HP Designjet L25500 series

Add New Substrate

and

Image Quality Troubleshooting procedures

Version 8.0

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1. SUMMARY

This section summarizes the procedure to bring a new substrate into operation with the printer. Once the Add New Substrate procedure is completed, the number of passes used for printing can usually be changed without the need for any extra action. See How to print faster.

The **Add New Substrate** procedure consists of the following steps:

Load substrate and align printheads
1. If substrate is smaller than printer width it's better to locate the substrate to the leftmost position in the spindle so it is centered in the print zone
2. Select the generic substrate family to start in the printer front panel from **Table 1**

↓

Create and install a new media preset following the RIP instructions:
1. Check media preset availability in the RIP and/or substrate vendor web site
2. If not available, check availability using the "Media Finder" search application located at www.hp.com/go/L25500/solutions

↓

Was media preset available?

No →
1. Choose the generic substrate family following **Table 1**
2. In the RIP, create a copy or use an available media preset from the chosen substrate family
3. Select a name for the new substrate in case you create a copy

Yes → Start printing using the available print modes

Start printing
1. Select the initial print mode. For first trial is recommended to use a 12 passes bidirectional print mode
2. Print the diagnostic plot available in: www.hp.com/go/L25500/manuals or in: http://ip-addr/hp/device/webAccess/images/new.tif ,where ip-addr is the IP address of your printer

↓

Check (and correct if needed) the ink quantity in the printed plot Following section "Checking the ink quantity on the substrate" recommendations.

↓

Is the print IQ ok?
No → Proceed to sections "Optimize substrate settings" and "Image Quality Troubleshooting"
Yes →

Is print IQ ok?
No → Proceed to sections "Optimize substrate settings" and "Image Quality Troubleshooting"
Yes → Process complete

2. SUBSTRATE LOADING AND RIP MEDIA PRESET

1. Check whether your media preset is available from your RIP's Web site or from your substrate vendor's Web site. If not, you have three options:
   a. Check the media preset availability in: http://www.hp.com/go/L25500/solutions
   b. Use a RIP media preset for a substrate of the same or a similar family. For instance, if you want to use a banner from vendor A you could start using the RIP media preset for a banner from vendor B.
   c. Create a RIP media preset departing from a "parent" RIP media preset, whose family is the same as or close to that of your substrate. For instance, if you want to use a self-adhesive vinyl from vendor A, you could start using any available self-adhesive vinyl RIP media preset and modify it according to the recommendations of the following sections.

   The following table may help when selecting the right family or printer media preset:

Table 1   Substrate families

Substrate family (or printer media preset)	Description
Self-Adhesive Vinyl	PVC films with adhesive on one side. There can be white-finished or transparent. The liner can be paper or plastic-based. There are two main manufacturing processes: calendering and casting. Also, there are varieties such as perforated vinyl to be placed on windows. For those substrates Manual Printhead Alignment may need to be used instead of Automatic. **Example: HP Air Release Adhesive Gloss Cast Vinyl,** Avery MPI3000 (calendered), Avery MPI1005 (cast), 3M IJ-380 (cast)…
Banner	Usually a polyester mesh (or fabric) covered with PVC coating. There are also recyclable types to cover the same applications (green banners). Banners can be frontlit or backlit. **Example: HP Durable Frontlit Scrim Banner**, Ultraflex Normandy Pro, Verseidag banners…
Film	Usually a polyester film for backlit applications, although there are other materials such as PVC or PC. Typically translucent, although there are transparent versions. **Example:** Intelicoat SBL-7 Polyester Backlit Film, …

Substrate family (or printer media preset)	Description
Fabric	Fabric substrates are usually composed of polyester fibers. Some of the fabric substrate types come with a liner to avoid the ink passing through the substrate. Fabric materials that are very stiff (such as polyester canvases) should preferably be loaded as "banner". **Example: HP Wrinkle-free Flag with liner**...
Mesh	Usually a polyester mesh covered with PVC coating with holes. Some of these substrate types can have a liner and be self-adhesive. **Example: HP Mesh Banner with liner**, Ultraflex Stripmesh...
Paper - Aqueous	Paper-based (cellulose) substrate with or without coating. The main difference from the billboards is that these papers are not compatible with solvent printers. Weight usually around 100 g/m².
Paper - Solvent	Paper-based (cellulose) substrate with coating to allow for use in solvent printers. Usually a limited water-resistant performance. **Example: HP Blue Back Billboard Paper,** Intelicoat GPIOF140, blue back substrates…
HP Photorealistic	Paper-based (cellulose) substrate with coating (gloss and matte finishing). It has a weight higher than the other billboard and offset substrates (200 g/m² or higher). The main difference is its rigidity compared to the other billboard substrates. **Example: HP Photo-realistic Poster Paper**
Synthetic Paper	Substrates manufactured using synthetic resin, mainly extruded from polypropylene (PP). They have characteristics similar to those of plastic film, but their appearance and properties are similar to regular paper made from wood pulp.

The printer settings in the table under the paragraph "Recommended default substrate settings" can also help you in substrate family identification.

2. Load the substrate. If the substrate is narrower than the maximum width, it's best to locate the substrate at the left end of the spindle so that it is centered in the print zone.
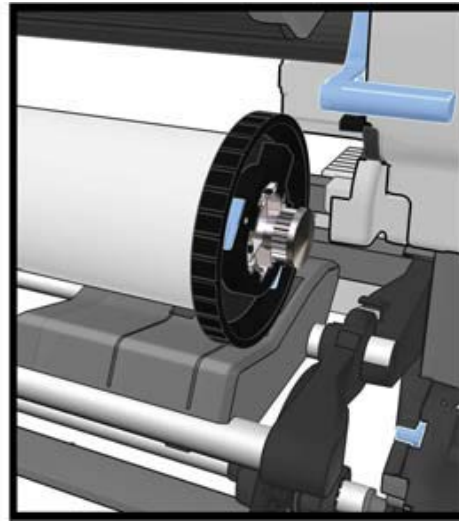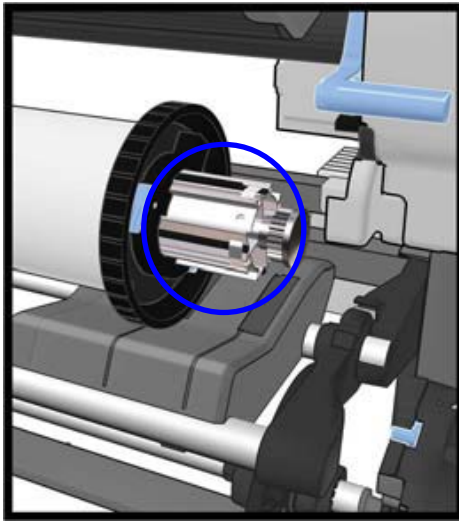
3. Disconnect OMAS in the RIP if the substrate is transparent or dark, or if the printer recommends you to do so during the substrate load operation.
4. Launch Printhead Alignment.
5. In your RIP software, open the HP diagnostic chart, which you can obtain from the Embedded Web Server at:

