DTG / DTF Printing

Epson F2100

institut
FRANÇAIS
de la
MODE

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FabLab security and good practices regulations

- Wearing of closed shoes recommended.
- Wear appropriate clothing for handling machines and tools (not too loose clothing, too long jewelry, tie your hair back if necessary).
- Never use a machine without first being trained on it.
- Be fully aware of your actions.
    - Do not use machines if you are tired or ill.
    - Do not consume alcohol or drugs before using the machines and tools.
- Do not distract or surprise other users while using the fablab machines and tools.
- Never leave a machine running unattended, use only one machine at a time.
- Warn the fabmanagers of any danger.
- Never open a machine, warn the fabmanager present in the area for any technical problems related to the machines (malfunction, breakage, etc.).
- Keep the work area clean and tidy after use.
- Store materials and tools in their place.
- Prepare files before occupying the machine workstation.
- Do not apply force to the machines: ask for help, that's what fabmanageuses are there for!
- Turn off the machines after use.
- Do not eat or drink in the Fablab.

Security related to DTG printing

The F500 printer is not a dangerous machine for the user. BUT the user can be a danger to the machine.

- **Never use textiles with long pile and/or long fibres.**
- **Do not allow fabrics to protrude from the mobile platen (secure them well).**
- **Never open the printer's covers.**
- **Never force the machine (force the moving parts, etc.).**

Dye sublimation requires the use of a thermal press. The main danger of this technique is burn injury.

- **Never leave the hot heating press unattended.**
- **Only one person at a time may use the heating press**

Principle of DTG printing

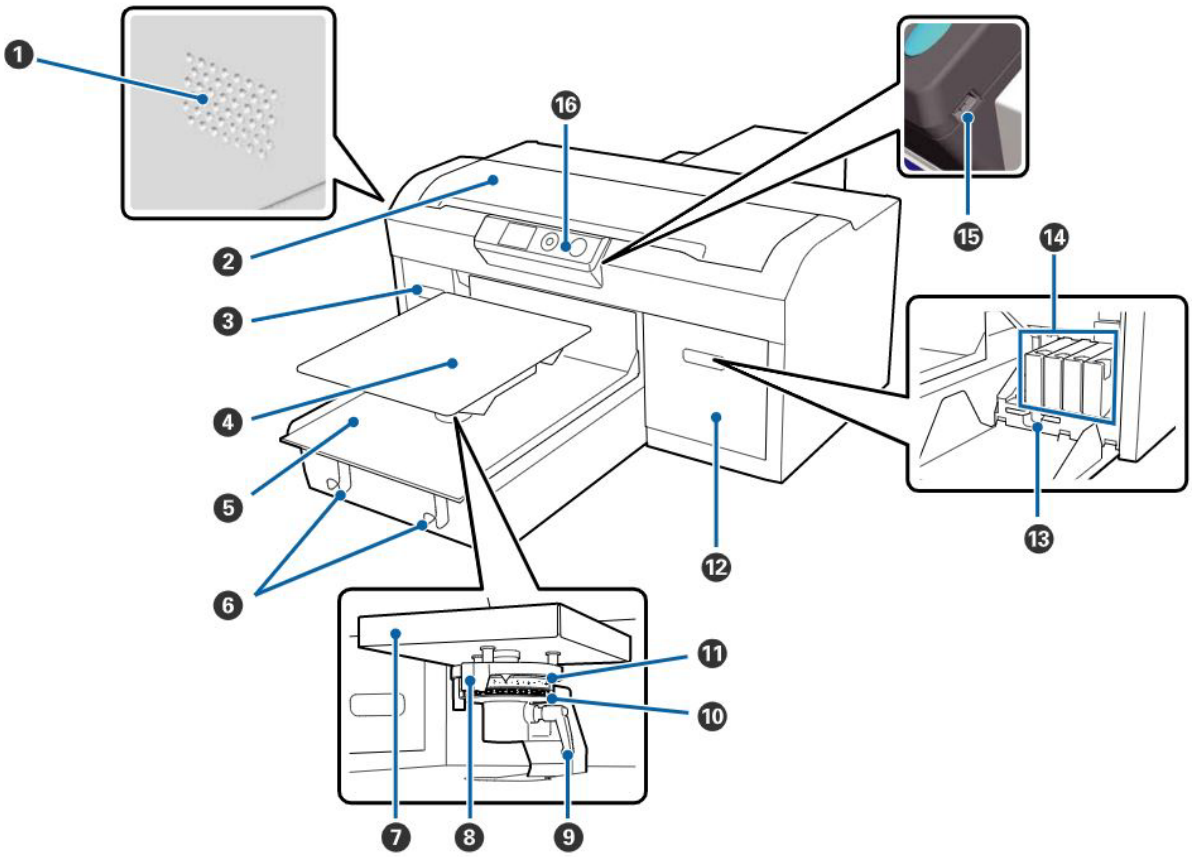
Direct to garment (DTG) printing is an inkjet printing technique that consists of printing a visual directly onto textiles by projecting ink onto the fabric fibre.

DTG printing is carried out using Cyan, Magenta, Yellow, Black and White inks (for printing on coloured or black textiles). White ink requires pre-treatment of the fabric. All inks must be fixed to the fibres by thermal pressure.

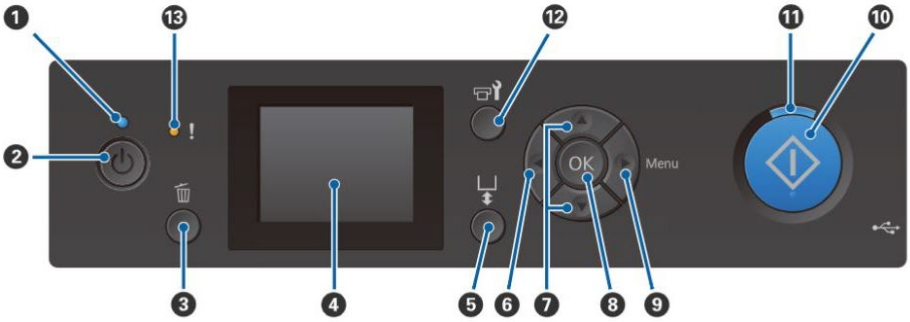
This printing technique is dedicated to natural vegetable fibres (cotton, linen, hemp, etc.) and animal fibres (wool, silk, etc.).

Printer description

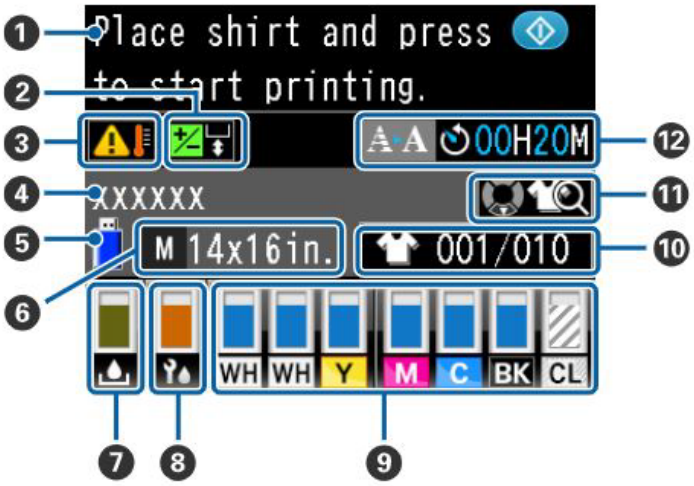
1. Diagram of the ESPSON SC-F2100 printer



1- Air outlet
2- Printer cover
3- Cartridge cover
4- Print tray
5- Carriage
6- Frame support
7- Tray support
8- Platter height adjustment lever
9- Position locking lever
10- Spacer A
11- Spacer B
12- Cartridge cover
13- Clamp
14- Cartridges
15- USB port
16- Control panel



1- Power indicator
2- On/Off
3- Cancel
4- Control screen
5- Tray Entry/Exit
6- Rewind
7- Up/Down selection
8- Enter
9- Menu
10- Start printing
11- Indicator light
12- Maintenance
13- Error indicator



1- Status / Message
2- Print head info
3- Temperature around head
4- Print job name
5- USB memory status
6- Tray format
7- Used ink tank level
8- Maintenance status
9- Ink level
10- Number of copies
11- Job information
12- Counter before cleaning

2. Features

The Epson SC-F2100 is a direct textile printer.

Technical information:

- Inkjet printing CMYK + White (CMYK + W)
- 5 printing modes
- 1 printing plate (M format) // max dimensions = 356 x 406 mm

DTG printing process

1. Diagram of the steps

Direct textile printing is a multi-step technique that requires the handling of several machines (printer and thermal press). It is essential to follow all the steps of the process to obtain a result.

PREPARATION OF THE IMAGE TO BE PRINTED

Knowing and checking the image characteristics required before printing.

↓

PRE-TREATMENT

When printing white ink (mainly on black and dark fabrics), the application of the pre-treatment liquid on the material is essential.

↓

PREPARATION OF THE MACHINE

Secure the fabric on the plate and adjust the height.

↓

SETTING UP THE PRINTING PARAMETERS

Know how to set the print parameters in the RIP software.

