Equipment

Quick start guide.
Auto Color Diagnosis (ACD).

HEIDELBERG

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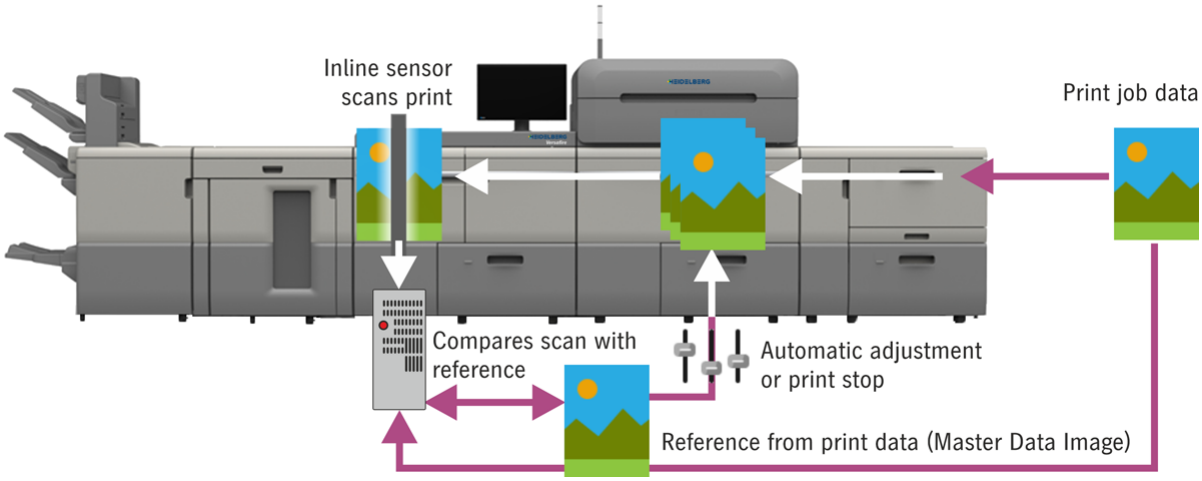
Overview of the Auto Color Diagnosis

How does the ACD (Auto Color Diagnosis) work?

The "ACD" (Auto Color Diagnosis) function lets you monitor and compensate color deviations or defects such as scratches over the entire printing process for stable color reproduction, which is especially helpful with long print runs.

A so-called "master image" is generated as a reference from the original digital data. The inline sensor scans the printed sheets and the results are continuously compared with the reference and the color reproduction is adjusted during printing.



Note: ACD is an optional extension and is available only for the Versafire LP press. For presses without ACD, you cannot run "ACD" in the Color Center Versafire, and the "ACD" menu is not available in the operator terminal.

ACD consists of two components:

- The basic component, "Color Homing", compares the last printed colors with the originally printed colors at the beginning of the printing process and automatically adjusts the colors. This automatically corrects any color deviations that may occur during the printing process.
- "Image Quality Monitor" checks the print results for flaws such as scratches or stains. IQC can be set so that printing is either stopped or inserts are printed in the relevant places.

The ACD settings are made for each paper on the Versafire operator terminal and can be customized in Prinect Cockpit in the "Digital printing" area of the job in the "Print and finishing settings" tab.

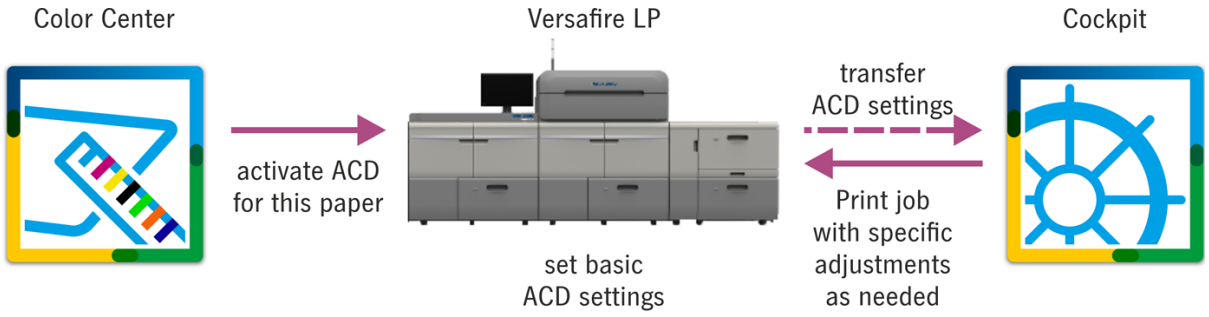
As a prerequisite, the ACD must be activated for the paper so that the basic ACD data is available.

To do this, first carry out the substrate qualification for the paper in Color Center and then start the ACD. Various test pages are printed, automatically analyzed with the inline sensor and the ACD is enabled for this paper.

You can then configure the ACD functions on the Versafire operator terminal according to your requirements and the options are also available in Prinect Cockpit.

Note: The term "Auto Color Diagnosis" serves as the umbrella term for the entire feature, but on the control terminal it also refers to the functions of "Color Homing" as distinct from the "Image Quality Monitor".

Interaction of the software components (What to do where?)



- Color Center Versafire: In Color Center Versafire, you set up the basic requirements for using the ACD by launching the "ACD" function after substrate qualification: this process determines the basic ACD data for each paper size by printing and automatically measuring test pages.
- Control terminal of the Versafire LP: Here, in the "ACD" menu, you can configure the basic ACD settings for all papers, such as the detection level for the Image Quality Monitor. These settings serve as defaults for every print job.
  You can also view the ACD results directly on the Versafire LP and open respective reports for every print job.
- Prinect Cockpit: The ACD is always enabled if the print job is printed on a paper with ACD enabled. In Prinect Cockpit, however, you can make basic adjustments on a job-specific level.

Enabling, configuring and using Auto Color Diagnosis

Presettings for the ACD

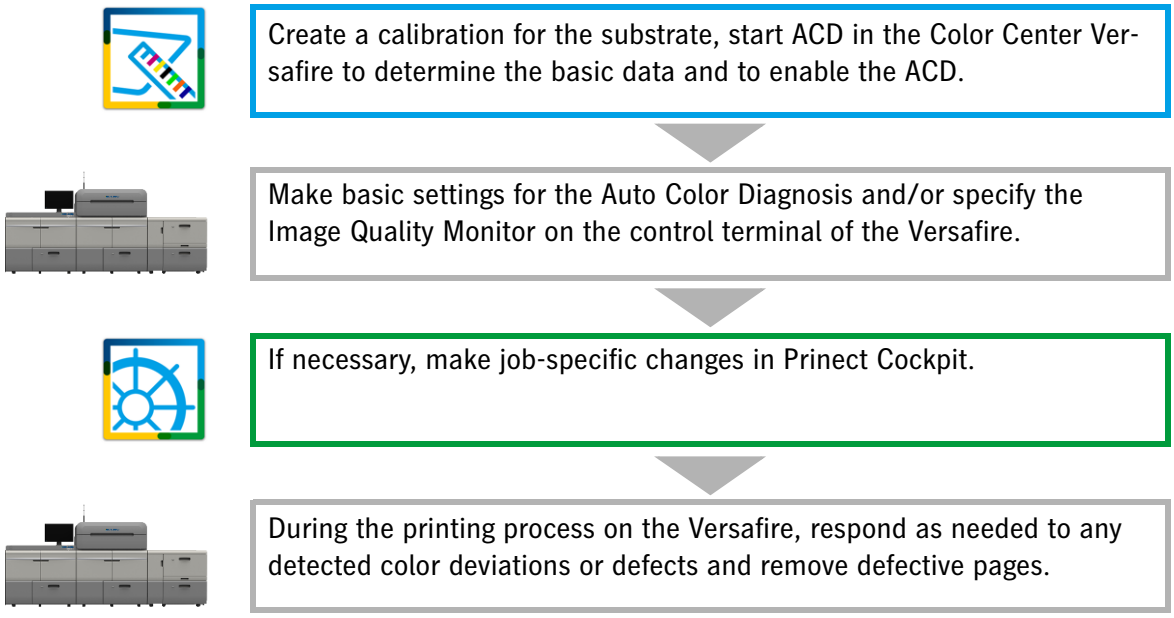
Supported papers

Paper Size	210–330.2 mm (8.3–13.0 inches) vertically × 279–700 mm (11–27.6 inches) horizontally; or 279–330.2 mm (11–13.0 inches) vertically × 210–700 mm (8.3–27.6 inches) horizontally (including user-specific and banner paper)
Grammage	"0"(40.0g/m^2) or higher
Paper Grade	Normal paper, recycled paper, high-gloss paper, glossy paper, matte paper, or synthetic paper
Paper color	white (same color of front and back)

ACD Cannot be used for transparent, structured or colored/preprinted substrates.