http://ip-addr/hp/device/webAccess/images/new.tif

where *ip-addr* is the IP address of your printer. Alternatively, you can find the chart on the Web under:
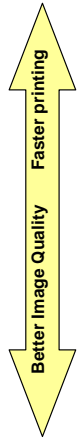
http://www.hp.com/go/l25500/manuals/

6. Select the number of passes recommended in the "print mode recommendation matrix" for the family (or Printer Media preset). These are generic proposals that work with most of the substrates available.
7. Print the file.

Recommended print modes

	Print mode	Bidirectional/ Unidirect.	Self-Adhes. Vinyl	Banner	Film	Fabric	Mesh	Paper-Aqueous	Paper-Solvent	HP Photorealistic	Synthetic Paper
	4 pass	Bidir									
	6 pass	Bidir		->Start here				->Start here			
	8 pass	Bidir		->Start here			->Start here		->Start here	->Start here	
	10 pass	Bidir	->Start here								
	12 pass	Bidir				->Start here					
	16 pass	Bidir			->Start here						->Start here
	18 pass *)	Bidir									
	20 pass	Bidir									
	24 pass	Bidir									
	28 pass	Bidir									

Faster printing / Better Image Quality

Legend

->Start here	Recommended print mode to start with
(green)	Other recommended print modes
(yellow)	Print mode where the unit might operate with acceptable Image Quality
(red)	Non-recommended print mode. Image Quality may be low or unstable across temperature and humidity conditions

NOTE 1: *) Unlike other print modes, 18-pass print mode has 1200×1200 dpi input data resolution at 1 bpp (1 bit per pixel). Therefore, to generate an 18-pass media preset you should start either from an existing 18-pass preset or from scratch. For the same reason, do not clone an 18-pass media preset to generate a preset with a print mode other than 18-pass.

NOTE 2: More specific settings for several substrates from different vendors are available in the "Media Finder" application located in: http://www.hp.com/go/L25500/solutions

If you are using HP Designjet 8000 with the following print mode…	We recommend you to start with:
4-pass bidirectional, 360x720	6-pass bidir
6-pass bidirectional, 720x540	8-pass bidir
8-pass bidirectional, 720x720	10-pass bidir
16-pass bidirectional, 720x720	16-pass bidir

If you are using HP Designjet 9000/10000 with the following print mode…	We recommend you to start with:
4-pass bidirectional, 720x720	6-pass bidir
8-pass bidirectional, 720x720	10-pass bidir
16-pass bidirectional, 720x720	16-pass bidir

Print-mode parameters

Setting	Explanation	If too low	If too high
Number of passes	The number of passes specifies how many times the printheads will print over the same area of substrate.	The amount of ink fired per time unit is larger and ink has less time to dry on the substrate. This may create coalescence and banding. Because larger substrate advances are required and ink has to be placed faster on the substrate, the boundaries between passes are more visible. However, printing speed is relatively high. If number of passes < 10 the "High Ink Limit" setting is not available.	Colors are vivid, print quality is high, needs lower curing temperature. However, printing speed is relatively low.
Print direction: bidirectional (if checked) or unidirectional (if unchecked)	Specifies if printheads print in both directions, when moving from left to right and from right to left.	If bidirectional is selected the amount of ink fired per time unit is larger, and therefore print quality defects such as coalescence and banding may occur, especially at the sides of the plot. However, printing speed is relatively high.	If bidirectional is unchecked, then the printing is unidirectional and the printing speed is relatively low. TIP: Always select bidirectional and increase the number of passes rather than selecting unidirectional.
High ink level: Normal (if unchecked), High (if checked)	Maximum quantity of ink that will be laid on substrate (high ink limit option only available when number of passes is 10 or larger). The ink quantity is further reduced by the RIP color profile.	If high ink limit is not selected, colors may look washed-out.	When selected there can be an excess of ink, and some problems related to poor drying and curing may be present. TIP: Select high ink level for backlit applications or if you want high color saturation.

3. OPTIMIZE SUBSTRATE SETTINGS

HP and third-party media presets use their own settings which have been optimized to maximize printing performance in terms of image quality and speed.

You may need to vary the settings for your specific substrate, so below we list the recommended defaults for a 'generic' substrate to use as a starting point for the "add new substrate" process. Your RIP may have an option to reset substrate settings to these defaults so that you don't have to change each one manually; consult your RIP documentation. Moreover, you can consult many available media presets in:

http://www.hp.com/go/L25500/solutions

Recommended default substrate settings

Default substrate settings are determined by the substrate family, which are the categories available from the printer's front panel at substrate load time. They are divided into main and advanced settings.