↓

PRINTING

Start a print correctly.

↓

FIXING THE INKS

Fix the ink on the textile with the thermal press.

2. Preparing the file to be printed

Knowing and understanding the characteristics of the image you wish to print is essential for any print job. The following concepts are the key to a good printing result.

- ***Image type:***

  Images can be classified into two categories: vector images or raster (bitmap) images. Raster images are images constructed from a grid of coloured points (pixels). Each of the points has a defined colour* and it is the set of coloured boxes placed side by side that will compose the image. Vector images are defined by a set of lines (straight or curved) in a 2D space (x;y). These lines are characterised by their positions in space, by their contours (colour, thickness, style, etc.) or fills (colour, opacity, etc.).

  ! *Both types of image can be printed by the printer. However, care must be taken with the processing of raster images which do not support enlargement (loss of image quality).*

- ***Image format:***

  The printer's configuration software uses the .PNG format. This allows you to work with transparent backgrounds (be sure to check the "transparent background" box when exporting via image processing software).

- ***Image size:***

  The size of an image is defined by the width and height (W x H) of the image when printed. It can be expressed in cm (or mm) or in inches.

  ! *When you want to print an image, always consider its size (especially for raster images). It is strongly recommended to work with a full size image (**scale 1**) to avoid pixelation.*

- ***Image resolution:***

  The resolution of an image corresponds to the pixel density for a given surface. It is defined in dpi = dot per inch. Here, we use images of **360 dpi**.

3. Pre-treatment for white ink printing

The pre-treatment liquid is a product diluted with water to fix the white ink on the fibres of your textile.

- **PLACE THE TEXTILE** on the **dedicated pre-treatment** area.

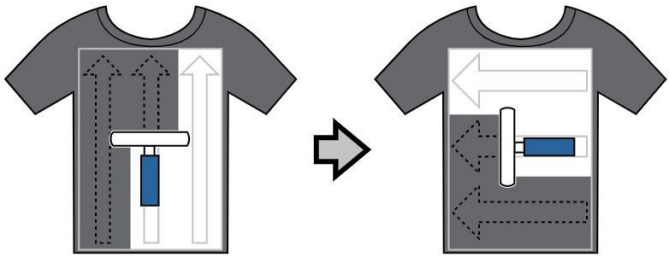
- **POUR <u>a little</u> pre-treatment liquid** into the yellow container and then

DIP the roller into the liquid.

! Remove the excess liquid by pressing the roller on the top of the yellow tray.



- **COAT THE TEXTILE** with a roller in **<u>criss-cross strokes</u>**.

! If the liquid is not applied evenly, the adhesion of the inks on the textile and the final result will not be guaranteed.

- **DRY the pre-treatment in the thermal press** (**170°C / 90sc**).

  - Place the fabric directly on the **sponge tray**
  - Place a **sheet of baking paper** over the fabric to protect the upper press plate.

  ! The pre-treatment must be dry before printing, so it is imperative to use the hot press. Repeat this step until the fabric is completely dry.

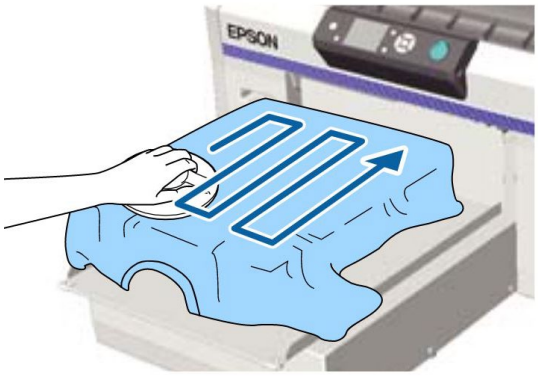
4. Set the printer

- **CHECK that the machine is switched on**. If not, press 
- **CHECK that the tray is outside the machine**. If not, press 

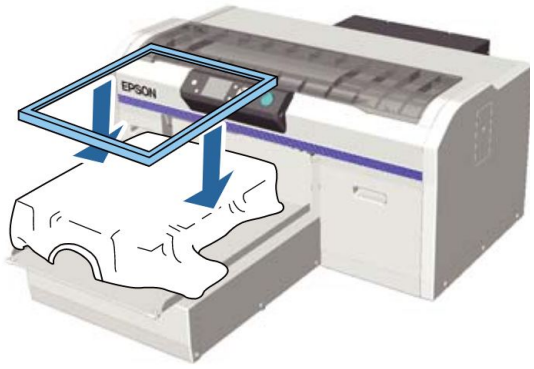
- **Place the fabric on the tray.**
  ! The "top" of the print will be at the front of the platen. Arrange the fabric accordingly to print in the correct direction.

- **PULL THE FABRIC** from both sides to obtain a flat, crease-free printing surface.

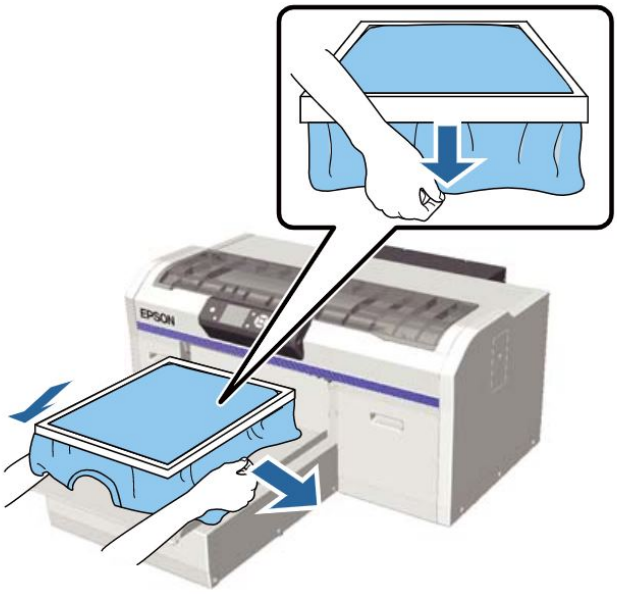
- **USE the pad** to flatten the print surface



- **MAINTAIN the fabric** with the metal frame OR with masking tape



- **TENSE the fabric** by gently pulling on each side



- **ADJUSTING the height of the tray**

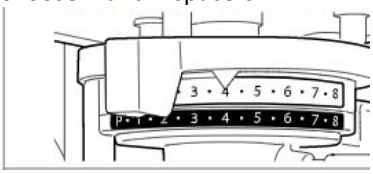
  The **height of the platen** depends on the thickness of the fabric. It allows you to obtain the right distance between the surface of the fabric and the print heads and thus to print with the right focus (sharpness).

  - If the plate **is too high**: Machine beep + error message = printing impossible!
  - If the plate **is too low**: printing possible BUT blurred

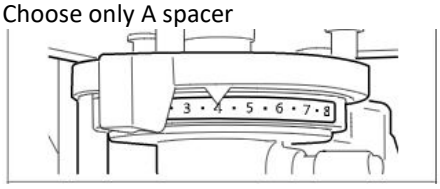
  *! The error message can also be displayed if the fabric is **not well stretched** on the plate OR if **a fibre is sticking out**.*
  In this case, repeat the previous step with the pad and check that no dust or fabric fibres are sticking out.

- **CHOOSE the right spacer(s)** for the fabric :

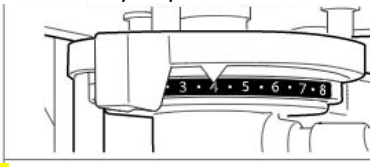
For fabrics up to 7mm thick
Choose A and B spacers



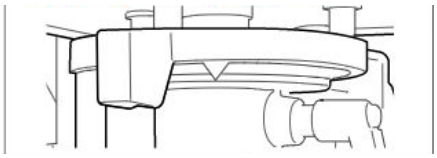
For fabrics with a thickness of 5 to 13mm
Choose only A spacer



For fabrics with a thickness of 9 to 17mm
Choose only B spacer



For fabrics with a thickness of 15 to 24mm
Remove all the spacers



! Ask one of the fabmanagers to change the spacers.