The following options cannot be used for ACD: Embossing, punching, borderless printing

Overview of the process sequence

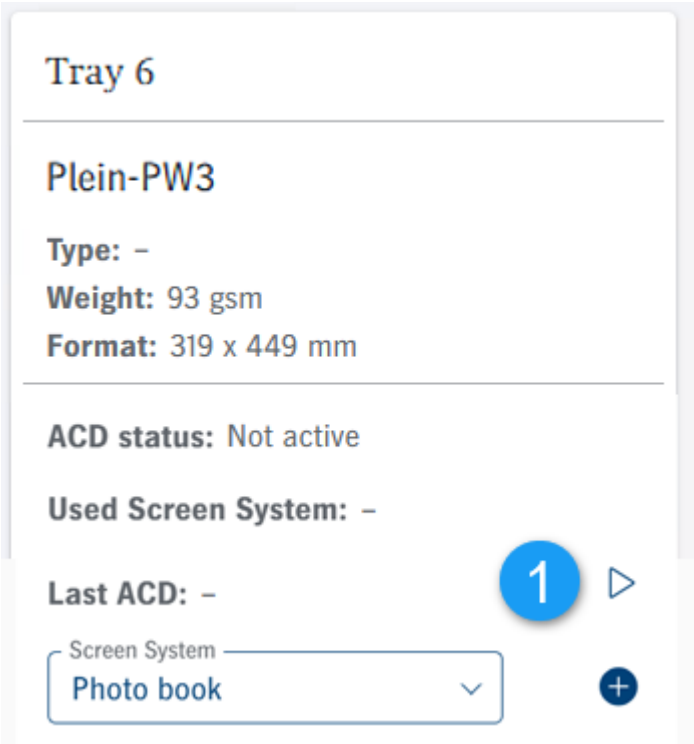


Starting ACD in Color Center Versafire

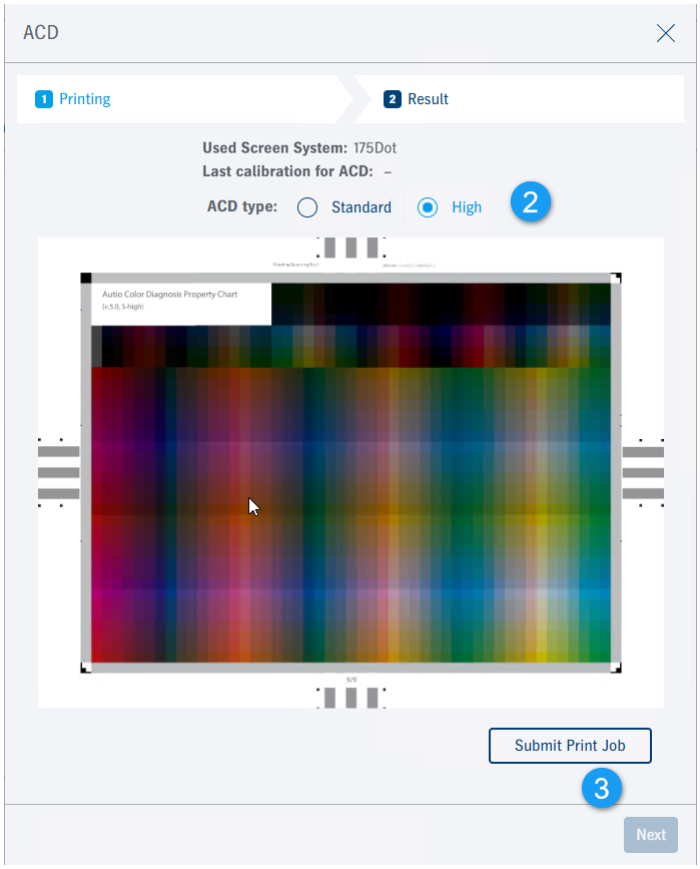
Prerequisite: The "Auto Color Diagnosis" function must be installed and enabled on the press. The substrate must meet the requirements and be calibrated. Make sure before ACD calibration that the inline sensor is clean (see the video on the machine for instructions on how to clean the sensor).

To use this function, you must run an ACD calibration for the paper:

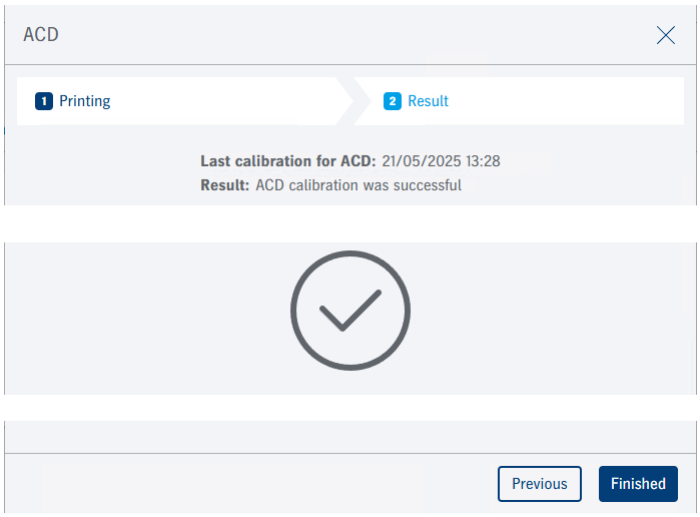
1. Click the arrow next to "Last ACD".



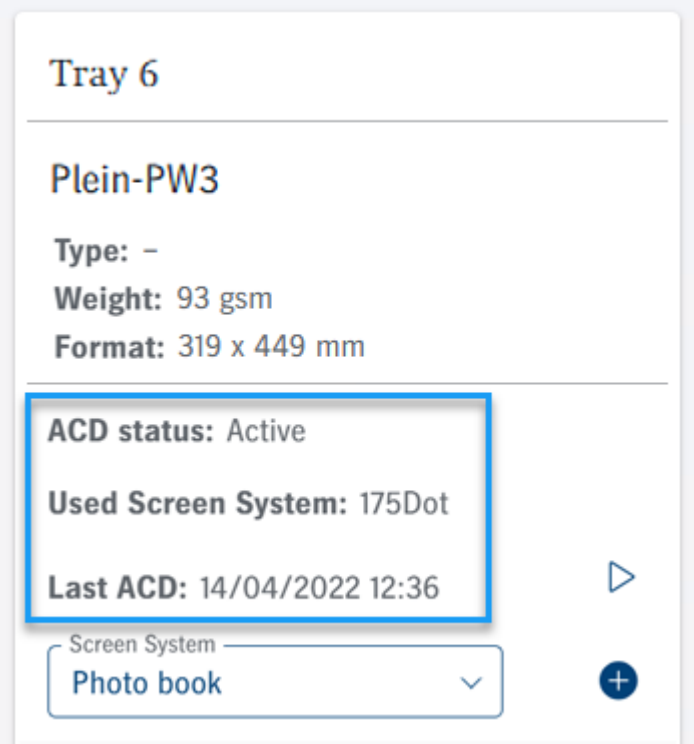
2. Choose either "Standard" or "High". For the standard ACD, 5 test pages are printed and evaluated inside the press, which is sufficient usually. For "High", 9 test pages are printed, which is recommended for more demanding print jobs.
3. Start printing the test pages via "Submit Print Job" and then click "Next". The test pages are printed and ACD evaluates them inside the Versafire.