Main settings

A summary of the main settings is reproduced in the table below:

Substrate family	Main substrate settings							
	Drying temperature	Curing temp	Heating airflow	Automatic tracking (OMAS)	Cutter	Substrate advance compensation	Input tension	Vacuum
Self-Adhesive	55	110	30	Yes	Enabled	0	15	25
Banner	50	110	45	Yes	Disabled	0	15	5
Film	55	95	30	Yes	Enabled	0	15	25
Fabric	55	100	45	Yes	Disabled	0	15	20
Mesh	50	95	30	Yes	Enabled	0	15	30
Paper-Aqueous	45	70	30	Yes	Enabled	0	15	20
Paper-Solvent	50	90	30	Yes	Enabled	0	15	25
HP Photorealistic	50	80	30	Yes	Enabled	0	15	40
Synthetic Paper	50	80	30	Yes	Enabled	0	15	40

The meaning of these settings is explained in the table below:

Setting	Explanation	If too low	If too high
Drying temperature	Heat applied in the print zone removes water and fixes the ink film to the substrate. This parameter determines the substrate surface temperature in the print zone.	Print quality defects such as banding, bleeding and coalescence may occur.	Thermal marks may be seen on the substrate; they may appear as vertical banding in some colors. The substrate may wrinkle on the platen, causing vertical banding, ink smears or substrate jams.
Curing temperature	Curing is needed to coalesce the latex particles, creating a polymeric film which acts as a protective layer encapsulating the pigments. Curing is vital to ensure the durability of the printed images.	The print may emerge not fully polymerized, so that the ink smears when rubbed with a finger. In some cases the print may appear wet, or get a wet appearance some time after printing. You may need a higher number of passes to get the print to cure completely.	The substrate may wrinkle under the curing module, causing substrate defects such as bubbles or liner detachment. The substrate wrinkles may also create vertical banding or ink smears at the beginning of the following print.
Heating airflow	Airflow helps to remove the evaporated water from the print zone and thus allows more efficient drying conditions.	As a general rule, use the substrate family default value.	
Automatic tracking (OMAS)	The Optical Media Advance Sensor (OMAS) is an automatic sensing device located under the print platen that tracks substrate movement to provide optimum advance accuracy.	Disable OMAS when: • The substrate is porous and allows ink to pass through to the platen. Clean the OMAS sensor after using this type of substrate. • You are instructed to do so by the front panel after substrate load or after a job, because the sensor is dirty or unable to track this particular substrate.	

Setting	Explanation	If too low	If too high
Cutter enabled	If enabled, the internal cutter cuts the substrate transversally after every print.	Disable the cutter in the following cases: • You want to increase printing speed. • You want to use the take-up reel. • You want to cut the substrate manually or with an external device. • The leading edge of the substrate tends to curl and causes substrate jams.	
Substrate advance compensation	Your printer was calibrated at the factory to ensure that it advances the substrate accurately when using supported substrate types in normal environmental conditions. However, you may find it useful to recalibrate substrate advance in certain circumstances: - Unsupported substrates: different manufacturers provide substrates with a wide range of properties such as thickness or stiffness, which may benefit from calibration. - Unusual but stable environmental conditions: if you are printing in unusual conditions of temperature or humidity and those conditions are expected to remain stable, recalibration may be beneficial.	• Dark lines appear when you use 4- or 6-pass print modes. • Graininess appears when you print at eight or more passes.	• White lines appear when you use 4- or 6-pass print modes. • Graininess appears when you print at eight or more passes.

Setting	Explanation	If too low	If too high
Input tension	Tension is applied to the substrate from the input roll. It needs to be constant over the full width of the substrate.	• The substrate skews and may become increasingly wrinkled in the printing zone. • Substrate advance may be irregular, resulting in horizontal banding.	The substrate may be permanently deformed or damaged. Substrate advance problems may appear in extreme cases.
Vacuum	Vacuum applied to the substrate in the print zone helps to hold the substrate down on the print platen, keeping the distance to the printheads constant.	• The substrate may lift up off the platen and touch the printheads. This can smear the printed image, cause a substrate jam or even damage the printheads. • Vertical banding may appear due to cockle.	For 'sticky' substrates, friction could be too high and substrate advance could become irregular, resulting in horizontal banding or irregular grainy patches.

Change substrate settings while printing

For your convenience, you can modify some substrate settings during printing so that you can see the effect immediately. The settings that you can adjust on the fly are as follows:

- Curing temperature
- Drying temperature
- Vacuum

To modify any of them, select the 🛢 icon in the front panel > **Image quality maintenance > Adjust printing params** and choose the setting you want to adjust. Use the arrow keys to increase or decrease the values. When you have reached the value you want, press OK.

The rest of the job will be printed with the modified value(s), but they will be reset to the previous ones at the end of the current job. If you want to keep the modified value(s) for future jobs, you must change them in the RIP's media preset.

Advanced settings

There are also a number of advanced parameters available for further optimization. **These should not be changed unless you have reached this point following the "troubleshoot substrate issues**" process. Remember that you can return at any time to the defaults using the "reset to defaults" feature in the RIP (if implemented by your RIP).

The advanced substrate settings are summarized in the table below:

	**Advanced substrate settings**							
Substrate family	Warm-up drying temperature offset	Warm-up curing temperature	Warm-up curing temperature offset	Cool-down drying temperature	Cool-down drying temperature offset	Cool-down curing temperature	Cool-down curing temperature offset	Minimum drying power
Self-Adhesive	10	95	0	80	0	95	0	0.7
Banner	10	95	0	80	0	90	0	0.7
Film	5	85	0	80	0	100	0	0.7
Fabric	5	85	0	80	0	90	0	0.7
Mesh	10	85	0	80	0	95	0	0.7
Paper-Aqueous	5	60	0	75	0	85	0	0
Paper-Solvent	10	75	0	75	0	90	0	0.7
HP Photorealistic	10	80	0	75	0	85	0	0
Synthetic Paper	5	80	0	75	0	85	0	0

The values on a green background in the table above can be modified from the RIP, but the ones on a gray background cannot. The latter are determined by printer firmware, change depending on the print mode, and are not user-modifiable. The values given here are the default ones for each substrate type (family), but can be further modified in printer firmware depending on the number of passes used, whether unidirectional or bidirectional print modes are being used, and whether low or high ink limits are being used.

You may notice that there is no "Warm-up drying temperature" column in the table above, only a "Warm-up drying temperature offset" column. This offset is added to the "Drying temperature" main setting (see "Main settings" section, above), which is controlled by the RIP. This is different from the other offset values, which are added to internal firmware values that are not controlled by the RIP.

Before starting to print, the printer must reach the value resulting from adding the "green column" offset value with the corresponding "gray column" value. These combined values are displayed in the printer's front panel while the printer is preparing to start printing. Once they are achieved, the printing job specific settings values are then displayed and used.