- **RELEASE the locking lever**

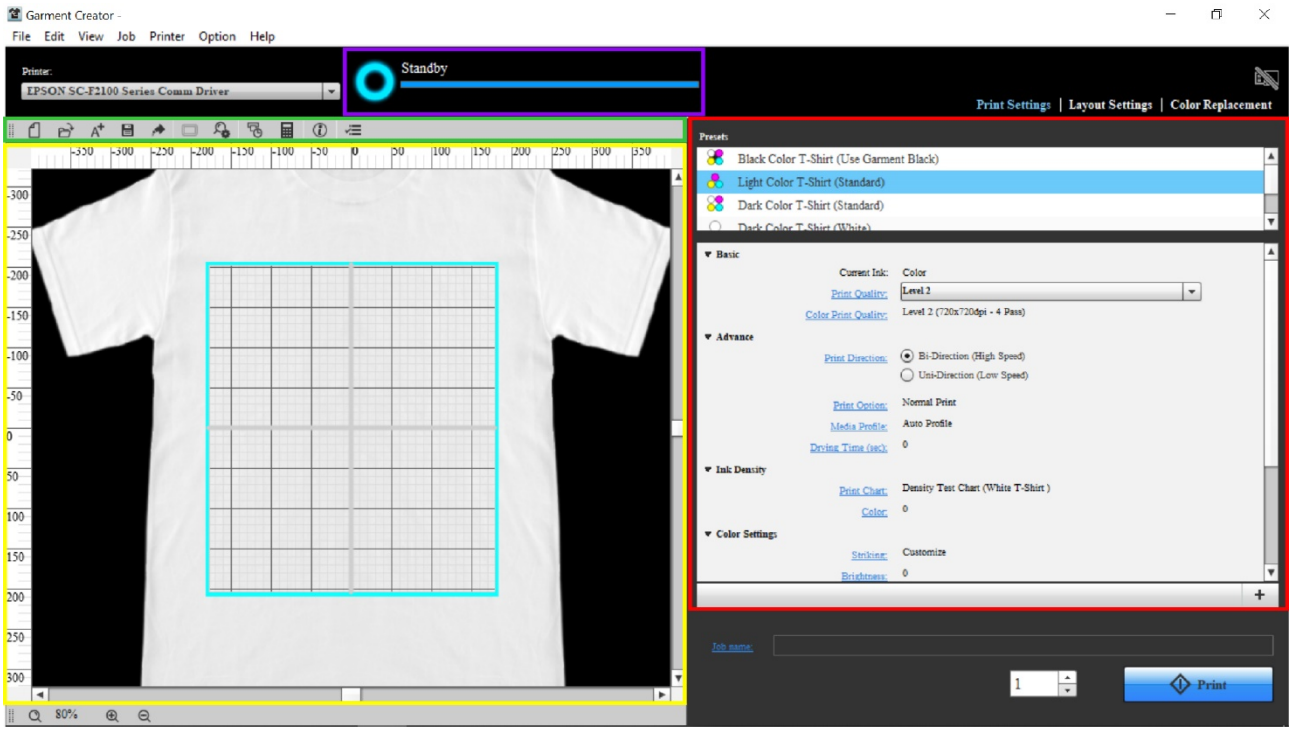
- **ADJUST the height** of the tray. The spacers are graduated every 0.5 pt between:
  > **P (highest position)** and
  > **8 (lowest position)**

  ! The objective being to obtain the closest height to the print heads, without generating the error message, it is necessary to start with the P position and then go down 0.5 in 0.5 as long as the machine beeps.

- **INSERT the tray into the machine** by pressing  to **test the height:**
  → The machine beeps = the tray is too high!
  → The machine displays "ready" = printing can start :)

5. Print settings

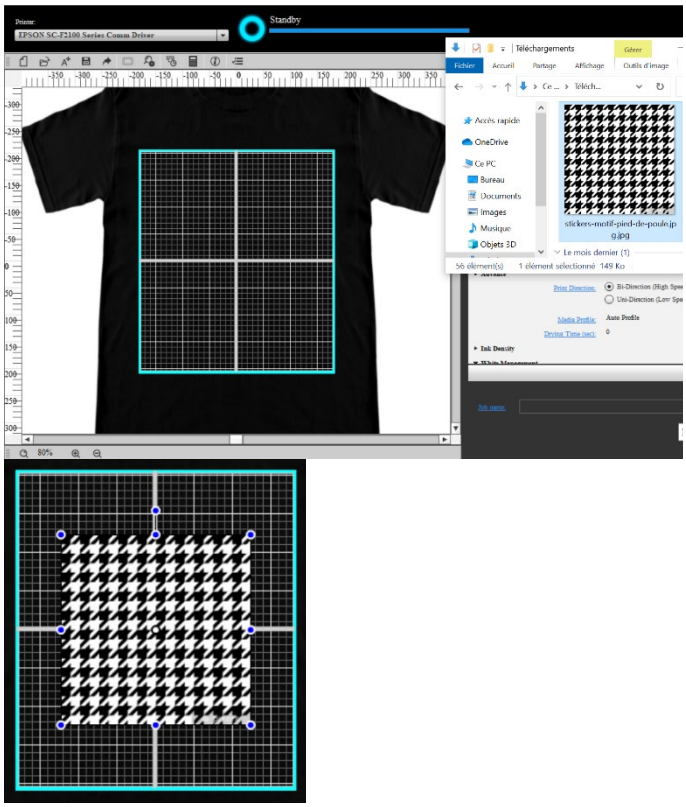
Presentation of Garment Creator software



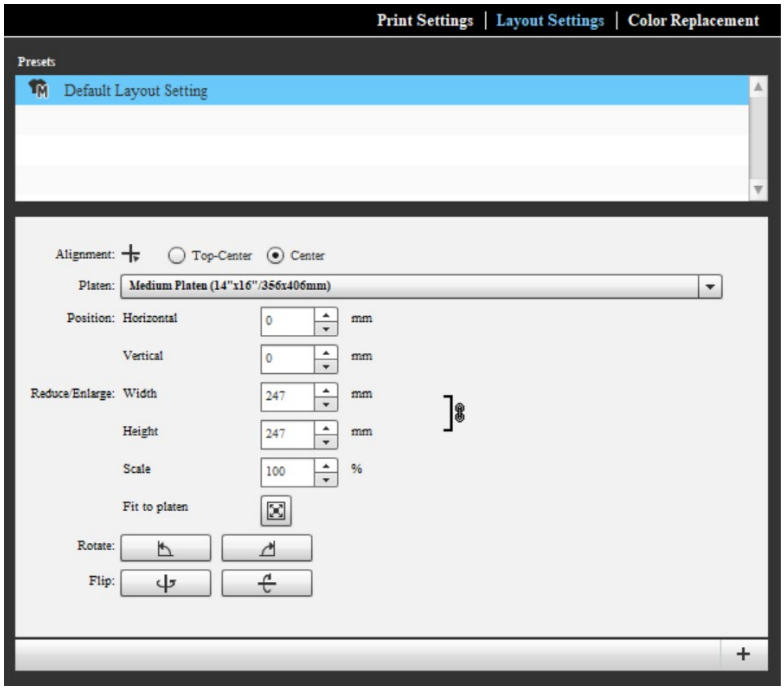
Printer status
Tools
Viewing
Settings windows

Using Garment Creator

- **DRAG-AND-DROP the picture** in Garment Creator



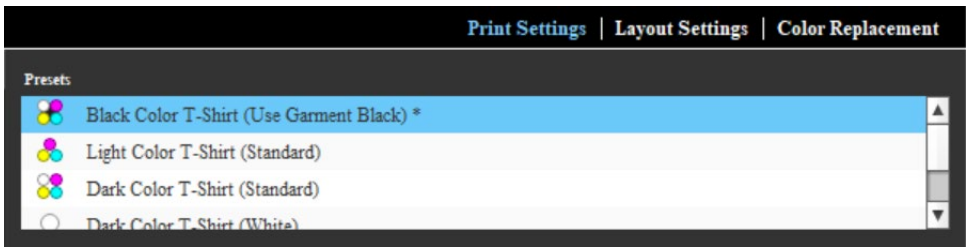
- **SET in *Layout Settings*** as required.



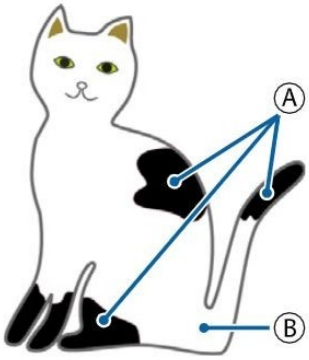
Alignment :	Alignment of the image to the stage: - ***Top-center*** = centre at the top of the tray *(note: reverse on the machine)* - ***Center*** = centre in the middle of the tray
Platen :	Tray format = Medium *(never change)*
Position :	Position of the image in relation to the centre of the board in (+/-) horizontal and (+/-) vertical.
Reduce/Enlarge :	Reduce or enlarge the image in millimetres or percent. *(check that the symbol*  *is present to keep the to keep the proportions of the image)* The ***Fit to platen*** option adjusts the image to the size of the platen.
Rotate :	Rotate the image clockwise and counter-clockwise.
Flip :	Vertical or horizontal mirroring of the image *(be careful if there is text in the image)*

- **SET in *Print Settings*** as required:

  - **CHOOSE the print mode**:



The examples below will be explained with the following image:



A = Black (RGB = 0,0,0)

B = White (RGB = 255, 255, 255)

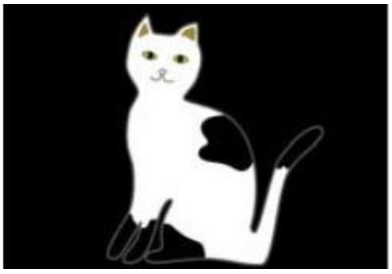
Coloured eyes and ears

Black Color T-shirt (Use Garment Black) :

This method is used to print on black or coloured T-shirts. It is applied in 2 successive layers: a white undercoat and a coloured layer.

*! **Use Garment Black** means that each black area of the image will not be printed (therefore empty) and will show the fabric on which the image will be printed.*
This mode requires the white ink pre-treatment.

