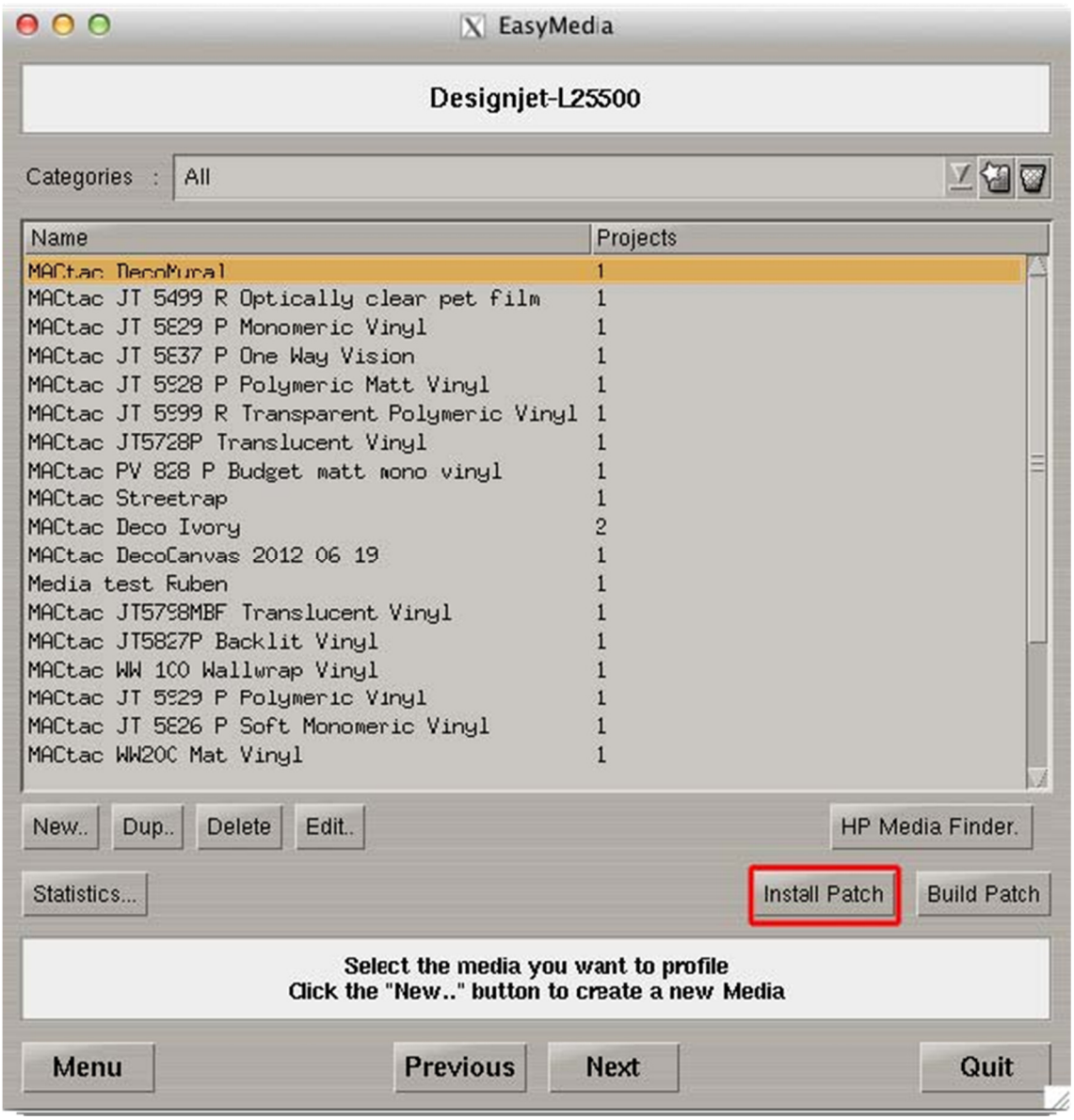
2. Click on the printer logo and click “next” to continue