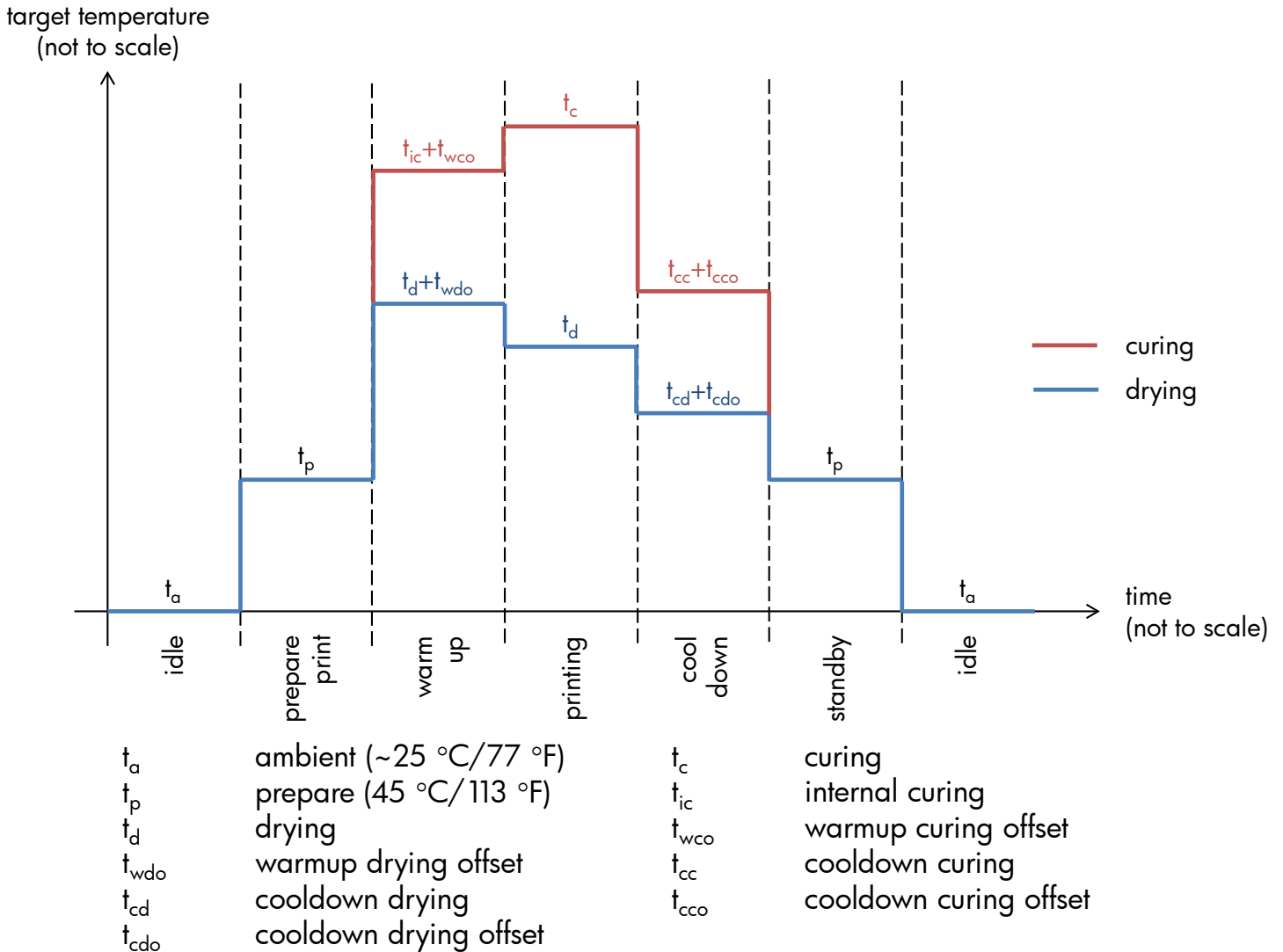The meaning of these parameters is explained in the table below:

Setting	Explanation	If too low	If too high
Warm-up drying temperature offset	Offset added to the drying temperature (see main settings). Their sum determines the effective surface temperature that the substrate in the print zone must reach before printing starts. This sum value is displayed in the printer front panel while the printer is preparing to start printing. Once it is achieved, the printing job specific settings values are then displayed and used.	Bleeding or coalescence may appear in the first 200-300 mm of the print.	A longer time to start printing is required. Vertical banding or ink smears may occur.
Warm-up curing temperature	The temperature that the substrate in the curing zone must reach before printing starts.	N/A – Determined by printer firmware.	N/A – Determined by printer firmware.
Warm-up curing temperature offset	Offset added to the warm-up curing temperature. Their sum determines the effective surface temperature that the substrate in the curing zone must reach before printing starts. This sum value is displayed in the printer front panel while the printer is preparing to start printing. Once it is achieved, the printing job specific settings values are then displayed and used.	The beginning of the print is not fully dry or looks oily.	Substrate degradation (bubbles, adhesive detachment) at the beginning of the print.
Cool-down drying temperature	The temperature that the substrate in the print zone must reach before the substrate stops moving.	N/A – Determined by printer firmware.	N/A – Determined by printer firmware.
Cool-down drying temperature offset	Offset added to the cool-down drying temperature. Their sum determines the effective safe surface temperature at which the substrate can be under the drying module without being damaged. At the end of a job, the substrate does not stop moving until this temperature is reached.	A long time is needed to finish the print.	The substrate at the beginning of the next print may be damaged because it has stopped moving under a too-high temperature. This case is uncommon.
Cool-down curing temperature	The temperature that the substrate in the curing zone must reach before the substrate stops moving.	N/A – Determined by printer firmware.	N/A – Determined by printer firmware.
Cool-down curing temperature offset	Offset added to the cool-down curing temperature. Their sum determines the effective safe surface temperature at which the substrate can be under the curing module without being damaged. At the end of a job, the substrate does not stop moving until this temperature is reached.	A long time is needed to finish the print.	The end of the print may be damaged if the cutter is disabled.