4. Finally, the result displays. Click "Finish".



The tray overview now indicates the ACD creation date while the status changes to "Active":

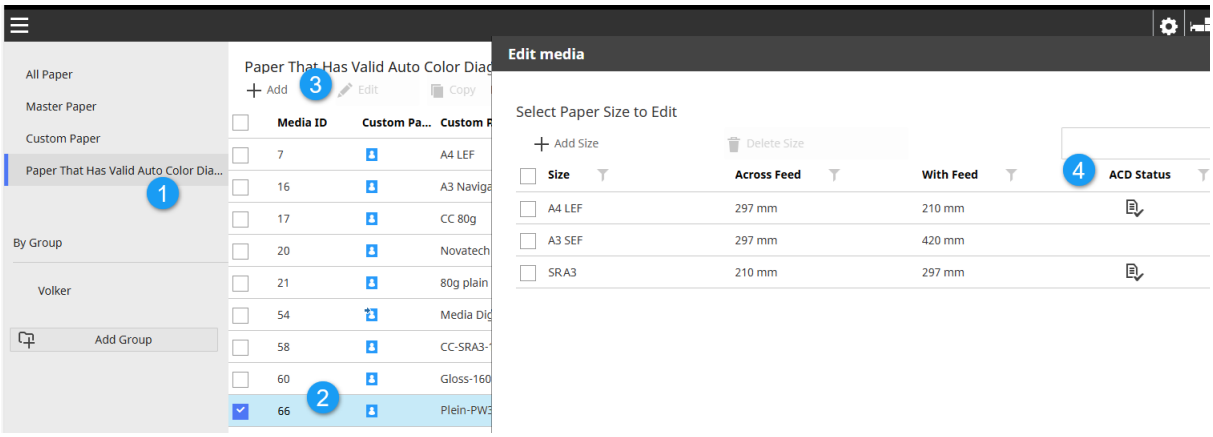


See also "Administration in Color Center Versafire", page 27.

Setting up the ACD on the control terminal (Administrator)

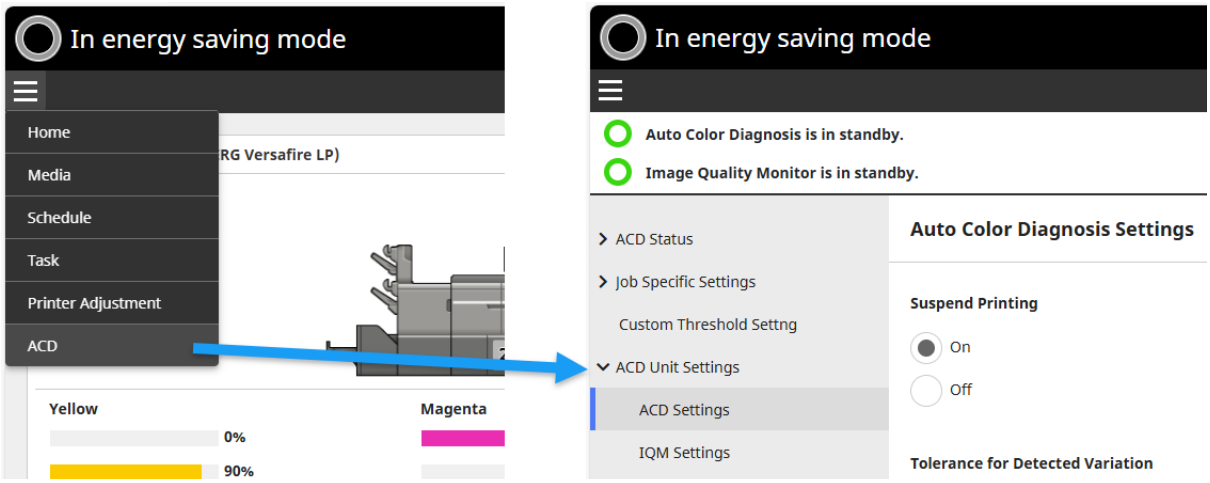
After ACD has been performed for the substrate for the first time on the Color Center Versafire, it will appear in the "Media" menu on the control terminal in the list of papers with valid ACD properties (**1**).

If you select the paper (**2**) and tap "Edit" (**3**), you will see – similar to the detailed view in the Color Center Versafire – in the "ACD Status" column (**4**) for which formats of this paper an ACD has been performed.



The settings used by the ACD are defined uniformly for all papers at the control terminal. You must be logged in with Administrator rights on the control terminal.

- In "Printer Settings > ACD Usage Settings", you can disable the Auto Color Diagnosis and/or the Image Quality Monitor.
- In the "ACD" menu, under "ACD Unit Settings", you can adjust the basic settings for the ACD, such as the error tolerance for each ink or the response to detected deviations, and you can define your own detection levels.



For detailed information on the ACD settings on the control terminal, see "Settings on the control terminal of the Versafire LP", page 19.

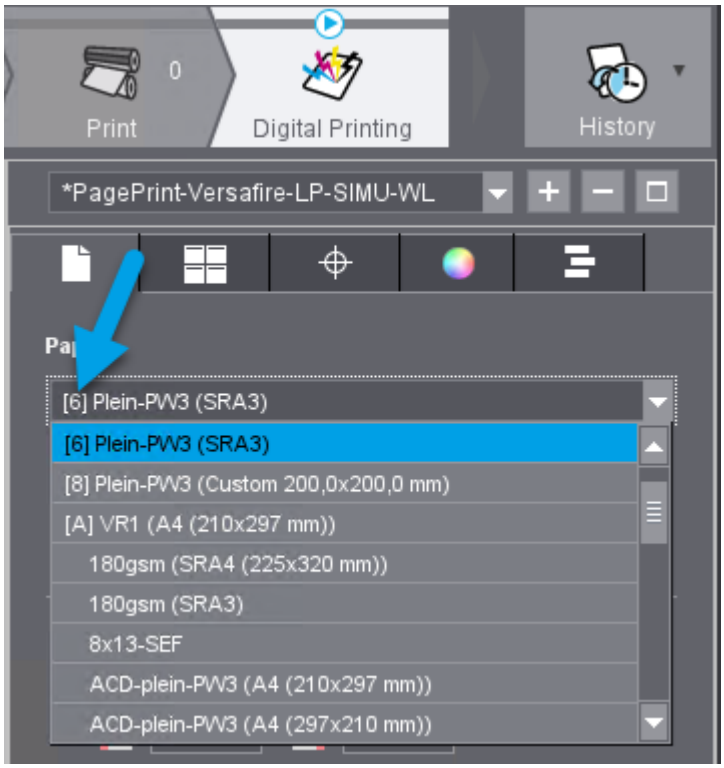
ACD in a print job in Prinect Cockpit

If ACD is enabled for a paper, the Auto Color Diagnosis is used whenever this paper is used for printing on the Versafire LP. However, you can adjust some of the settings for the specific print job in the "Digital Printing" section of the "Print and finishing settings" tab.