Example :


On black fabric


On coloured fabric

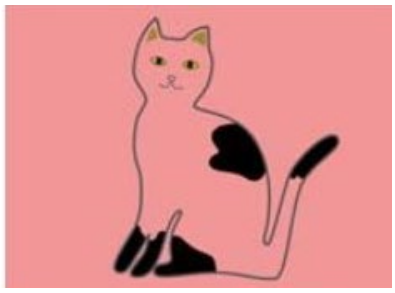
Light Color T-shirt (Standard) :

A mode used to print on white or light-coloured T-shirts. It is executed in one colour layer.

! Each white area of the image will not be printed (therefore empty) and will leave the fabric on which the image will be printed visible.

Example :


On white fabric

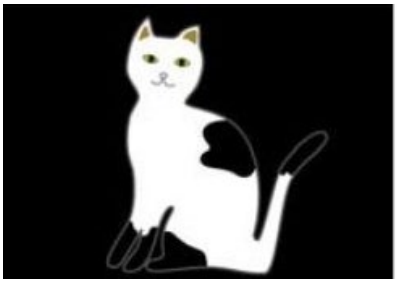

On coloured fabric

Dark Color T-shirt (Standard) :

This mode is used to print on black or coloured T-shirts. It is executed in 2 successive layers: a white undercoat and a colour layer (+ black).

The image will be printed exactly as it appears on the screen.
This mode requires pre-treatment for white ink.

Example :



On black fabric

On coloured fabric

Dark Color T-shirt (White) :

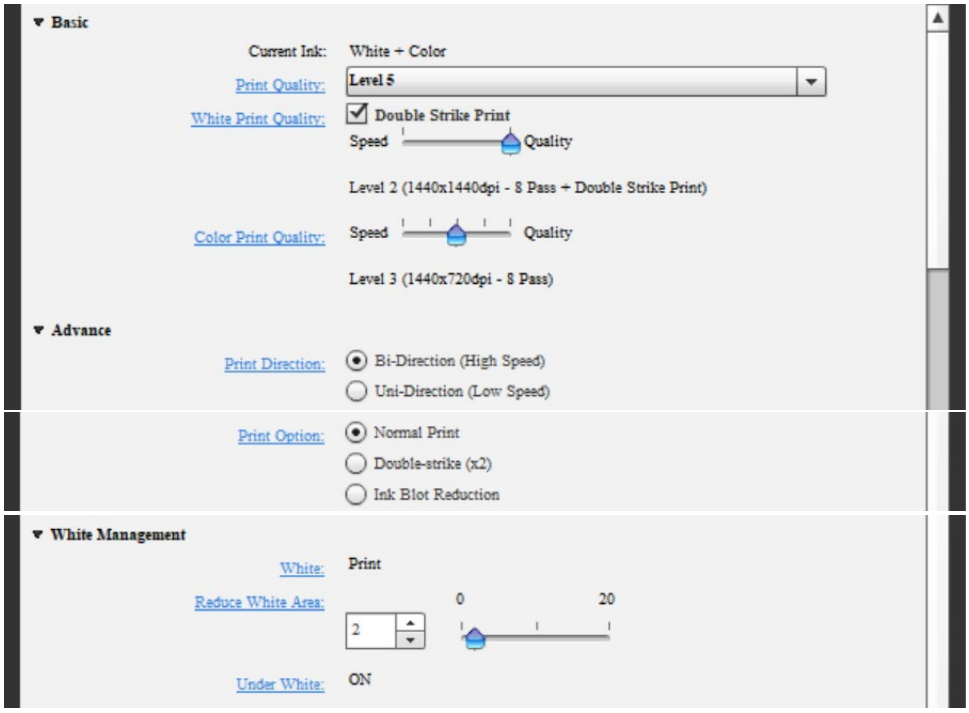
This mode is used to print on black or coloured T-shirts. It is done in one white layer.

! The image will be printed as a greyscale image (but in white).
This mode requires the pre-processing for white ink.

- **ADJUST parameters** according to the image and fabric:

  Depending on the selected mode, different parameters can be set. The following settings are sufficient to achieve a good print.

  ! To find out the correct settings, it is necessary to carry out several tests on the fabric selected for the project.



Print Quality :	To be chosen in "level" (according to the modes, choice of level 1 to level 6) *! The print quality also influences the quantity of ink deposited on the fabric. If the fabric is thin and not very absorbent, test with low "levels".* If printing **White + Color**, you can choose the "level" for the white and the "level" for the colours. ***Double strike*** **:** Layer / Without Double strike / With Double Strike 2 / Colours / Colours + White 1 / White / White If an image contains white and colour, a standard print will consist of one layer of white and one layer of colour. If the Double Strike option is selected, the machine will print a white layer and a colour + white layer (*! the amount of ink will also increase*).
Print Direction :	- ***Bi-direction***: the machine prints in both directions (faster) - ***Uni-direction***: the machine only prints from left to right (slower)
Print Option :	***- Double strike (x2)*** allows you to print 2 layers of colours to reinforce the tones.

	- ***Ink Blot Reduction*** should be used to reduce the capillary effect between yellow and blue/black inks (when yellow and blue/black areas are juxtaposed in an image).
White Management :	***- Reduce White Area*** : Reduces the print area of the white layer. When printing with the Black Color T-shirt or Dark Color T-shirt modes, the white layer (as an underlay) is sometimes wider than the colour layer (on top), leaving a white outline all around the print. To avoid this phenomenon, use the option (test with value 2). - ***Under White*** : It is sometimes necessary to turn off the white underlay. Switching ***OFF***

6. Printing

Once the printout has been set up, simply:

- **PRESS the button** 

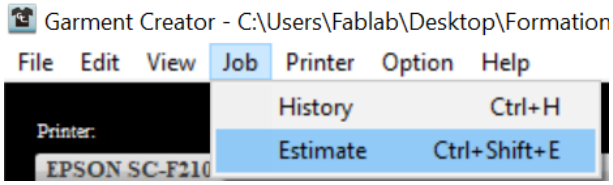
in **Garment Creator**

  ! At the top of the screen, the printer status displays :

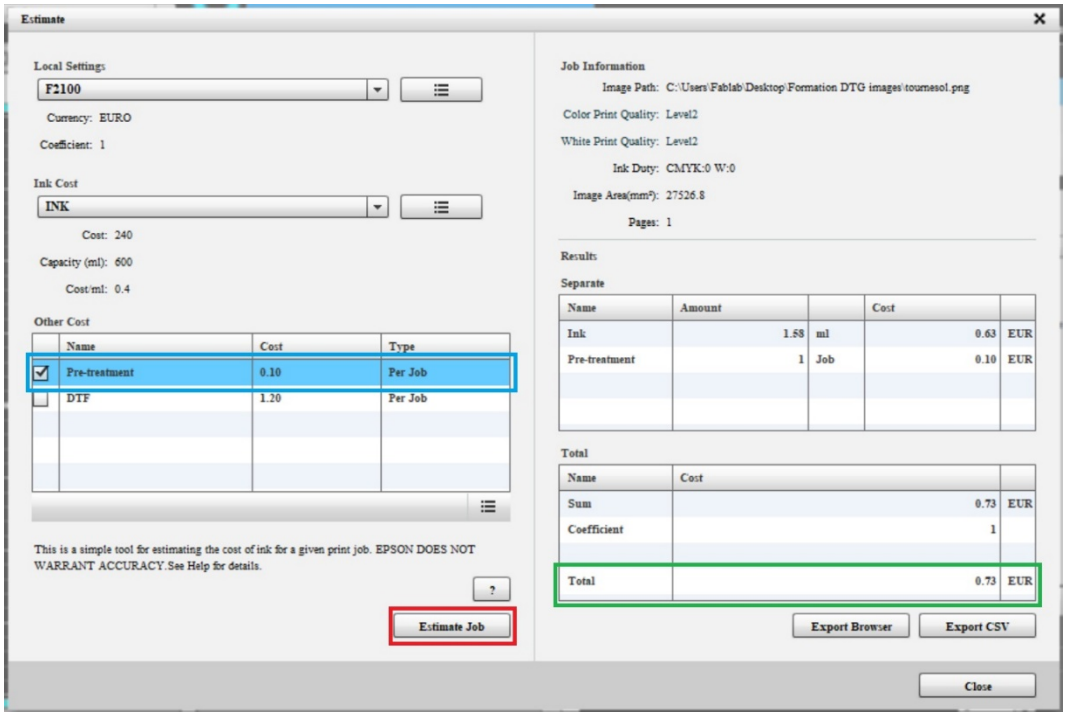
- On the machine, **PRESS the** :

! The machine will not start printing until you press the button.