Minimum drying power	The minimum power applied in the drying module while printing, so that the drying resistor does not cool off too much in lightly inked areas.	A heavily inked area that comes after a lightly inked area will have bleeding or coalescence defects.	The substrate is damaged in blank or lightly inked areas of the print, especially at a high number of passes.

Temperature profile

Many of the main and advanced substrate settings are related to temperature control, since this is a critical area for correct printing results with latex inks on a wide variety of substrates. The diagram below graphically represents the evolution of drying and curing temperatures during the various printing phases.

target temperature (not to scale)

t_c

$t_{ic}+t_{wco}$

t_d+t_{wdo}

t_d

$t_{cc}+t_{cco}$

$t_{cd}+t_{cdo}$

t_p

t_p

t_a

t_a

curing
drying

time (not to scale)

idle | prepare print | warm up | printing | cool down | standby | idle

t_a	ambient (~25 °C/77 °F)	t_c	curing
t_p	prepare (45 °C/113 °F)	t_{ic}	internal curing
t_d	drying	t_{wco}	warmup curing offset
t_{wdo}	warmup drying offset	t_{cc}	cooldown curing
t_{cd}	cooldown drying	t_{cco}	cooldown curing offset
t_{cdo}	cooldown drying offset		

Note 1: Target temperatures and time are not to scale. For the specific values used for a given substrate type (family), consult the main and advanced settings tables above.

Note 2: Standby time can be modified through the printer's front panel, from firmware version 3.x onwards.
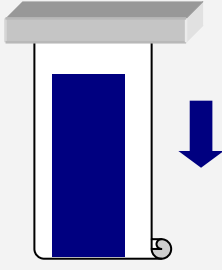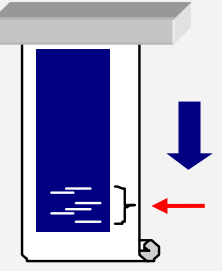
4. IMAGE QUALITY TROUBLESHOOTING

Before continuing, please check the following items:
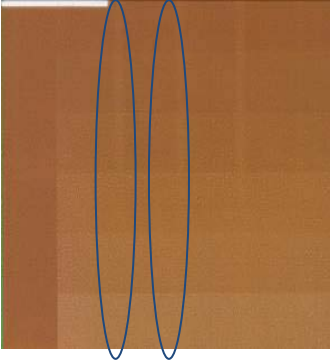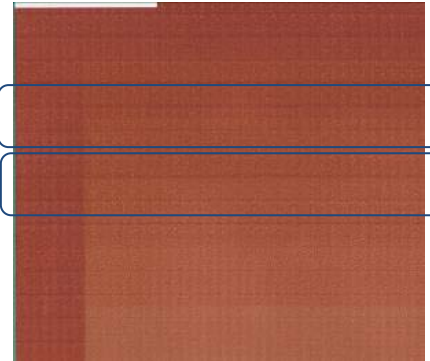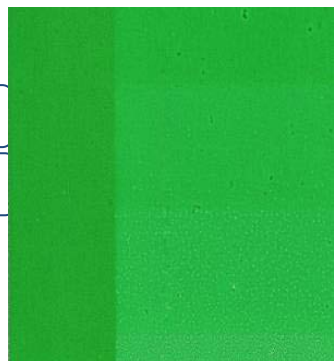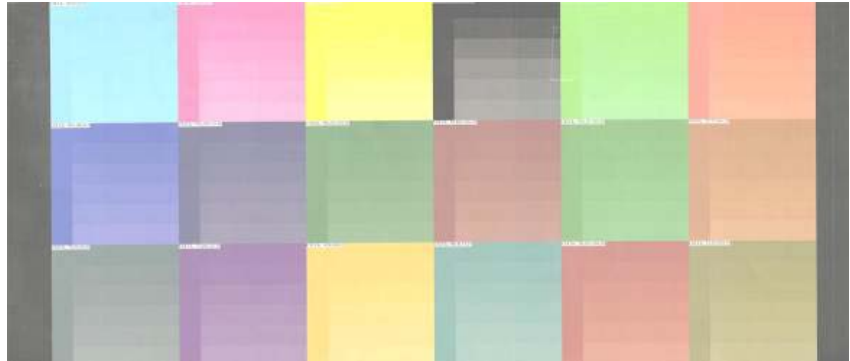
- Ensure that all previous steps in the "**Add New Substrate**" procedure have been followed.
- Check that the substrate physically loaded is the same that has been specified in the front panel and in the RIP.
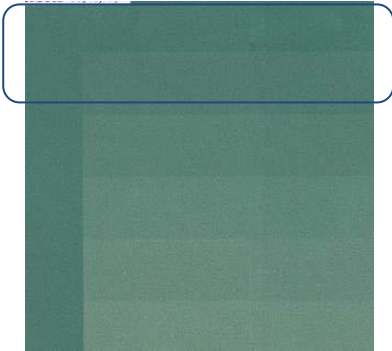
Substrate jams, ink smears or deformation

Problem description	Cause	Solutions
Substrate jams or ink smears at any distance in the image	Substrate may have been loaded with too much skew.	Make sure that you have not skipped the "Substrate was loaded with too much skew" warning that appears during the substrate loading process.
	The substrate is not flat while printing.	• Increase the vacuum level in steps of 10 mmH$_2$0. • Reduce the curing temperature. Probably at the same time you will need to increase the number of passes so that the ink will be adequately cured. • Check whether there are fibers on the printheads.
Substrate jams, ink smears or deformations (curling, bubbles) only on the first 200 mm of the image.	The initial portion of the image has been affected by the curing process of the previous job. Try the following solutions in this order.	• Disable the cutter. This allows better substrate control at the beginning of the job. • Set the extra bottom margin: Go to the front panel and select the icon, then **Substrate handling options** > **Extra bottom margin**. Set the margin to 100 mm, 150 mm or 200 mm as needed. This extra margin will apply only to jobs that start printing when printer is idle and when the cutter is disabled. • Increase the vacuum level in steps of 10 mmH$_2$0. • Decrease the warm-up drying offset temperature in 5°C steps. • Decrease the curing temperature offset in 5°C steps. • If the problem is not solved or there are durability problems, increase the number of passes. • Ensure that the substrate is stored in the same room where the printer is located.
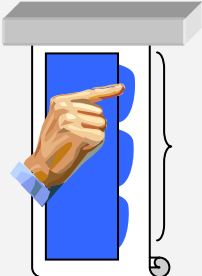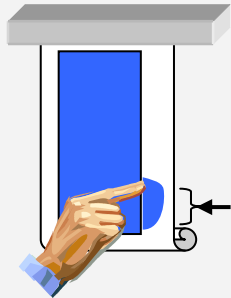
Checking the ink quantity on the substrate
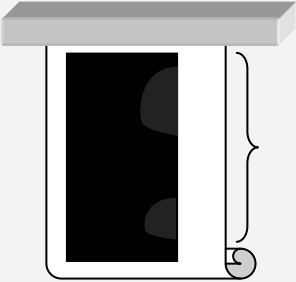
Check whether the ink quantities in your preset are adequate.