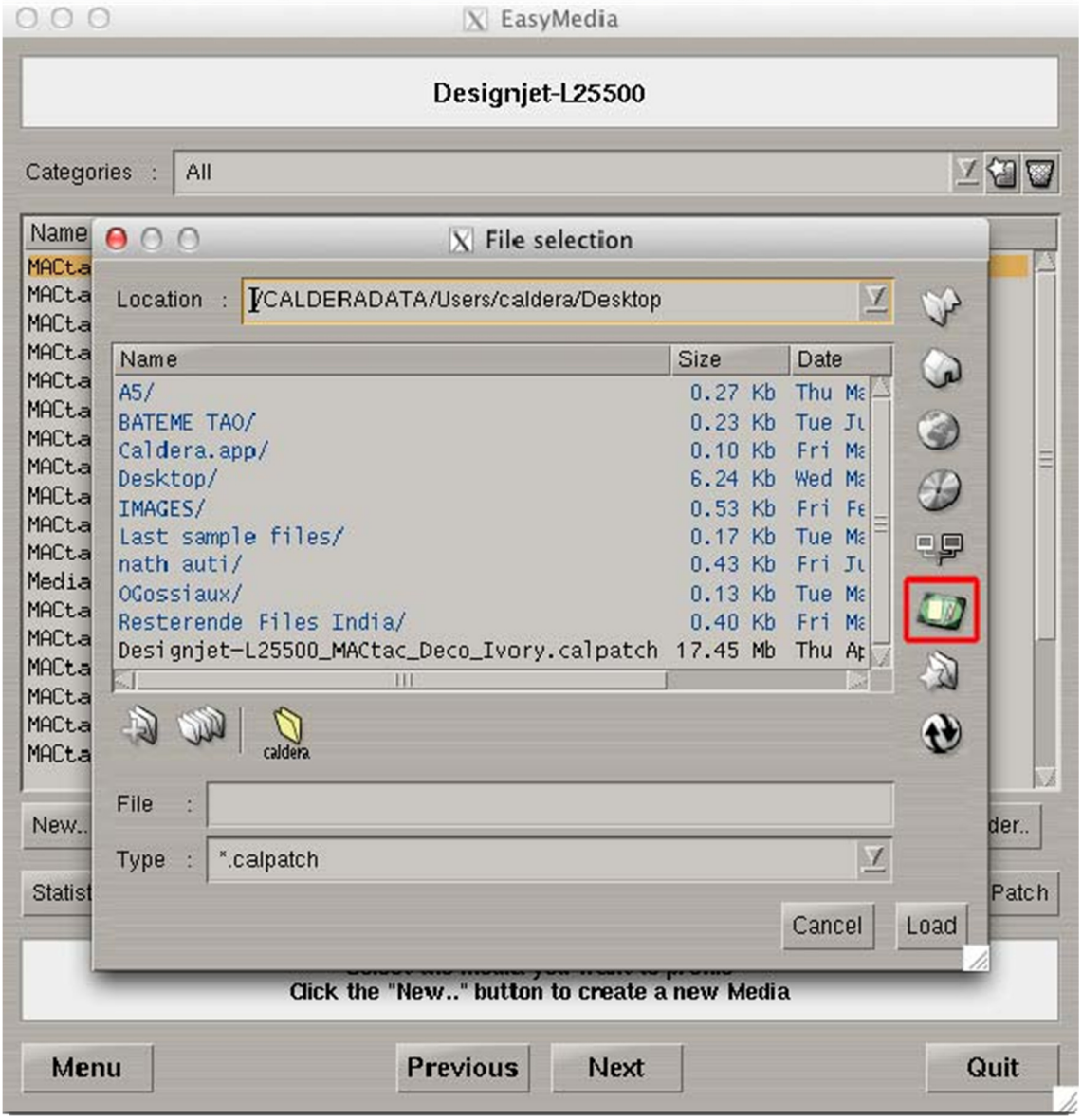
3. Select your printer and click “next” to continue. In this case, profiles for the HP L25500 printer are selected for import