- **ESTIMATE THE COST** of <u>each print job</u> by clicking on ***Job*** > ***Estimate***



- In the window that opens, **ADJUST OPTIONS**:



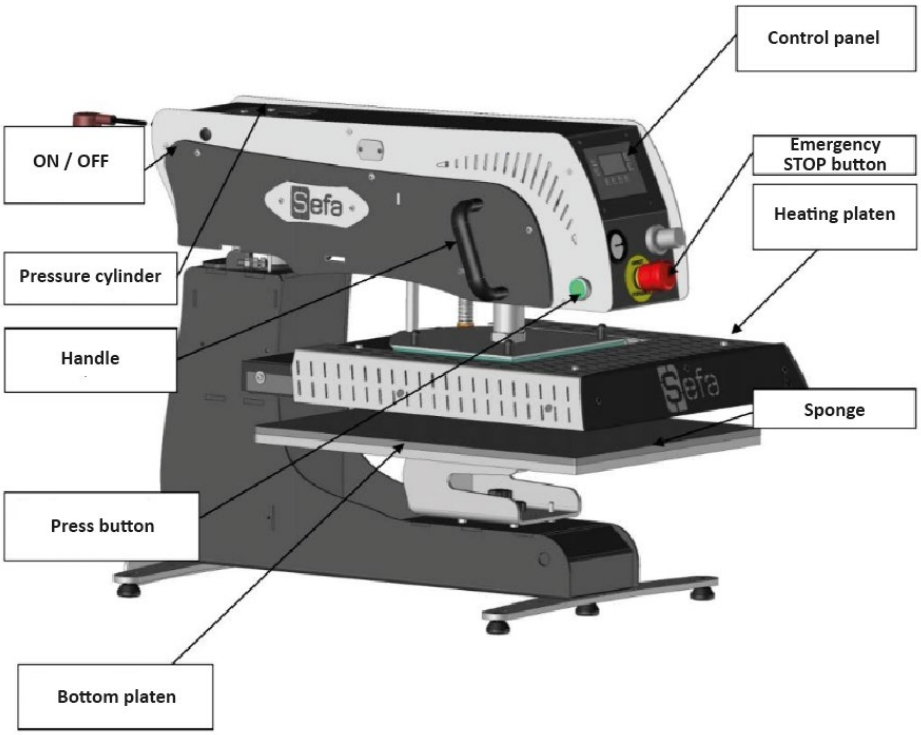
  - **CHECK THE PRE-TREATMENT BOX** for **<u>each fabric</u>** pre-treated.
    If there are several prints on 1 pre-treated fabric, tick the box only once.

  - **CLICK ON *Estimate Job***
    The software should calculate the ink consumption for the file in the workspace.

  - **WRITE THE TOTAL**
    At the end of the print run, you will need to give the total to the fabmanager for payment.

7. Fixing the inks

Diagram of the SEFA Rotex Pro 2 heating press



Use of the heating press

- **SWITCH ON the press** by pressing the **white button** at the back of the machine.
- **SET THE TEMPERATURE to 170°C** by pressing the 

  then using the arrows 

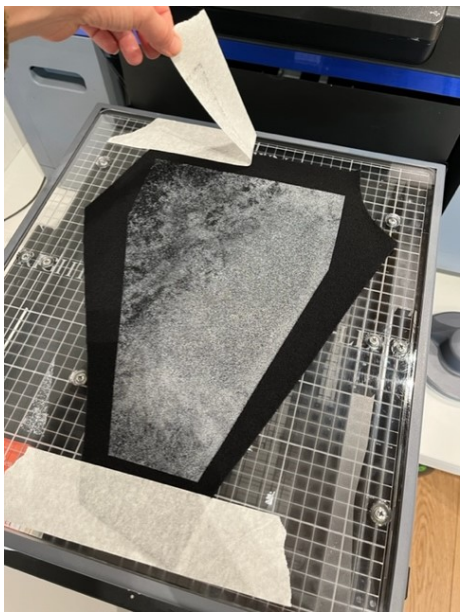
- **SET THE EXPOSURE TIME to 90 seconds** by pressing the 

  then using the arrows  

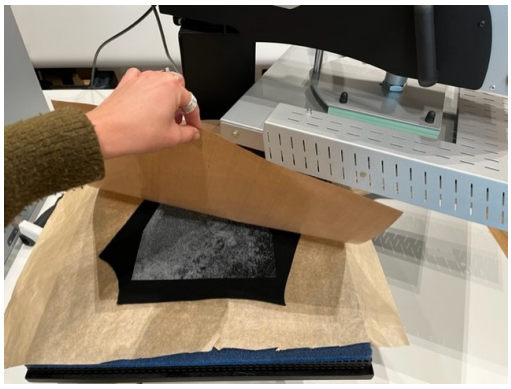
- **PRESS**  **to confirm.**

- **REMOVE the fabric** from the machine **CAREFULLY**.

  ! Be careful, the inks are wet. Touching the print could damage it.

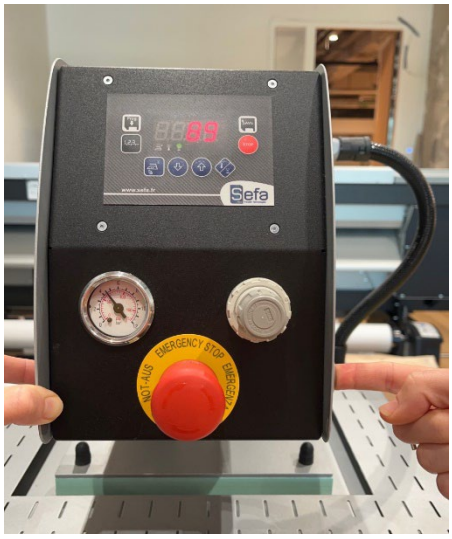


- On the press, **PLACE THE FABRIC** **on a layer of protective paper** then **COVER** with the **Teflon sheet.**



- **LAY A SECOND LAYER of paper** **over** the Teflon Foil.

- **PUT THE HEATER TRAY back on top** of the "sandwich" and **PRESS both green buttons** on the side at the same time.



! The heating plate rises automatically at the end of the time countdown.

DTF printing process

1. Introduction

Direct film printing (DTF) is very similar to DTG printing, but the difference in substrate (printing on a specific film instead of fabric) modifies the steps in the process. Although its name indicates that it is a direct print, **a transfer** must be made after printing on the film so that the image is transferred to the textile. In the process, the application of the white and colour layers is reversed compared to DTG. With DTF, the colour layer (which will be the 1st layer after transfer) must be applied first, followed by the white layer (which will be the background layer). In fact, the image will have to be mirror printed (see **3. DTF print settings**).

After printing on the film, it is necessary to add a powder to the ink, which will be 'cooked' by the heat of the press (without pressing). Once the film is ready, it can be flocked onto the chosen textile.

The advantage of DTF printing is that it can be used to flock printed graphics onto all textiles (not just natural textiles, provided they can withstand the heat of the thermal press). As with DTG printing, DTF printing is available for both light and dark textiles.

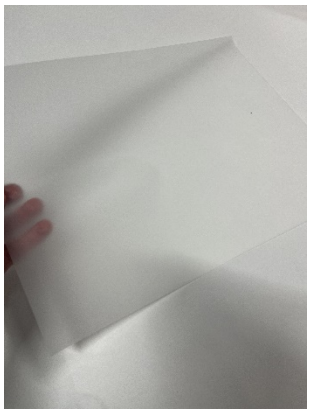
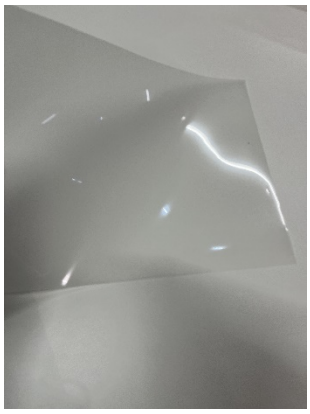
The files used for DTF printing must have the same characteristics as for DTG, i.e. :

- **.PNG** format (transparent background if needed)
- **RGB colours**
- High resolution / **360 dpi**
- **Scale 1:1** minimum (equal or larger than the expected size on fabric)

2. Set the printer for DTF

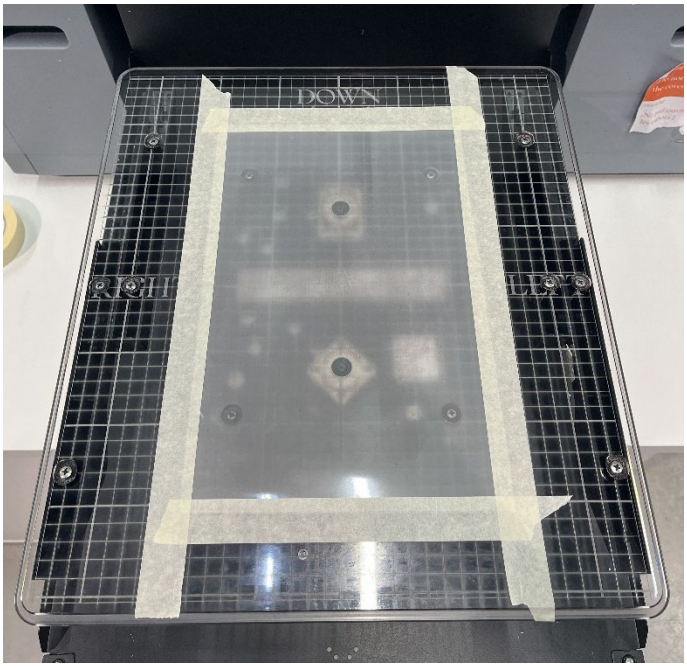
- **CHECK that the tray is outside the machine**. If not, press 

- **GETTING SPECIFIC THE FILM**

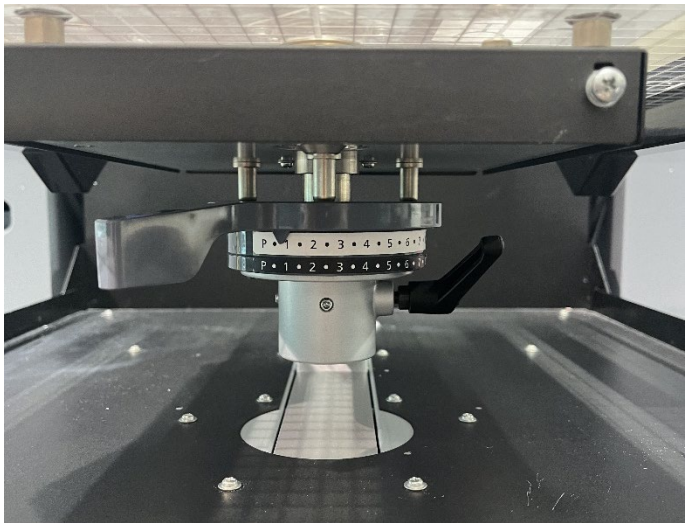



The film has a matt side and a gloss side.
Only the matt side is printable!