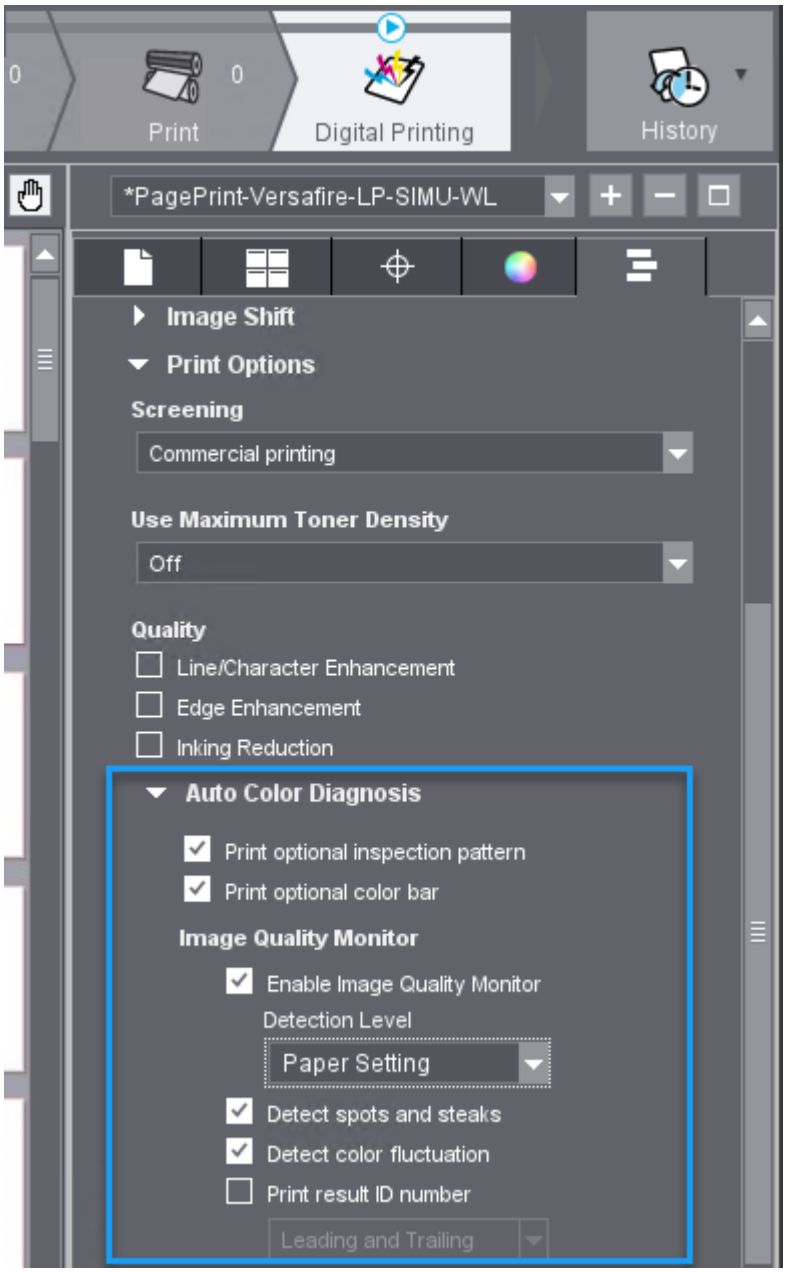
Note: The optional settings are only displayed if a connection to the printing press is established and paper has been loaded and selected for which ACD has been enabled.

Press is available:

Select paper with ACD (the number in square brackets indicates which tray the paper is currently loaded in):



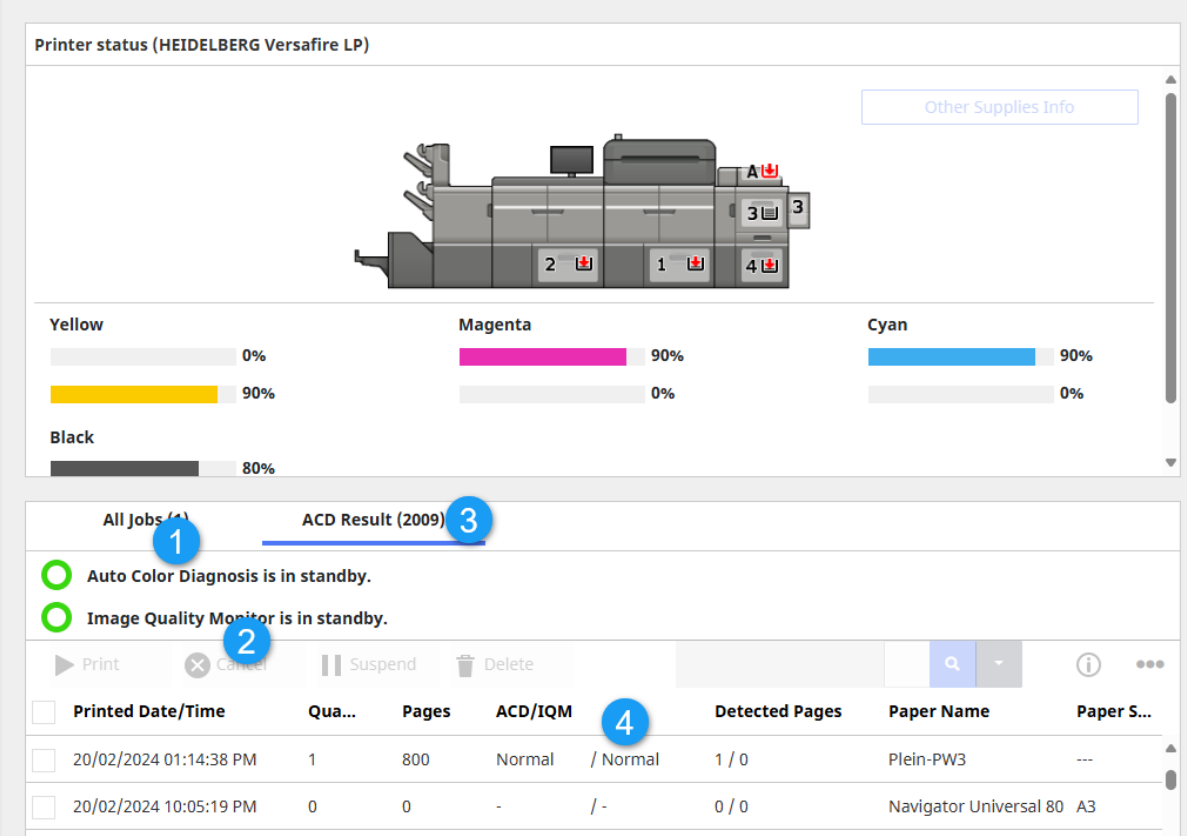
In "Print Options", you can open the "Auto Color Diagnosis" settings:



To use the options of the Image Quality Monitor, diagnostic markers must be printed. When the Image Quality Monitor is enabled, the various detection options can be turned on or off individually. For detailed information on the settings that can be made in the print job, see "Adapting ACD for specific jobs in Prinect Cockpit", page 26.

Display of ACD results on the control terminal (Operator)

As an operator, you can view the status indicators for Auto Color Diagnosis (**1**) and the Image Quality Monitor (**2**), and under "ACD Result" (**3**) you can view the results for individual print jobs on paper with a valid ACD (**4**) and thus respond to potential problems.



The actions you take in response to problems the ACD has detected depend on how the system has been configured by the administrator:

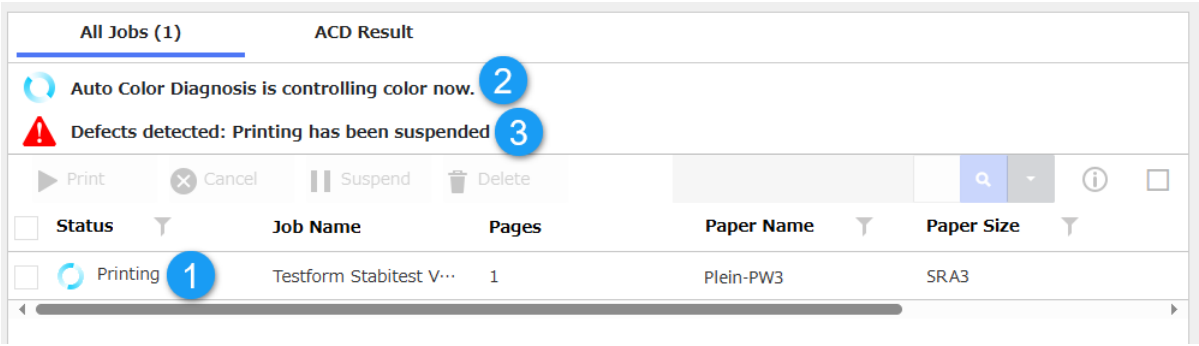
- If "Suspend Printing" is set as the behavior for Color Diagnosis and/or the Image Quality Monitor, the print job is suspended and a corresponding message displays on the control terminal.
- If "Suspend Printing" is disabled, printing continues, and the defects are listed in "ACD Result".
- When the "Image Quality Monitor"detects defects such as spots or streaks, alternative behaviors can also be configured:
    - "Restore" repeats printing the page in question. The print job stops if the error occurs again. If the error does not occur again, printing continues, and you simply need to remove the affected page from the print stack.

