



TS-1800 User Guide

December, 2022

Draft 1 Revision 2.0

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1. Introduction

1.1 About the TS-1800

Twine's TS-1800 is a unique and revolutionary textile dyeing machine offering on-demand Digital Thread Dyeing capabilities. You can set the TS-1800 to dye a single color, multiple colors, or gradient colors, as needed for your particular dyeing job. The TS-1800 supports various types of raw or standard white polyester thread and yarn for the sewing, knitting, embroidery and other sectors of the textile industry.



Figure 1: The TS-1800 thread and yarn dyeing machine

1.2 Contacting Twine Support

In case of any technical question or problem, contact Twine Customer care at Support@twine-s.com / your Twine representative (contact details at <https://twine-s.com/contact/contact-us/>).

1.3 System Specifications

The following are the System Specifications for the TS-1800:

Parameter	Specification
Definition	Digital Thread and yarn Dyeing System
Dye Technology	DST™
Ink	Twine Digital Ink™ (TDI)
Certification	CE, ZDHC and Intertek
Pre & Post Treatment	Integrated
Yarn Loading System	Automatic loading system
Yarn Winding System	Integrated winder
Yarn Fiber Type	Polyester
Operator Interfaces	Industrial grade touch screen
Network	Wi-Fi
Remote Support	Secured connection

1.4 Terms and Abbreviations

The following terms and abbreviations are used throughout this document:

Term / Abbreviation	Definition
BIT	Built-In Test
Coats	The Coats catalog colors
Color space	System for defining colors
EMO	Emergency off button
GUI	Graphical User Interface
LAB	The "CIELAB" color space
MSDS	Material Safety Data Sheets
N/A	Not Applicable
PPC	Panel PC
RFID	Radio Frequency Identification
RGB	The "Red, Green, Blue" color model
RML	Recommended Media List
TGU	Thread Guiding Unit
Job Factor	Percentage of thread added to a job to allow for a certain amount of spare thread

Term / Abbreviation	Definition
Color Proofing	Method of checking and approving colors by dyeing a small sample of each color before dyeing the whole job
Unit	The amount of thread needed to make one complete item

1.5 Supported Color Spaces

Use Twine’s Digital dye-to-match technology to select from an almost unlimited color gamut. You can dye a solid color or color gradients in single or multiple segments. The TS-1800 enables you to easily program thread length, sequence, and more.

TS-1800 currently supports colors from the following color spaces:

- Twine
- Coats
- LAB
- RGB

1.6 Supported Ink

The TS-1800 supports Twine’s proprietary TDI™ ink cartridges only. It automatically checks that the ink cartridge inserted is authentic. If the cartridge is not authentic, it will not proceed with the dyeing process.

NOTICE

USE ONLY TWINE TDITM INK CARTRIDGES. ATTEMPTING TO USE A NON-TWINE TDITM INK CARTRIDGE MIGHT CAUSE DAMAGE TO THE MACHINE AND COULD RESULT IN DEGRADED PERFORMANCE.

1.7 Supported Thread Types

Since the TS-1800 supports many types of threads and thread thicknesses, it can be used to dye thread for sewing, embroidery, and knitting applications. A list of supported threads can be found in the Recommended Media List (RML).

1.8 TS-1800 Parts Overview

The following tables describe the different parts of the TS-1800, as shown in the diagrams.



Figure 2: TS-1800 parts front view

Part	Description
1	PPC
2	Dryer Cover
3	Cartridge Cover
4	Thread Feeding Unit
5	Front Service Cover
6	Electrical cabinet Cover
7	Thread Winding Unit
8	Emergency Button
9	Thread Groove
10	TS-1800 Operating Panel (Power / Thread jogging / Thread loading / USB port)
11	Operating Panel Cover



Figure 3: TS-1800 parts rear view

Part	Description
12	AC Power Socket
13	AC Power Switch
14	AC Power Cable with Plug

1.9 Safety Considerations

⚠ CAUTION

Do not start using the TS-1800 or attempt to perform any service or maintenance action before carefully reading through this section.

1.9.1 Disclaimer

It is the customer’s responsibility:

- To ensure that the TS-1800 is used for the purpose it was intended (see section 1.9.2 “Designated Purpose”)
- To ensure that all Twine instructions and guides are carefully and accurately followed
- Twine assumes no responsibility:
 - ◆ If the TS-1800 is used for any purpose other than that for which it is intended
 - ◆ If Twine instructions and guidelines are not carefully and accurately followed

1.9.2 Designated Purpose

The TS-1800 is deemed to be used for its designated purpose if it is used in accordance with its product documentation and within its performance limits.