- **ATTACH the film to the tray (matt side up) using masking tape.**
  ! The 'top' of the print will be at the front of the tray. Position the film accordingly to print in the right direction.

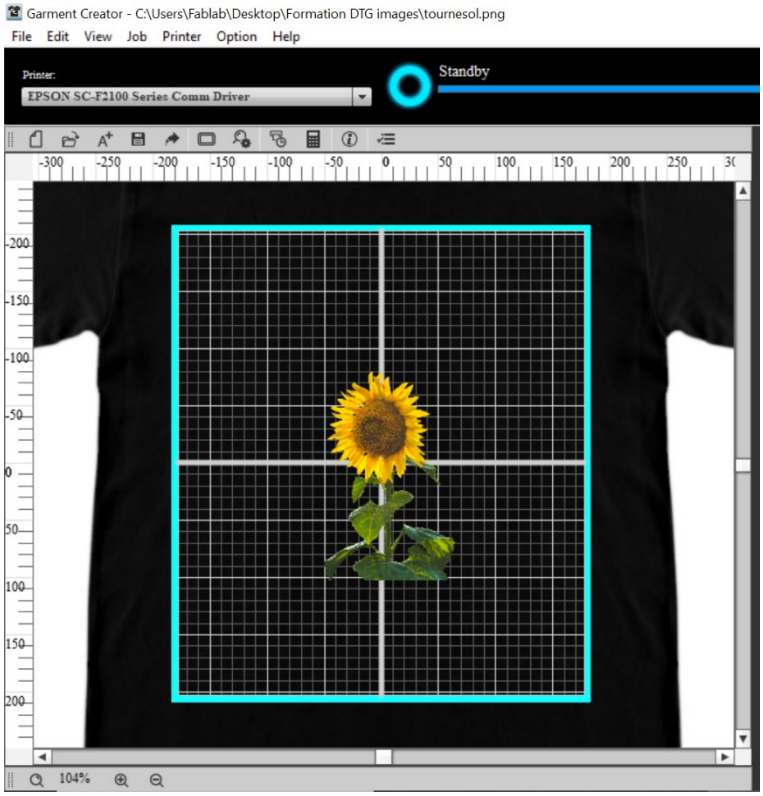


- **ADJUST THE HEIGHT OF THE TRAY using the spacers and the lever** (see P12)

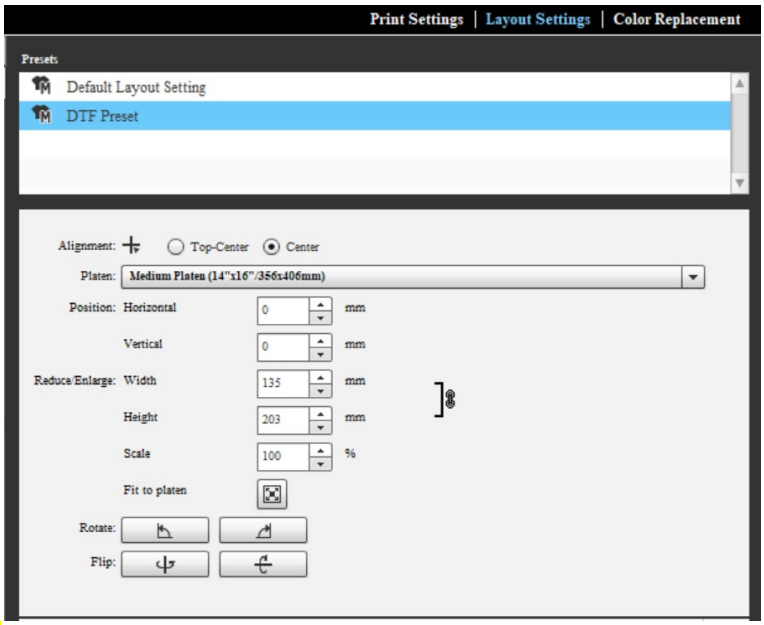


3. DTF print settings

- **OPEN *Garment Creator*** and **DRAG-AND-DROP THE FILE**



- In the ***Layout tab***, **CHOOSE SETTINGS:**



> Select *DTF Preset* : this <u>automatically mirrors</u> the image

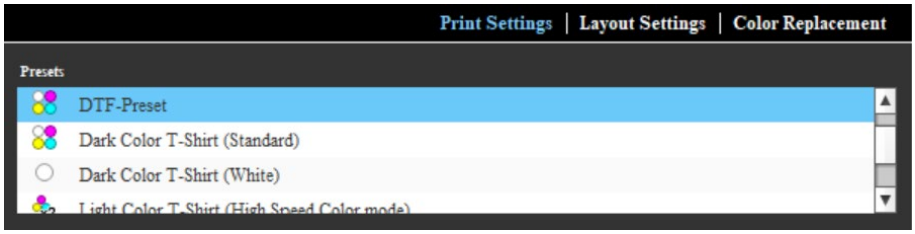
> **Choose** image **alignment**

> **Adjust** image **size**

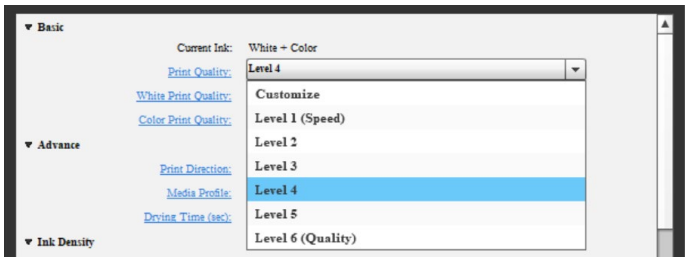
> **Choose** image **orientation**

*! <u>Don't touch the **Flip** buttons</u>, the image is automatically mirrored using the **DTF Preset**.*

- In the ***Print Settings*** tab, **SELECT *DTF preset* MODE**



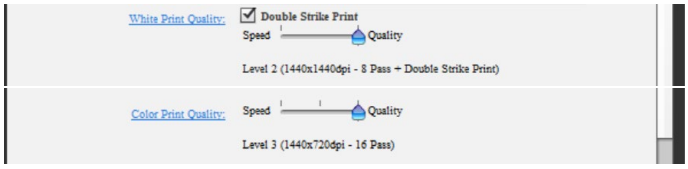
- **CHOOSE THE SETTINGS :**



<u>Basic</u>

Print quality : global print quality

! You can choose the quality of the white or colour inks independently.



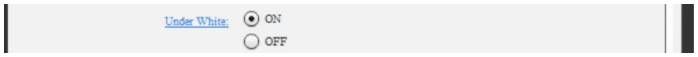
Double strike print : deeper white

Advance

Bi-direction ou ***uni-direction*** printing

White Management

Reduce white area is useful when the final result shows a white line all around the image. Standard value = 2, choose > 2 if necessary.