- "Insert separator sheet": Printing continues, but the defective pages are marked with separator sheets so they can be easily removed from the print stack later.

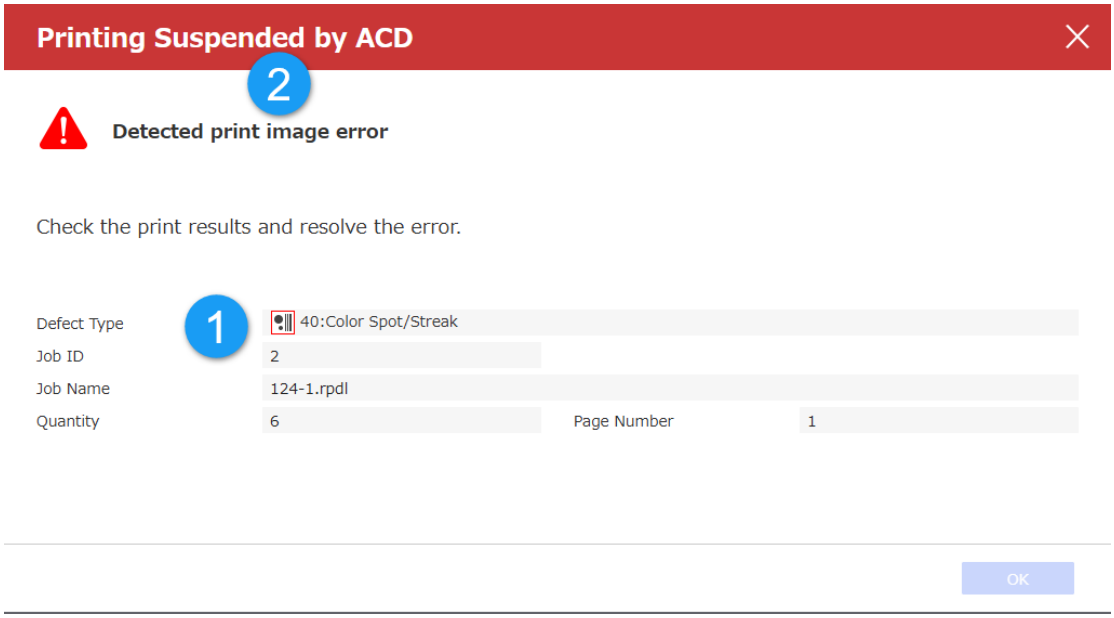
Example

The Auto Color Diagnosis and the Image Quality Monitor are enabled for the paper. The print job is submitted without the changes to the ACD settings made in Prinect Cockpit. There is a single sheet with an ink spot in the paper stack.

While the job is being printed on the Versafire (**1**), Color Diagnosis continuously checks for uniform color reproduction (**2**), and the Image Quality Monitor "detects" the ink spot (**3**).



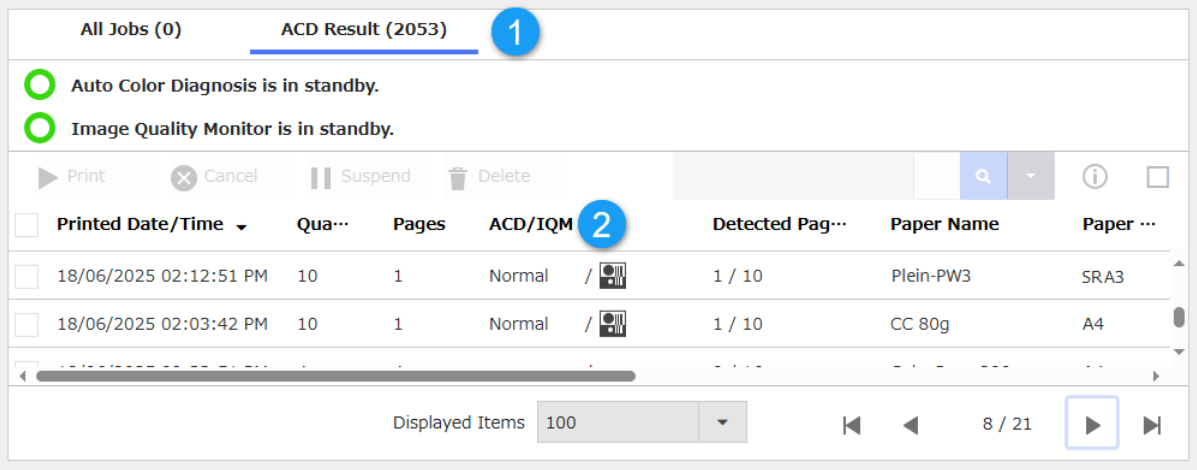
The control terminal displays a message that identifies the Defect Type (**1**). In the example shown, the Image Quality Monitor was set to "Suspend Printing" as the action to take when defects are detected, meaning that the print job was suspended (**2**).



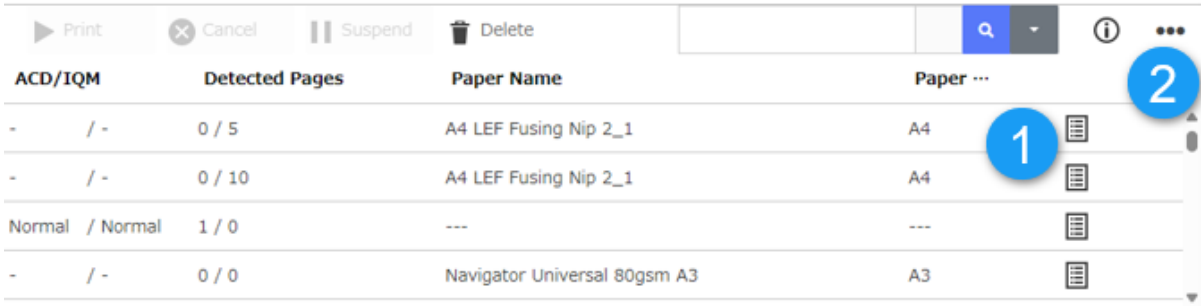
Remove the press sheet containing the defect from the print stack. Please note that this is not the last printed sheet as the Versafire, due to its high printing speed, will continue to print several more sheets that may not necessarily have defects.

Then close the error message and resume the print job (administrator rights may be required for this).

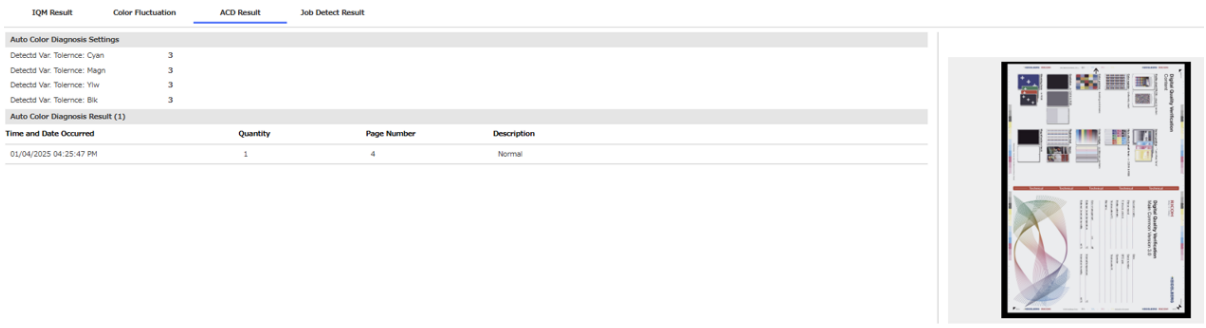
In the "ACD Result" section (**1**) you can see in the "ACD/IQM" column (**2**) for all print jobs whether any problems have occurred. In the example shown, the Image Quality Monitor detected individual pages with defects in both print jobs, while the Auto Color Diagnosis did not identify any problems.