Too much ink

The patch shows one or more of the problems indicated on the drawings.

Solutions:

- Lower the ink quantity using your RIP (consult your RIP documentation).
- Choose a media preset that uses less ink. For example, self-adhesive presets use more ink than paper-aqueous presets.

The last 2 or 3 top scales of the plot look the same:

Vertical banding:

Horiz. banding:

Coalescence:

Too little ink

The whole plot looks washed out.

Solutions:

- Increase ink quantity (consult your RIP documentation).
- Try another media preset that uses more ink. For example, self-adhesive presets use more ink than paper-aqueous presets.

NOTE: Backlit applications usually require the "High Ink Level" option available in the RIP.
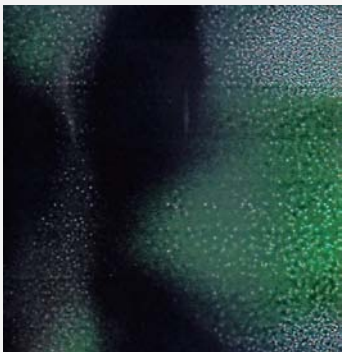
Correct ink quantity - The patch has no defects. **- An increase in** ink quantity results in higher color density.	The top scales of the plot show a smooth increase:

Ink smudge and image durability problems

Problem description	Solutions
Ink smudges in any area of the image when touched. 	• Increase the curing temperature in steps of 5°C as many times as needed. • If the substrate is damaged or you reach the limit in the RIP control, then increase the number of passes. • Lower the ink quantity (getting less saturated colors).
Ink smudges in the first 200 mm of the image when touched. 	• Increase the warm-up curing offset temperature in 5°C steps, as many times as needed. • If the substrate is damaged or you reach the limit in the RIP control, then increase the number of passes.

Problem description	Solutions
Oily finish in any area of the image.	• Do not store prints partially covered or with printed faces touching each other. • Increase the curing temperature and drying temperature in steps of 5°C as many times as needed. • Increase the number of passes. • Decrease ink quantity (this is always an option). Notes: • Check the prints 24 hours after printing to ensure that they are properly dried and cured (especially when using backlit films). • Do not cover, roll or laminate the prints until you are sure the oily finish is no longer present. • If you leave the print uncovered for a while, the oily appearance normally disappears.

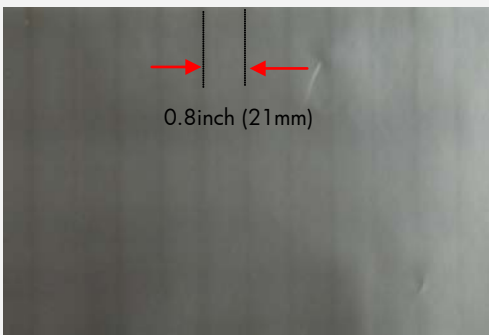## Graininess or coalescence in dark or saturated colors
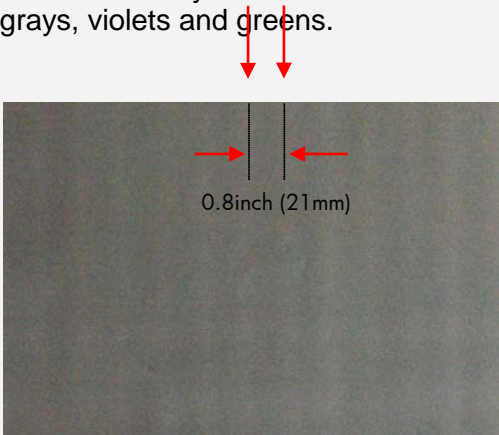
Problem description	Solutions
Graininess or ink coalescence appears mainly in dark or very saturated areas	• Use a higher number of passes *or* • Lower the ink quantity through the RIP controls.

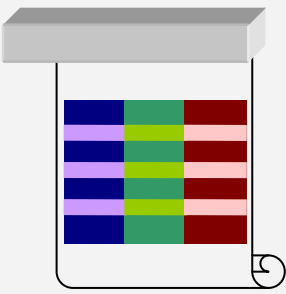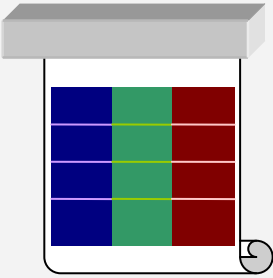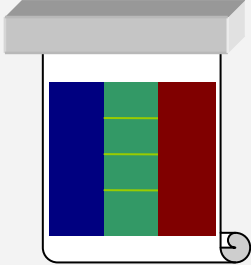|	
Graininess appears in different areas of the plot	• Ensure that vertical correction is disabled. Select the ⚙ icon, "Image Quality Maintenance", then "Disable Vertical Correction". • If the problem persists, perform printhead alignment. Select the ⚙ icon, choose "Image Quality Maintenance", then "Align Printheads" and "Auto PH alignment". • To improve black and dark colors, you may find media presets with optimized dark-color reproduction. In particular HP Permanent Gloss Adhesive Vinyl and HP Air Release Cast Gloss Adhesive Vinyl contain specific print modes called "High-KOD". These print modes may sometimes produce a higher level of graininess. • From 8 passes or more, adjust the substrate advance compensation by printing the Substrate Advance plot. Select the ⚙ icon in the front panel, then "Ink Quality Maintenance", "Substrate Calibration" and "Print adjustment plot". From this plot find the position of the lightest band and introduce the value into the RIP. • If previous actions have not reduced the graininess level sufficiently, increase the number of passes. Note: With 4 or 6 passes it is unlikely that a substrate advance problem will create graininess. See the [Horizontal banding](#) section for more information. 8 passes or more tend to have more graininess.