Under white must be ***ON.***

! Tip ***:*** *if you want to double the colour layer, print once with no white (***Under white OFF***) and once with white + colours (***Under white ON***)*

Ink order must be set on ***Reverse (Color -> White)***

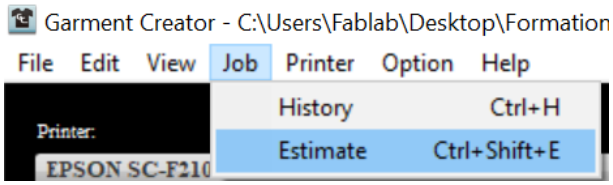
- **PRESS the button** 

in ***Garment Creator***
! At the top of the screen, the printer status displays:

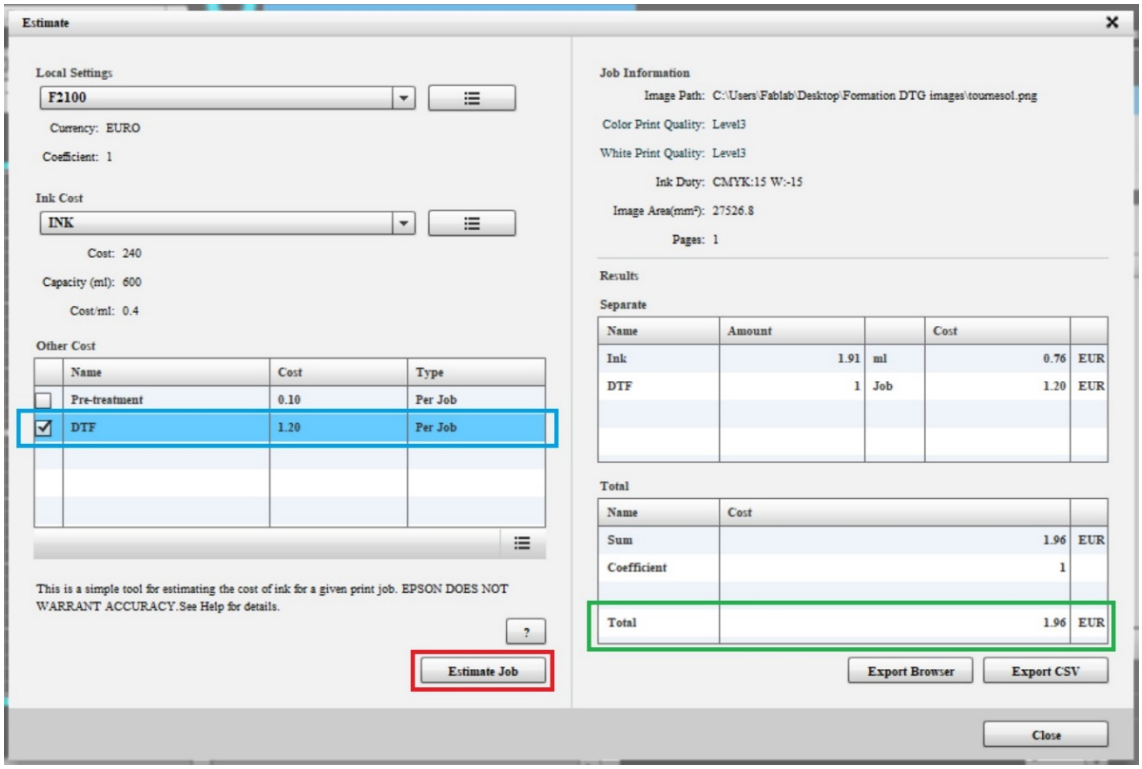
- On the machine, **PRESS THE BUTTON**:

! The machine will not start printing until you press the button.

- **ESTIMATE THE COST** of **<u>each print job</u>** by clicking on ***Job*** > ***Estimate***



- In the window that opens, **ADJUST OPTIONS**:



  - **CHECK THE DTF BOX** for **<u>each film used</u>.**
    If there are several prints on 1 film, tick the box only once.

  - **CLICK ON *Estimate Job***
    The software should calculate the ink consumption for the file in the workspace.

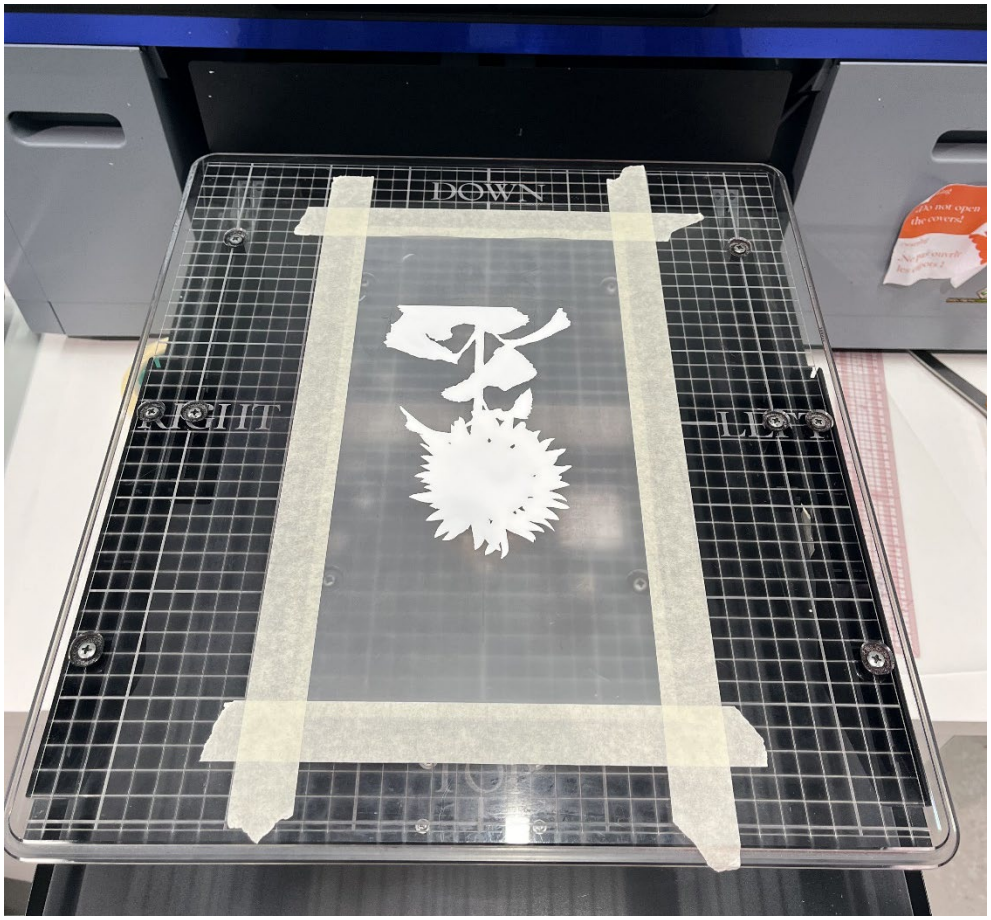
  - **WRITE THE TOTAL**
    At the end of the print run, you will need to give the total to the fabmanager for payment.

4. DTF printing

- **MONITOR THE MACHINE DURING PRINTING** to make sure everything is running smoothly and **WAIT UNTIL THE PLATEN EXITS**.

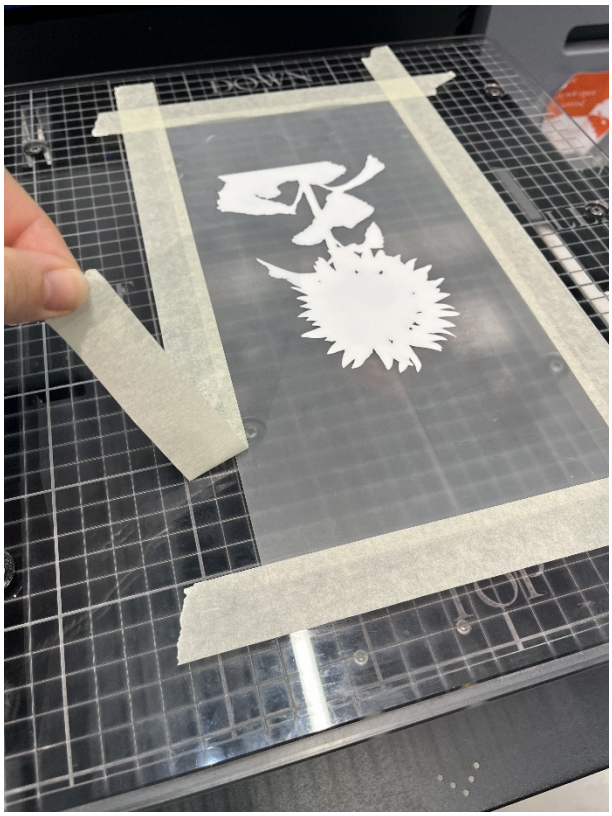
1st layer = colours

2nd layer = white



5. Post-printing operations

- **GENTLY REMOVE THE TAPE.**
  The ink is still wet at this stage. Touching it could damage the print.



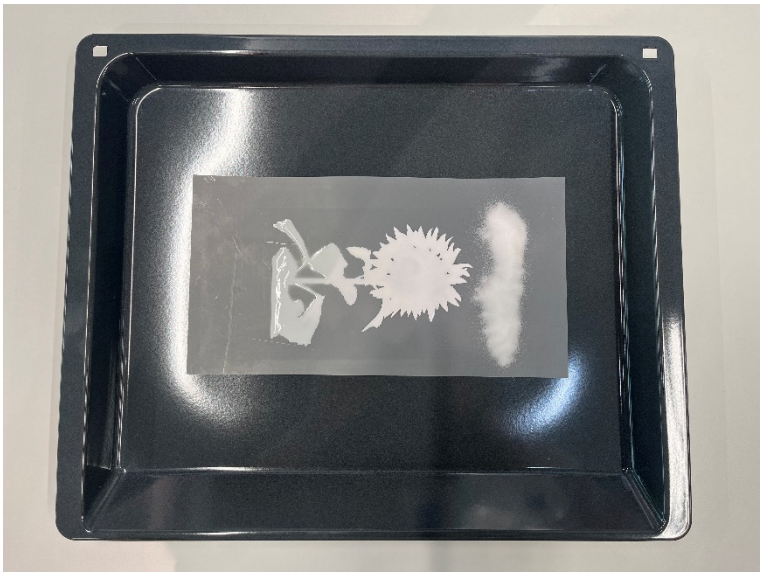
<u>Powder coating</u>:

- **PUT ON THE METAL PLATE** and **CHECK that <u>it is clean</u>.**
  If necessary, clean it with a damp paper towel.