Detailed view/Report



Click the Detail icon (**1**) to view the ACD results for each separate print job:



Click the three dot menu (**2**) and choose "Output ACD Report" to create a report of the print job in the PDF format.

Repeat ACD

ACD must be repeated in the following cases:

- Inline sensor of the press has been replaced
- Printing speed has been changed in the paper settings
- Changed register information in the paper catalog

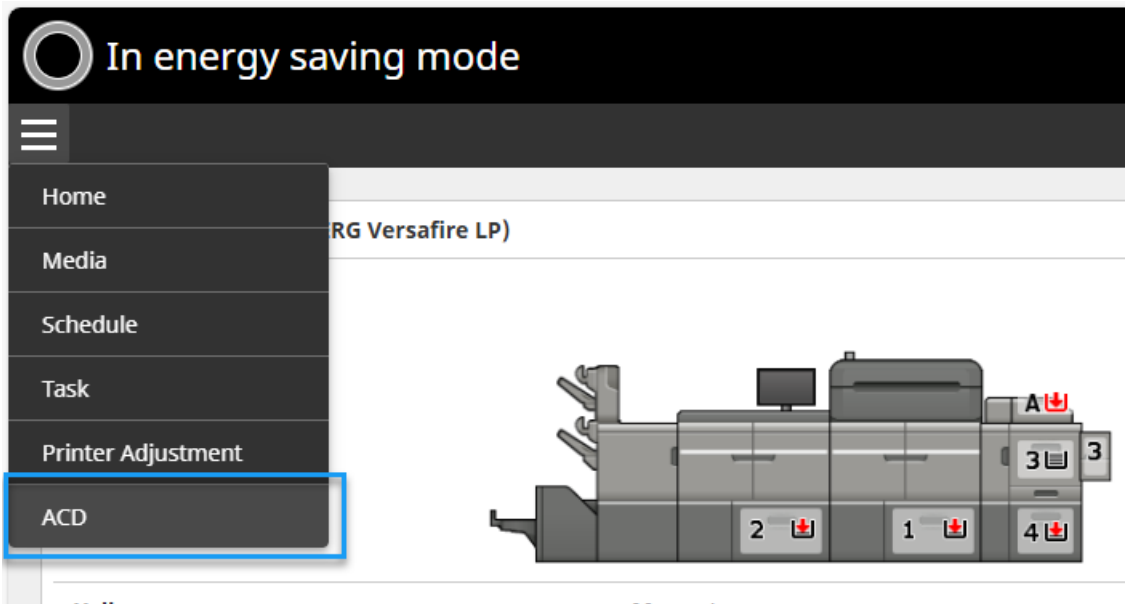
Detailed information on the software components

Settings on the control terminal of the Versafire LP

Prerequisites

- The additional hardware is installed in the Versafire LP and configured.
- You are logged in with Administrator rights on the control terminal.

The user interface of the machine's control terminal shows an additional "ACD" menu.

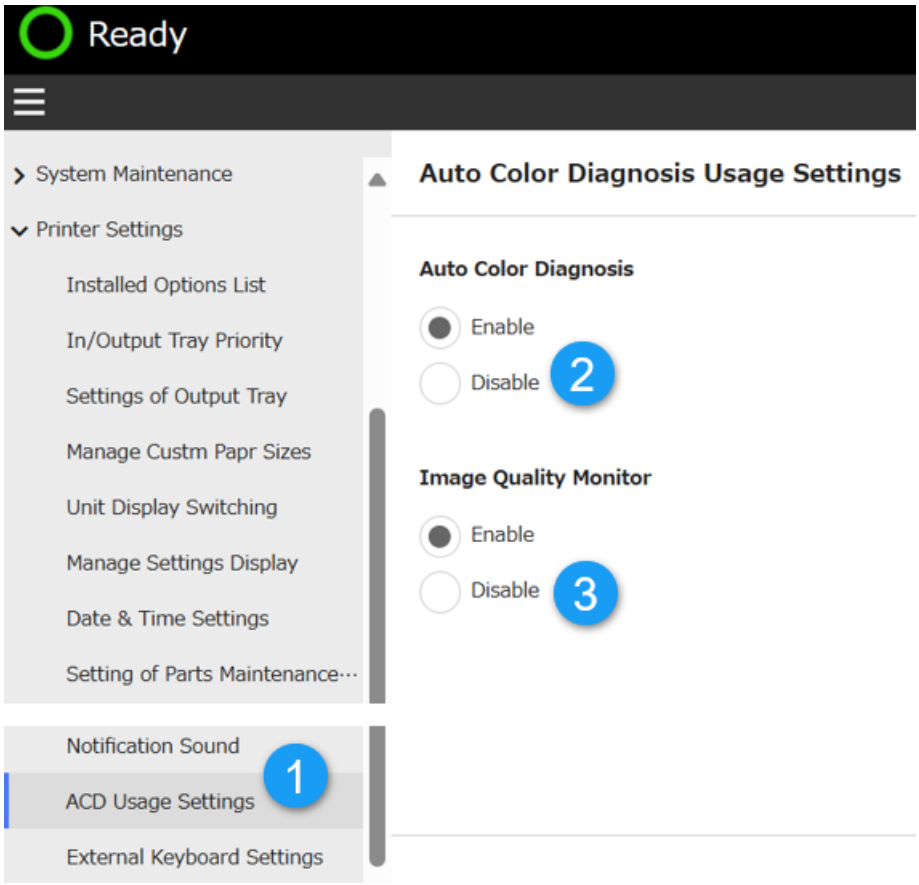


"Auto Color Diagnosis" and "Image Quality Monitor" are enabled by default with preset parameters.

This means, the ACD is always enabled automatically as soon as a print job is output on a paper with valid ACD assignment.

Disable ACD completely or partially

In "Printer Settings > ACD Usage Settings" (1) (can be invoked with the cogwheel icon), you can completely disable the Auto Color Diagnosis (2) and/or the Image Quality Monitor (3). This will then apply to **all** print jobs.



Overview of possible ACD Unit Settings

In "ACD > ACD Unit Settings", you can edit the basic ACD settings (= apply to **all** papers with valid ACD):

- "Auto Color Diagnosis":
    - Error tolerance per ink
    - Behavior if deviations are found
- "Image Quality Monitor":
    - Check for register errors between front and back
    - Behavior if deviations are found
    - and detailed settings for the behavior
- "Detection of unstable ink levels":
    - Selection of the Delta-E type
    - Behavior if deviations are found
    - Setting up the maximum color deviations

Setting up the Auto Color Diagnosis

Suspend printing

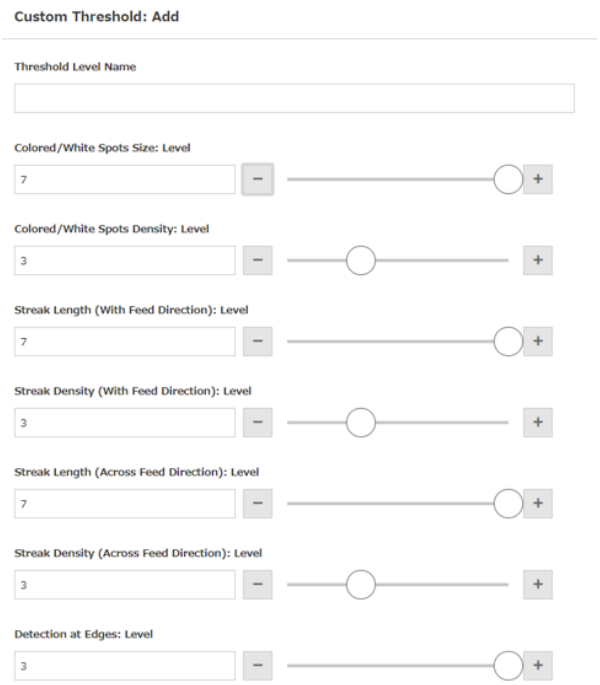
If the option is enabled, the print job is suspended if deviations are found, and the machine operator must decide how to proceed. If the option is disabled, printing continues, and the deviations are listed in "ACD Result".

Tolerance for detected deviations

For all four inks, you can set different values (default: 3) for permitted color deviations.