Vertical banding

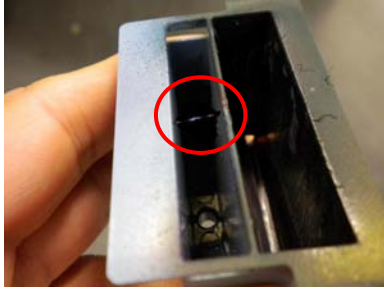| Problem description	Solutions
Vertical banding due to wide straight bands with different darkness and/or graininess separated by about 0.8 in (21 mm). You can typically find it in some vinyl and banner substrates in medium-density area fills such as grays, violets and greens. 0.8inch (21mm)	• Perform printhead alignment. Select the ♨ icon, choose "Image Quality Maintenance", then "Align Pritnheads" and "Auto PH alignment". • If the banding persists, select the ♨ icon in the front panel, "Image Quality Maintenance", then "Enable Vertical Correction". It may generate some graininess. **Note**: Do not forget to select "Disable Vertical Correction" after finishing the job.
Vertical banding due to thin straight bands with different darkness separated by about 0.8 in (21 mm). You can typically find it in the first 150–200 mm of the plot in some vinyl and banner gloss substrates in high density area fills or in backlit applications. 0.8inch (21mm)	• If possible, reduce ink quantity. • Disable the cutter. • Try using a higher number of passes. • If applicable, select in your RIP "Group jobs together" so that the temperatures in the printer are kept more stable between jobs. • Optimize black and dark colors using HP media presets following the recommendations stated in the Color reproduction tricks section.

Problem description	Solutions
Irregular or isolated vertical bands.	- Increase the vacuum in steps of 10mmH$_2$O. - In backlit applications, increase the number of passes to 20 or more and change the drying temperature up and down in steps of 5°C. - If it happens at the beginning of the job, try disabling the cutter and advancing the substrate manually about 100–150 mm before printing the first plot.
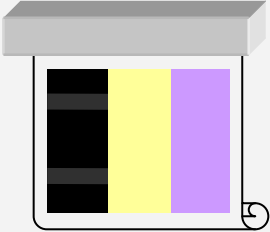
Horizontal banding

Problem description	Cause	Solutions
The banding affects most colors; visible bands are thick and not well defined. 	The printheads could be misaligned. This is likely if you performed printhead alignment on another substrate, or you have not done so for a long time, or there has been a substrate jam.	- Perform printhead alignment. Select the ⬛ icon, choose **Image Quality Maintenance**, then **Align Printheads** and **Auto PH alignment**. - Try using a higher number of passes.

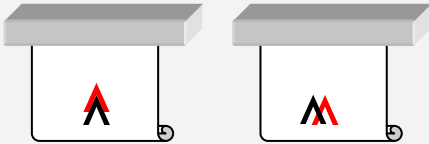| Problem description	Cause	Solutions
The banding is affecting all the colors across the job and is produced by thin horizontal lines (dark or light).	If you are using 4 or 6 passes, the cause could be a substrate advance problem. Note: With 8 passes or more, it is unlikely that a substrate advance problem will create banding. See the graininess section for more details.	During printing, try to reduce Horizontal Banding by changing the **Substrate Advance Compensation** parameter with the arrow keys through the "on-the-fly" button in the Front Panel. Select the ⬧ icon, choose **Image Quality Maintenance**, **Substrate Advance Calib** and **Substrate Advance Compensation**. • If the print shows dark lines then increase the substrate advance compensation. • If the print shows light lines then decrease the substrate advance compensation. At the end of the job, the value will be reset to the previous one. If you want to apply your manual correction to subsequent jobs, do not forget to store the value in the RIP media preset.

Problem description	Cause	Solutions
The banding affects one or only some colors. 	The cause could be a defective printhead.	Step1: Select the ⬥ icon, then "Image Quality maintenance", then go to "Clean Prinheads" and "Print Test plot". Check whether any of the printheads has a significant number of missing nozzles. If so, perform a "Clean PHs procedure" on the affected printhead. After doing so, repeat your print to see whether the banding problem persists. Step 2: If the problem persists, repeat step 1. Step 3: If the problem persists, try performing the Manual Printhead Alignment procedure. When done, repeat your print. Step 4: If the problem still persists, then repeat the "Print Test plot". Identify the printhead with most missing nozzles and replace it. Lower the ink quantity of that specific color.
	If bands appear and disappear intermittently along the job, the printheads could need a more intense printhead maintenance.	On the printer's front panel, select the icon ⬥, then select "Image quality maintenance" and "Enable extra PH cleaning". Remember to disable this option once plot is printed as it shortens the life of the printhead cleaning kit.

Problem description	Cause	Solutions
	Another cause could be a fiber attached to the ink funnel or to any of the printheads. 	First check the ink funnel in the following way: 1. Select the 🖤 icon, then "Replace PH cleaning kit". 2. When the message "Open the right door to replace the PH cleaning kit" is displayed, press the Cancel button on the front panel. 3. When the message "Press OK to continue with the ink funnel replacement or x to cancel it?" is displayed, press OK. Then follow the instruction "Open window". 4. When the message "Replace the ink funnel and press OK when done or press x to cancel the replacement" is displayed, take out the ink funnel and remove any fibers attached to it. 5. Follow the instructions "Close window to continue" and then the message "Ink funnel replacement finished successfully" will be displayed. 6. To finish the operation, you need to select the 🖤 icon, then "Image Quality maintenance", then go to "Clean Prinheads" and "Clean all". If the ink funnel did not have any fibers or particles and the problem persists, then check the printheads, selecting the icon 🖤 and the "Replace printhead" option. Inspect one at a time and gently remove any fibers that you may see attached to them.