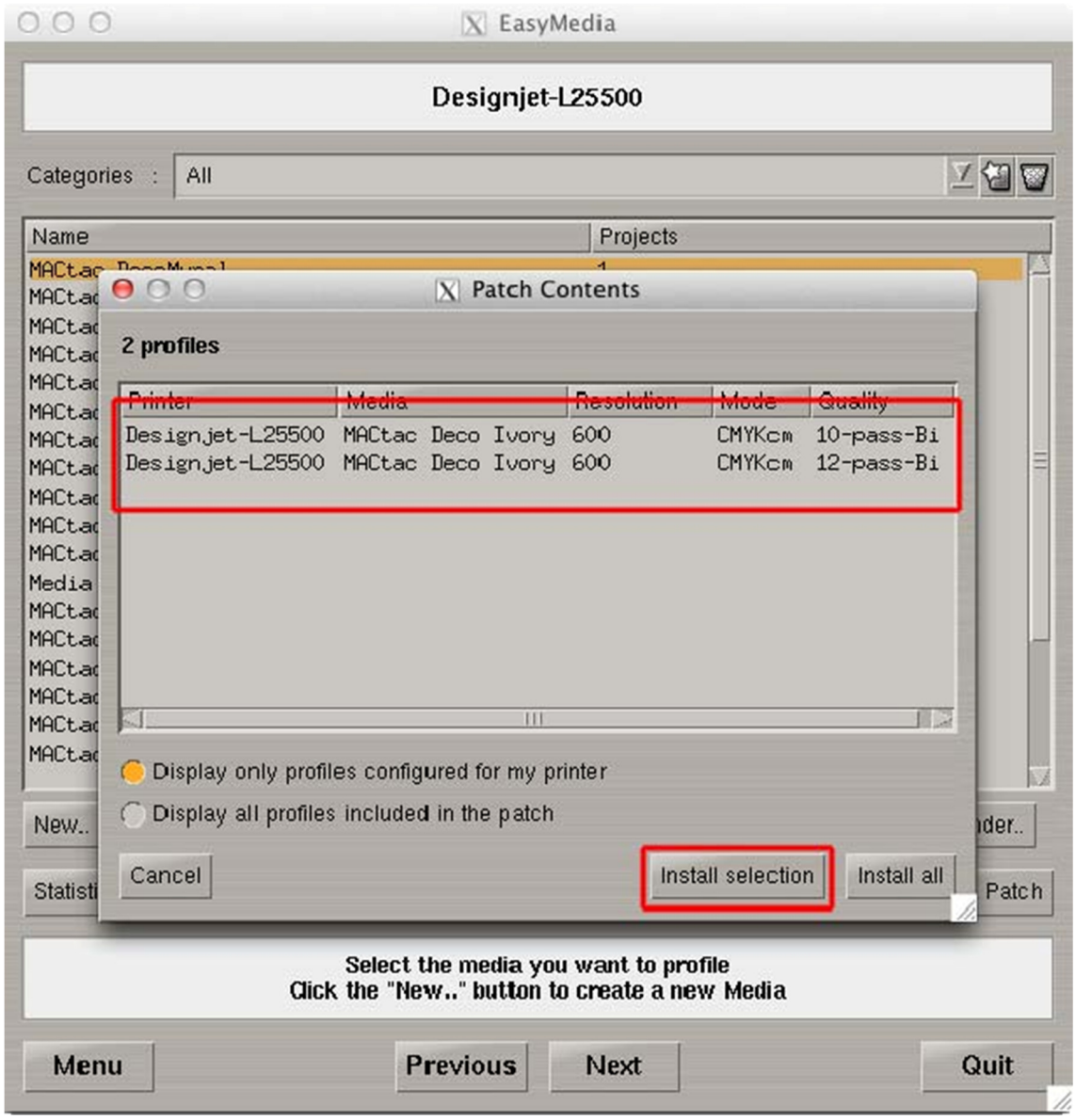
4. Click on “Install Patch” to import a new media profile.



5. Browse to the folder that contains the media profile. (Extension media profile: ".Calpatch") In this case, the media profile is located on the desktop. Once you have selected the ".calpatch" file, click on "load" to import the media profile into your media library.



6. Select the print mode you prefer and click on “Install selection” to confirm



4 TROUBLE SHOOTING

WHY DOESN'T THE INK DRY FAST ENOUGH?

When the ink doesn't dry fast enough, there are only 2 options:

1. Print slower. It will probably solve all problems and it will allow you to roll up the output straight away.
2. Use a media profile that uses less ink.

I HAVE BANDING IN MY PRINT. WHAT DO I NEED TO DO?

First of all, you need to determine which type of banding you have:

- What is the condition of the print head? Can this be the cause?
- What about the media advancement? If this is not set up as it should you will see dark or white lines throughout the print, also in light colours!
- In most cases banding is caused by excessive use of inks. If that is the case, there are only 2 options:

1. Print slower. It will probably solve all problems and it will allow you to roll up the output straight away.
2. Use a media profile that uses less ink.
3. Increase the temperature on the printer. But be careful! If the media curls on the printer, the temperature is set too high.

HOW DO I PRINT SLOWER USING THE SAME MEDIA PROFILE?

1. Print unidirectional instead of bidirectional.
2. Increase the print passes if possible.
3. Decrease the speed of the carriage.

THE SELF-ADHESIVE FILM CURLS ON MY PRINTER. WHAT DO I NEED TO DO?