Setting up the Image Quality Monitor

The Image Quality Monitor includes seven predefined standard threshold settings (7 = highest sensitivity level) that you can assign to your paper. If necessary, you can also create and use your own combinations of threshold values ("Custom Threshold Settings > Add").



Settings for detecting registration errors between front and back

For duplex printing, the register accuracy between front and back is checked, and an error displays if the deviation exceeds a given threshold.

Printing when defects are found

This is where you set the system behavior if errors are detected in the print job (default: "Suspend printing").

Suspend printing: The print job is suspended, and an error message displays on the control terminal. Based on the error found, decisions on how to proceed can be made. You can change the permissible number of pages wit errors (default: 1).

Restore: This page will be reprinted. The print job is suspended if the error persists after the maximum number of repetitions (default: 3).

Insert separator sheet: With this option, you can print separator sheets to better identify defective sheets later.

Detection of unstable ink levels

Color difference

Select how the difference between target color and measured color is displayed

ΔEab ("CIELAB") is the definition for calculation of color difference based on the ISO standard of 1976 and the standard for offset printing. The more recent ΔE2000 formula is significantly more complex, provides preciser values and is the standard for digital printing.

Suspend printing

If the option is enabled, the print job is suspended if deviations are found, and the machine operator must decide how to proceed. If the option is disabled, printing continues, and the found deviations are listed in "ACD Result".

Color difference threshold

Here, you use the slider, the plus/minus buttons, or by typing in the input field to set the maximum color deviation for individual colors or the overall value.

Job-specific settings

In "Job-specific settings", you can set custom values:

- Define undetected areas
- Define colorimetric areas
- Define various thresholds that you can select as detection levels for specific jobs in Prinect Cockpit. You can, for example, reduce the detection size of streaks and spots to prevent undesired print stops.

For detailed description, please refer to "Auto Color Diagnosis / Image Quality Monitor Guide".

Notes and Tips

PLEASE REMEMBER: The operator must ensure that there is sufficient space for the ACD analysis marks. As the program adds the marks, they do not show in the DFE preview!

The analysis system does not require any additional color bars because it measures the image content. If only few images are present, additional color bars can be useful, even if this means that additional space must be reserved on the press sheet.

Auto Color Diagnosis

The Auto Color Diagnosis

- creates a basic color standard,
- calculates the color deviation
- And applies the correction value.

The level of deviation is calculated by automatically selecting the most appropriate areas and taking numerous CMYK measurements at various points.

The CMYK correction value is calculated for each set of pages by comparing the digital master image with the scanned image. At least 18 pages are required to perform the correction.

Print jobs with the following characteristics are optimal for color diagnosis:

- All tonal ranges (highlights, midtones, shadows)
- Wide distribution in both scanning directions
- Many measuring points

Image Quality Monitor

The Image Quality Monitor (IQM) finds image defects. It detects streaks or spots on printed media by comparing processed data with the scanned print image.

The test chart is necessary to maintain the test accuracy.

The "Print result ID number" function makes it easier to locate the page in question.

Image patterns affect the evaluation:

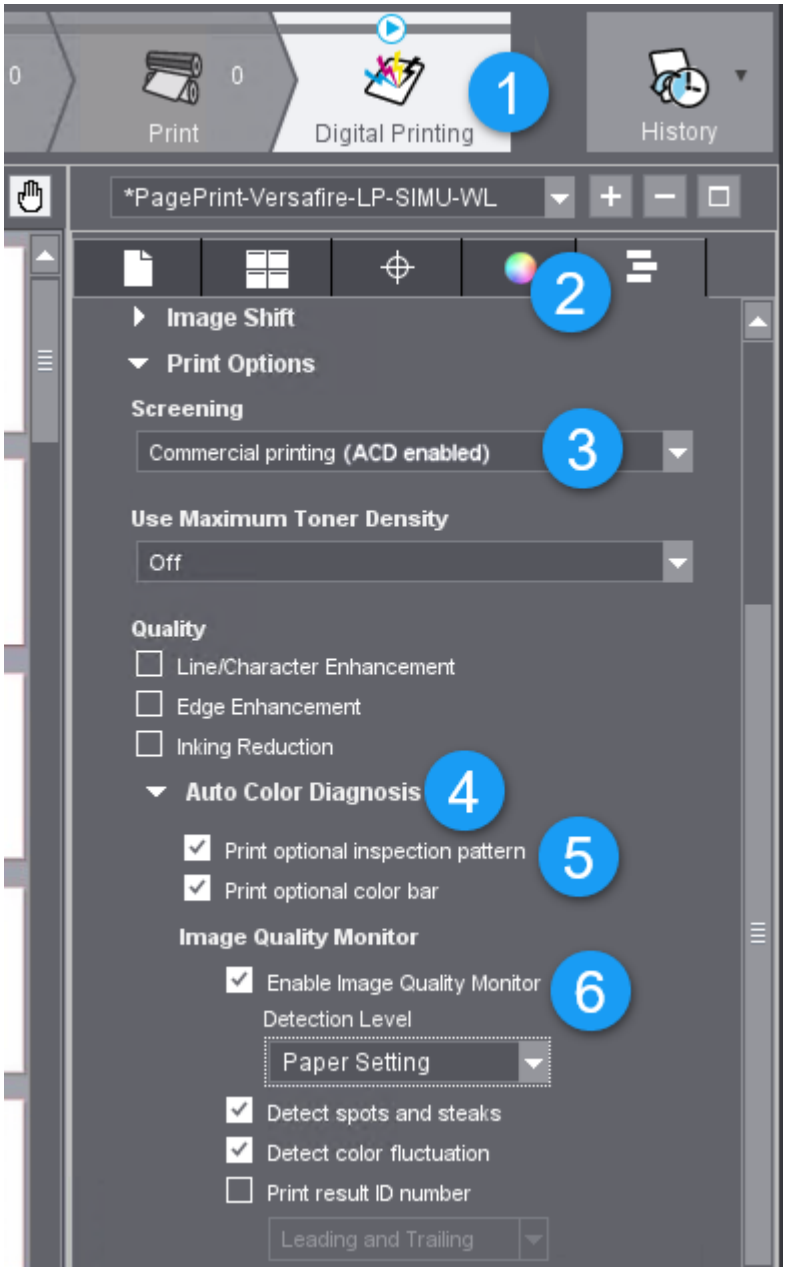
- Fine lines/text with high contrast and a dark background may be incorrectly detected as defects.
- Images with very low resolution may be detected as defects.
- Embossed paper may be detected as a defect if the pattern is part of the image rather than the paper surface.

Workarounds in case of incorrect detection of defects:

- Lower the detection level
- Clean the sensor
- Specify areas to be omitted from defect detection

Adapting ACD for specific jobs in Prinect Cockpit

If ACD is enabled for a paper, the Auto Color Diagnosis is used whenever this paper is used for printing on the Versafire LP. The basic function cannot be enabled or disabled individually for every print. But you can adjust some of the settings for the specific print job in the "Digital Printing" section (**1**), for example, if you want to print the current job without "Image Quality Control".



Prerequisite: The optional settings are only displayed if a connection to the printing press is established and paper has been loaded and selected for which ACD has been enabled.

The availability of ACD also depends on the selected screen set: The list box indicates the screen set for which ACD is enabled (**3**). The ACD settings will be disabled when a different screen set is selected. The tooltip for the Info icon informs you that the selected screening does not support ACD.

1. Open the settings for "Auto Color Diagnosis" (**4**) in the "Print and finishing settings" tab (**2**). By default, ACD is set as you specified on the control terminal of the printing press.
2. You can now make the following settings:
   - "Print optional inspection pattern" (**5**): Under certain conditions, you can print groups of color patches named "Inspection pattern" aligned parallel to the feed direction on the left and right paper margins. Inspection patterns support the Auto Color Diagnosis if the number of colors printed on the page is insufficient. When printing, you must make sure the inspection patterns are positioned outside the print subject so that they are trimmed off later.
   - "Print optional color bar": Prints an optional color bar for improved color diagnosis.
   - "Enable Image Quality Monitor" (**6**): The Image Quality Monitor checks the print product for defects such as white or dark spots or horizontal or vertical streaks.