- **PUT ON THE POWDER**

- **PLACE PRINTED FILM** on the plate

- **PUT SOME POWDER** on the film, <u>next to the printing.</u>

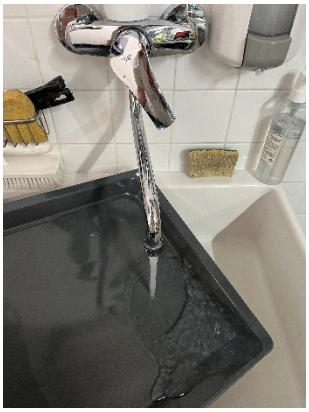


- **HOLD THE EDGES of the film** and **GENTLY MOVE THE WIPER so that the powder glides over** the entire print.

- **REMOVE THE EXCESS powder** by letting it slide over the plate. **TAP THE BOTTOM OF THE FILM <u>lightly</u>** against the plate.

- **GATHER THE POWDER** and **RETURN IT to the pack.**
  ! Caution: Do not do this if there are ink stains or dust in the remaining powder! or dust in the remaining powder.


- **CLEAN THE PLATE**

<u>Powder cooking</u>:

- **SET THE TEMPERATURE AT 150°C** by pressing the 

  and by using the arrows  

- **SET THE EXPOSURE TIME AT 45 seconds** by pressing the 

  and by using the arrows  

- **PRESS**  to **CONFIRM.**

- On the press, <u>previously protected with baking paper</u>, **PLACE THE FILM on the tray with the <u>printed side facing upwards.</u>**

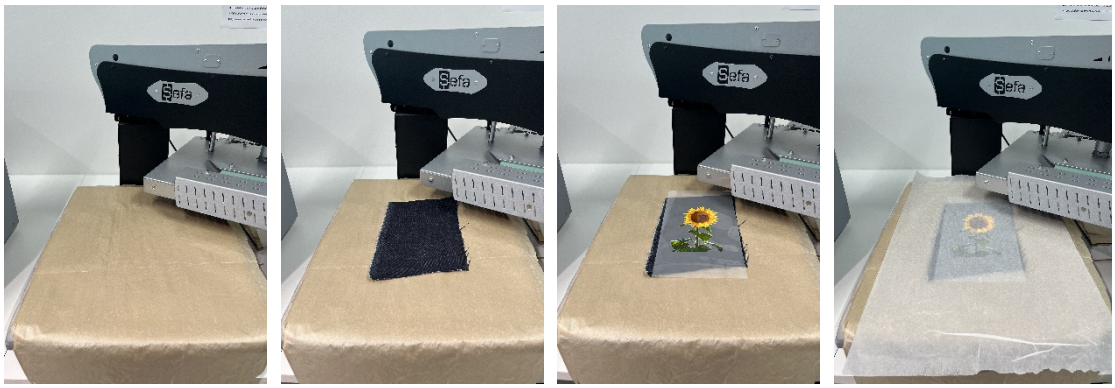
- **RAISE THE PRESS HEAD above the print** and **HOLD IT IN POSITION for 10 MINUTES using the wedges provided**.

  ! Warning: DO NOT PRESS !

This stage simply 'cooks' the powder so that it fuses with the inks with the inks.

Film flocking:

- **PLACE THE FABRIC** and **PRINT on the protected press** and **COVER with baking paper.**



PRESS AT 150°C for 45 SECONDS

- **REMOVE THE FILM from the print**

- **RECOVER the print** with the **<u>teflon sheet</u>** then **<u>baking paper</u>** and **PRESS FOR ANOTHER 5 SECONDS:**

- **ADMIRE THE RESULT!**

- **Test on different settings or fabrics:**

Platen at 1.5
Colours X2
White X1
Denim flocking

Platen at 1.5
Colours X1
White X1
Toile flocking

Platen at 1.5
Colours X1
White X0
Toile flocking

Platen at 8
Colours X1
White X1
Toile flocking

Cleaning and storage after printing

It is essential that everyone participates in the good maintenance of the fablab and the machines to ensure quality and comfort of work for all. After each use, it is necessary to clean and tidy up the machine and its working space.

1. Cleaning

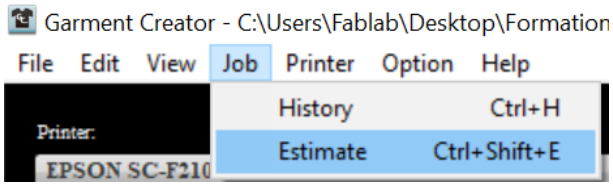
- **DISPOSE OF SCOTCH BITS** in the trash.
- **CLEAN THE INK OVERLAPS FROM THE MACHINE'S PLATEN** with a clean damp cloth.
- **CLEAN THE YELLOW TANK AND PRE-TREATMENT AREA** with a sponge, soap and warm water.
- **RINSE THE ROLLER THOROUGHLY** with clean water (the water that drains out should no longer be cloudy) then **WASH IT OUT** by pressing hard.
- **REPLACE THE PROTECTIVE PAPER** if it is stained.

2. Storage

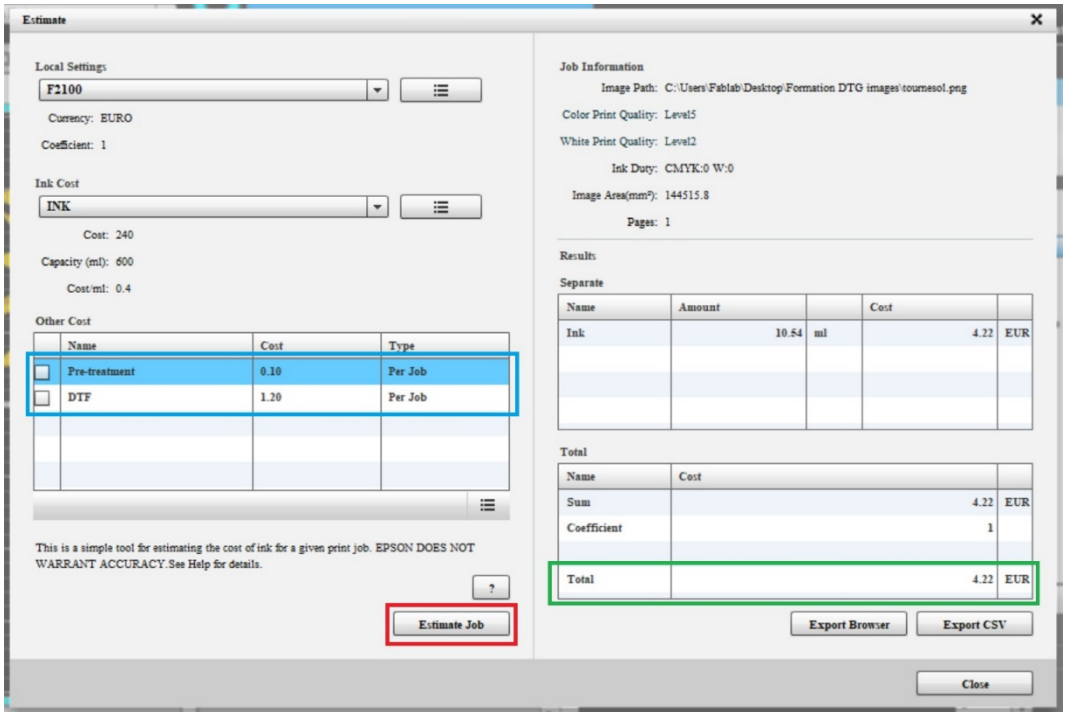
- **STORE TOOLS** (protective paper, rulers, etc.) in their respective locations.
- **DELETE FILES** from the computer.
- **Be sure to LEAVE THE WORKING SPACE** as you found it when you arrived.
  ! *Inform the fabmanager in the fablab if the workspace was not in order, clean and tidy, when you arrived on the machine.*

3. How to pay

- **ESTIMATE THE COST** of **<u>each print job</u>** by clicking on ***Job*** > ***Estimate.***
  ! Warning: This step must be carried out for each new image or printout with a change in size or print quality.



- In the window that opens, **ADJUST OPTIONS** if necessary:



  - **CHECK THE BOW :**
    - **PRE-TREATMENT** for **<u>each print with white ink</u>** or
    - **DTF** for **<u>each film used</u>** or
    - **NO BOX** for DTG printing without white ink.

  - **CLICK ON *Estimate Job***
    The software must calculate the ink consumption for the file in the workspace.

  - **WRITE THE TOTAL**
    At the end of all the prints, you will need to give the total to the fabmanager to make the payment.

- **PAY by credit card only to the fabmanager.**