Solvent printers:

1. Lower the temperature on the printer until the problem is solved.
2. Make sure there are not any high temperature differences in the print room. (Between day and night for example.)
3. Use a constant temperature on the printer. If the printer needs to heat up before every print, the self-adhesive film will probably curl.
4. Be careful with air-conditioning systems.
5. Make sure the media is stored in the same room as the printer.

Industrial Latex printers:

1. Use a self-adhesive film with a backing paper of at least 140g./sqm. This will prevent curling on the industrial latex printers.

UV-printers:

1. The heating of the UV-lamps is probably causing the curling. Decrease the power of the UV- lamps to the minimum.

WHEN I MEASURE THE PRINTED OUTPUT, IT IS 2CM LARGER THAN WHAT I REQUESTED IN THE RIP.

The media advancement is probably the cause. You can solve this on the printer or in the software.

IS MY PRINTER CONTROLLING THE TEMPERATURE OR IS THIS DONE IN THE SOFTWARE?

In almost all cases, the temperature is set on the printer but it is overruled as soon as there is a temperature set inside the software.

Why can't I print all Pantone colours?

From a palette of 14 basic colours, each of the spot colours in the PANTONE MATCHING System is mixed according to its own unique ink mixing formula developed by Pantone. A CMYK-printer only has 4 colours to simulate the Pantone library, that's why not all colours can be reproduced. Some "easy" colours will be reproduced quite correctly; others are very hard to reproduce using a CMYK- printer.

I KNOW I CAN'T PRINT ALL PANTONE COLOURS, BUT HOW DO I REPRODUCE THEM AS ACCURATELY AS POSSIBLE?

1. Use a good RIP-software that is compatible with the Pantone library.
2. Use a correct ICC-profile.
3. Use a printer with orange and green inks if possible.
4. Use the "absolute colorimetric" rendering intent in your software to print Pantone colours as accurately as possible.
5. Use the Pantone colour in the design application and export as Adobe PDF. Pantone colours that are already converted to CMYK at this stage will be incorrect for sure.

CAN I SEND RGB-IMAGES TO MY PRINTER?

Yes! You do not need to convert them to CMYK before printing. Your RIP-software does this for you.

CAN I PRINT & CUT THE SELF-ADHESIVE AT THE SAME TIME?

Yes, but only next to the printed image. If you would cut inside the printed image, the solvent of the ink will have a negative influence on the adhesive.

THE PVC BECAME VERY SOFT AFTER PRINTING AND IS DIFFICULT TO APPLY. HOW COME?

In theory, you need to wait a while (48h) before applying the printed film. When a PVC is still quite soft after printing, it means it still contains solvents from the ink. You need to wait for the solvents to evaporate.

CAN I PUT A LAMINATE ON THE PRINT DIRECTLY AFTER PRINTING?

No, in theory you need to wait 48h before lamination. If all solvents are not evaporated before lamination, problems will occur.

THERE ARE RECTANGLES APPEARING WHEN I PRINT. ON THE COMPUTER I CAN'T SEE THEM.

This is probably a flattening problem. This means that your RIP-software had some difficulties calculating the transparencies in the file. Flatten the transparencies in a design application like Adobe Photoshop before printing.

DO I NEED TO PUT THE HEAD HEIGHT OF THE PRINT HEAD ON HIGH OR LOW?

If the temperatures are set correctly on the printer, the head height can be set on "low". When the head height is too high, overspray will be visible in the print.

DO I NEED TO PUT THE VACUUM OF THE PRINTER ON HIGH OR LOW?

On most printers, the vacuum is set on "high". But when the print platen is not 100% flat and has a certain structure, the vacuum is set less strong.

THE PVC IS DAMAGED BY THE UV-LIGHT OF MY PRINTER. WHAT DO I NEED TO DO?

Set the power of the UV-lamps to the minimum to minimize the influence of the UV-light. When the UV-ink is "sticky" after printing, you need to increase the power because the ink is not100% cured.

Laminate the printed media with a Mactac LUV protection film. It will reduce the UV effect after the printing and ensure a better handling, application and removability.

THERE IS NO PROFILE AVAILABLE FOR THE MEDIA TYPE I WANT TO PRINT ON. WHAT DO I NEED TO DO?

1. Test another Mactac media profile.
2. Test the generic vinyl profile that was installed by the technician of your machine.
3. Contact printsupport@mactac.com to get some more information.

I FOUND A MEDIA PROFILE IN THE MACTAC PROFILE DATABASE BUT I GET AN ERROR WHILE IMPORTING. WHAT DO I NEED TO DO?

The media profile you are trying to import is probably created for your printer type but not for you ink configuration. Contact printsupport@mactac.com to get some more information.