Prerequisite: The output of inspection patterns is enabled.

With Image Quality Monitor enabled:

- "Detection level": You can define multiple user-specific detection levels on the printing press control terminal, for example, to use a lower sensitivity for certain print jobs. In Prinect Cockpit, you can then select a detection level for each print job that differs from the standard "Paper Setting."
- "Detect spots and streaks": Detects image quality issues such as white spots on monochrome areas or black or different background color as well as longish spots or white spots in an image.
- "Detect color fluctuation": A color difference between the last printed copy and the first copy or the predefined color standard that exceeds the specified value.
  Note: Color fluctuations are not detected if there is no colored area on the page that can be measured.
- "Print result ID number": Specify if and ID number is to be added on the printed material. We recommend adding ID numbers so that the printed copies can be searched for pages with defects.

Administration in Color Center Versafire

Function of Prinect Color Center Versafire

The quality and true-color nature of a print result depend on various factors. Above all, the settings on the press matching the substrate used play a decisive role in this. Substrate refers to the material that will be printed. This can be paper of different qualities or different materials like plastic film.

Before printing actually starts, these settings must have been calibrated to ensure accurate color reproduction. Prinect Color Center assists you when creating this substrate qualification. This substrate qualification is also necessary for starting the ACD in Color Center Versafire.

Note: Color Center Versafire is a browser-based application that can be started with various browsers. Internet Explorer is not supported.

Components of a substrate qualification

- Creating a (color) calibration for every paper
- Apply calibration to similar papers, where applicable
- Creating ICC profiles that can be assigned to print jobs in the Digital Printing section of Cockpit

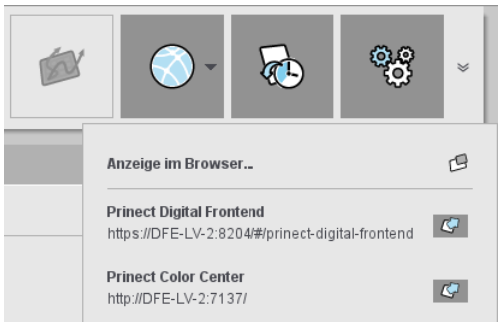
You will find more details about this in the Online Help of Color Center Versafire.

Data management

For information on the the papers set up in the press, see "Administration in Color Center Versafire", page 27; an overview of the calibrations/profiles, refer to "Calibration management" or "Profile management".

Invoking ACD in Cockpit

You can also invoke Color Center Versafire in Prinect Cockpit: Click the globe icon in the Digital Printing Terminal and, in the menu, the icon following "Prinect Color Center". The prerequisite for this is that you are logged in with at least the "Press Operator" and "Digital User" user rights.



List of Papers in Color Center Versafire

You cannot create papers or edit them in Color Center Versafire. Paper definition is done at the press. "Paper management" shows only an overview of all papers defined at the press.

The Color Center Versafire PC and the press synchronize automatically on a regular basis, so that newly created papers or changed paper properties are immediately visible in Color Center Versafire.

The three-dot menu to the right of each paper item offers the following functions:

Download: This will export all the data of the selected paper into a Zip file.

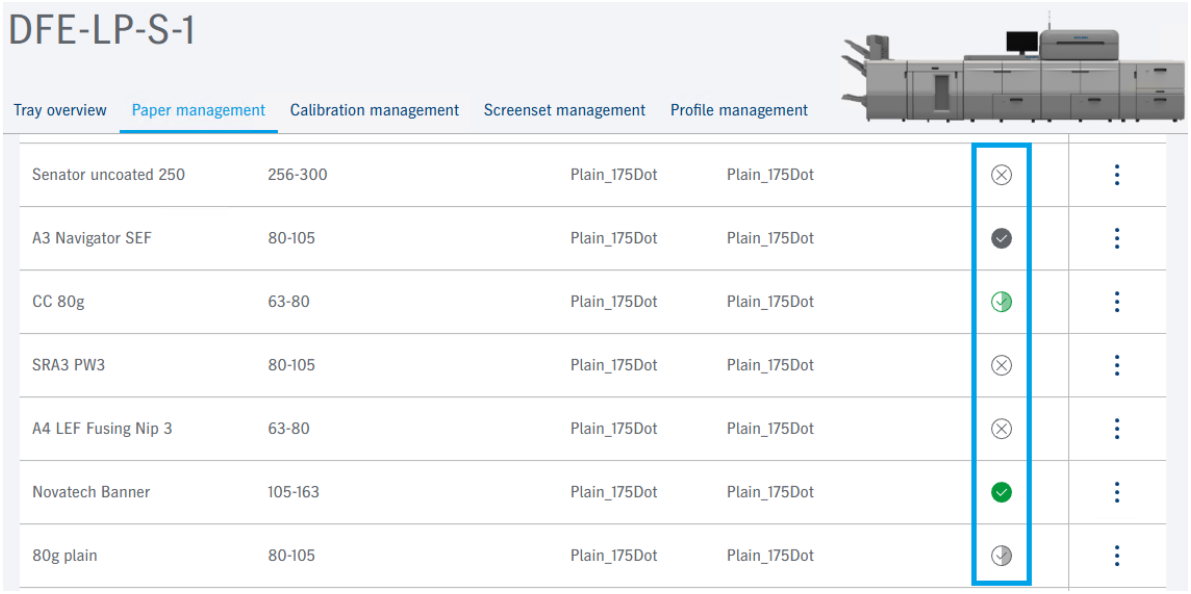
To view all detailed information for a paper, click the book icon.

Copy paper settings (see below)

In addition to the three-dot menu, the states of the ACD for the respective paper are also displayed if Auto Color Diagnosis (ACD) is installed.

ACD representation in Paper management

In addition to the three-dot menu, the ACD states for the respective paper are also displayed in Paper management:



By clicking the three-dot menu, you can call up the details in which all formats of this substrate are displayed with their respective ACD states.

ACD fully active (for all the formats of this substrate)

ACD is active for some of the formats of this substrate and can activated for the other formats

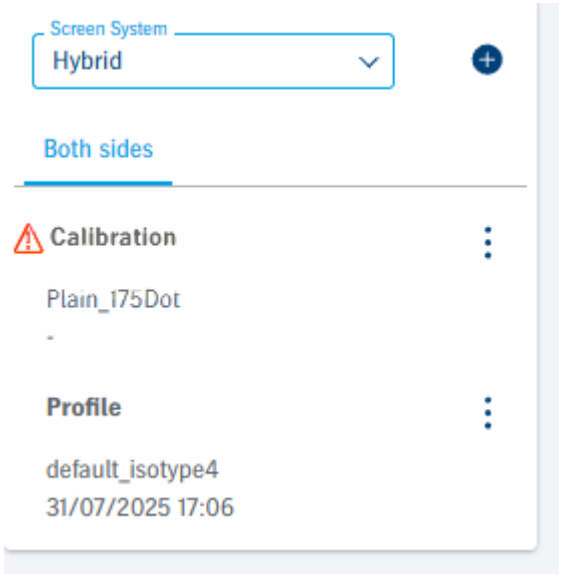
Color Center Versafire started ACD for this substrate, but cannot be used for print control because the formats do not meet the requirements (e.g. paper formats too small)

ACD is active for some of the formats of this substrate but cannot be activated for the other formats

ACD has not been performed or cannot be used for this paper

ACD status in Tray overview

If a screen set is selected for a paper for which no calibration has yet been performed, a warning icon appears next to the "Calibration" entry. No ACD can be used for the substrate with this screen set (ACD function hidden).



Status	Explanation
Not active	ACD cannot be used for this substrate (for example, black paper, format too small, etc., see Presettings for the ACD)
Activated	ACD can, in principle, be used for this type of substrate, but it has not yet been performed and is therefore not active.
Active	ACD has been performed and is available in Cockpit. Note: The Versafire LP displays this status as "Valid".

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Technische und sonstige Änderungen vorbehalten.