Problem description	Cause	Solutions
The banding affects mostly dark or saturated colors.	If banding is only in **area fills near the edges** of the substrate, the cause could be insufficient drying of the ink.	• If possible, reduce the ink quantity in your RIP options. • Use a higher number of passes. • You can also reduce the ink quantity of these colors.
	Banding in any area of the job could be caused by an inaccurate color profile.	Optimize black and dark colors using HP media presets or creating a new media preset following the recommendations stated in the Color reproduction tricks section.

Misaligned colors or lack of sharpness

Problem description	Solutions
Colors look shifted in any direction or text, lines or solid areas are rough or blurred.	• The printheads could be misaligned. This is likely if you have not aligned the printheads for a long time, you have performed the alignment with another substrate or there has been a substrate jam. • Perform printhead alignment. Select the 🖋 icon, choose "Image Quality Maintenance", then "Align Pritnheads" and "Auto PH alignment".

Black areas look hazy or image gloss is not completely uniform

Problem description	Solution
Black areas do not look totally dark or look hazy.	• Use a higher number of passes. • Laminate the printed image. • Optimize black and dark colors using HP media presets following the recommendations in the Color reproduction tricks section.

Stains or uneven finishing of image

Problem description	Solutions
Area fills show subtle stains or an uneven appearance after storage.	• Prints should be stored either totally covered or totally uncovered. • Avoid prolonged contact between two printed faces. • These problems tend to disappear once the substrate is left uncovered for some time. • Make sure that it is not a substrate coating defect. Try another roll or batch of substrate.

5. HOW TO PRINT FASTER

The "Add New Substrate" procedure already described will give you sellable indoor print quality for the majority of available substrates. However, sometimes substrates support faster printing while providing adequate quality for many applications.

This section describes tips to speed up printing:

- **Decrease the number of passes.** Bear in mind that:

    o 8-pass printing may have more graininess than 10 passes and beyond.
    o 4- and 6-pass printing is more sensitive to substrate advance problems.
    o 4- and 6-pass printing may provide better results if the ink quantity is reduced in the RIP.
    o 4- and 6-pass printing may need lower ink usage for the ink to dry properly.
    o High-ink-limit printing is available only for 10 passes or more.
    o Decreasing passes may make it more difficult to find an appropriate curing temperature setting, and may make it more sensitive to ambient temperature and humidity conditions.

- **Take advantage of the "concatenated plots" feature**
  If a job is sent while the previous one is being printed, the plots are concatenated and then finishing time is saved.

- **Disable the cutter**
  In most substrates this speeds up the Finishing Print stage.

6. PRINTER COLOR CALIBRATION AND SUBSTRATE COLOR PROFILING

The printer can already be used with the color preset you have selected when following the "**Add New Substrate**" procedure. However, depending on your color accuracy requirements, you may want to do the following:

- **Color-calibrate the printer**
  This operation measures the current color performance of your printer and brings it to a known stable point. This is useful if you need color consistency over time—even if you change ink cartridges or printheads. The procedure should be repeated whenever the ambient conditions change significantly or after changing any printhead. See your RIP manual for details on how to launch the calibration.

- **Color-profile your substrate**
  If the color profile you are using corresponds to a substrate other than the one in your printer, then the colors may not be completely accurate. If this is a problem, you can proceed to profile your substrate using your RIP's usual process. Consult your RIP documentation for more details.

7. COLOR REPRODUCTION TRICKS

Latex inks are a new technology, and there are some important guidelines when doing color separations (such as when creating or modifying a new media preset within your RIP) that will help to optimize the printer output in terms of color gamut, ink usage and print quality. These are as follows:

1. To achieve the best dark colors in vinyl gloss and other substrates, please use as much black as possible and as little composite (CMY) as possible when creating the ICC profile.
2. Light inks should be avoided as much as possible in high-density colors such as secondaries and tertiaries (dark red, blue, green…).
3. Light inks should be restricted to the lowest-density colors, starting the use of dark inks as early as possible. Typically, a color of more than 50% density should not contain any light inks.
4. Light inks should be used at most at 50% quantity of its maximum quantity. An excessive amount of light inks might create gloss artifacts in vinyl gloss substrates

Please, refer to your RIP documentation on how to create or modify media presets.

Presets created for HP-branded substrates have been created following the recommendations stated above in order to optimize black and dark colors. You can try them selecting the HP media preset for your substrate family in http://www.hp.com/go/L25500/solutions.

To improve black and dark colors even for non-HP branded self-adhesive vinyl substrates, you may find media presets with optimized dark-color reproduction. In particular, HP Permanent Gloss Adhesive Vinyl and HP Air Release Cast Gloss Adhesive Vinyl contain specific print modes called "High-KOD".

8. SUMMARY OF COMMON SUBSTRATE PROBLEMS

Here is the table of common problems and the RIP parameters that can be changed in order to solve the problem. There is also a potential side effect that you may see in some cases.

Problem	Parameter	Increase/ Decrease	Potential side effect
Durability problems, ink smudges or oily finish	Curing temperature	Increase	Substrate jam, ink smears, damaged substrate
	Number of passes	Increase	Reduction in printing speed
Substrate jam, ink smears, damaged substrate	Curing temperature	Decrease	Durability loss (smudge) or oily finish
	Vacuum change and Disable cutter	Increase	Substrate skew
	Top and/or bottom margins	Increase	Substrate waste
	Drying temperature	Decrease	Image quality: more coalescence and/or banding Durability loss (smudge) or oily finish
Horizontal and/or thin vertical banding in highly saturated area fills	Drying temperature	Increase	Substrate jam, ink smears, damaged substrate
	Ink limits	Decrease (depends on RIP)	Color gamut loss
	Number of passes	Increase	Reduction in printing speed
	Modify color separations and black and dark color generation resources		
Graininess, color mis-registration or lack of sharpness	Printhead alignment		
	Substrate advance calibration troubleshooting process		

Problem	Parameter	Increase/ Decrease	Potential side effect
Black areas look hazy or image gloss is not completely uniform	Modify color separations and black color generation resources		
	Drying temperature	Increase	Substrate jam, ink smears, damaged substrate
	Number of passes	Increase	Reduction in printing speed
	Curing temperature	Decrease	Durability loss (smudge) or oily finish