It is essential that only trained personnel be allowed to use this system because of the technical skills and fair level of English comprehension required.

1.9.3 Regulations

To prevent accidents while operating the system, observe all applicable local and national safety rules and regulations.

1.9.4 Safety Notice Definitions

The following table describes the safety labels used throughout the TS-1800 documentation.

Notice	Definition
	Indicates a hazardous situation which will result in death or serious injury.
	Indicates a hazardous situation which might result in death or serious injury.
	Indicates a hazardous situation which can result in minor or moderate injury.
	Indicates a situation where incorrect operation of the system can result in damage to the product. The label ATTENTION is used synonymously.
	Indicates information related to proper use of the system.

NOTE:

A description of specific product hazards can be found in Appendix A- Technical Specification

2. Operating the TS-1800

Operating the TS-1800 and preparing it for dyeing involves the following main steps:

1. Powering it up and down. (Section 2.2 “Powering Up and Down”)
2. Loading ink. (Section 2.3 “Loading the TS-1800 with Ink or Lubricant”).
3. Handling the waste. (Section 2.4 “Handling Waste”)
4. Filling the Lubricant (Section 2.5 “Lubricant Filling”)
5. Loading the thread (Section 2.6 “Thread Loading Steps”)
6. Replacing a cone (Section 2.7 “Inserting an Empty Cone”)

2.1 TS-1800 Operating Panel Button Definition and Functionality

2.1.1 Definition

The TS-1800 panel buttons are defined in Figure 4.



Figure 4: TS-1800 panel buttons

2.1.2 Functionality

The functionality of each of the TS-1800 panel buttons is summarized in the tables below.

2.1.2.1 Power Button

Function	Description	Method	Button Light Indication
Power up	Powering up the system	Short press	Blue
Power down	Safe powering down sequence	Long press (5 seconds)	No light
Standby	Switch to standby mode	N/A	Blinking Blue
Wake up from standby	Switch to normal system operation	Short press	Blue

2.1.2.2 Thread Jogging Button

Function	Description	Method	Button Light Indication
Thread Jog	Thread is jogging	Press and hold	Blinking Blue
Thread jog locked	Thread is jogging without pressing the button	Long Press (5 sec)	Blinking Blue
Jog function disabled	Function is disabled when system is running	Button is disabled while job is running	Off

2.2 Powering Up and Down

2.2.1 Powering Up

To power up the TS-1800:

1. Make sure that the power cable is connected to the machine power inlet and to the wall outlet.
2. On the machine panel, press the **Power** button.

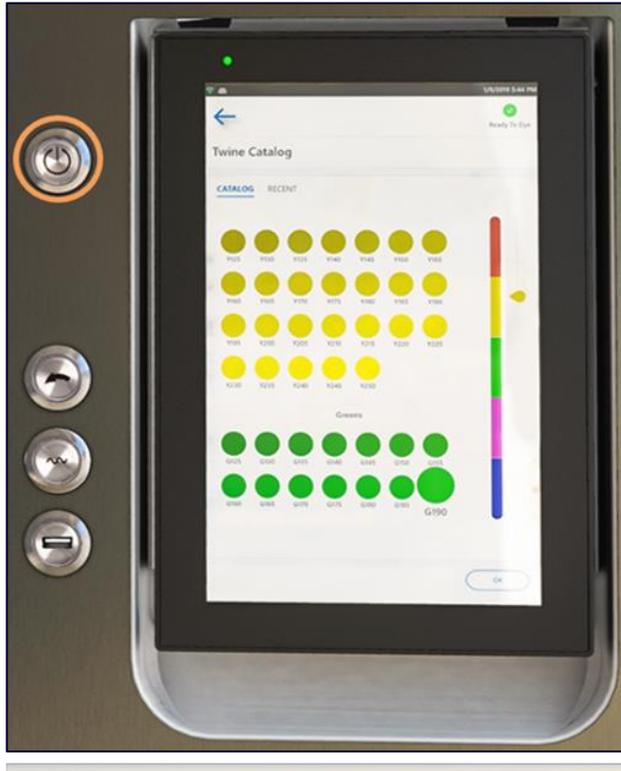


Figure 5: Power button

The TS-1800 powers up and performs its startup procedures.

When it has completed its startup procedure successfully, the **green** Ready to Dye icon will appear on the upper right side of the operating panel (PPC) screen.

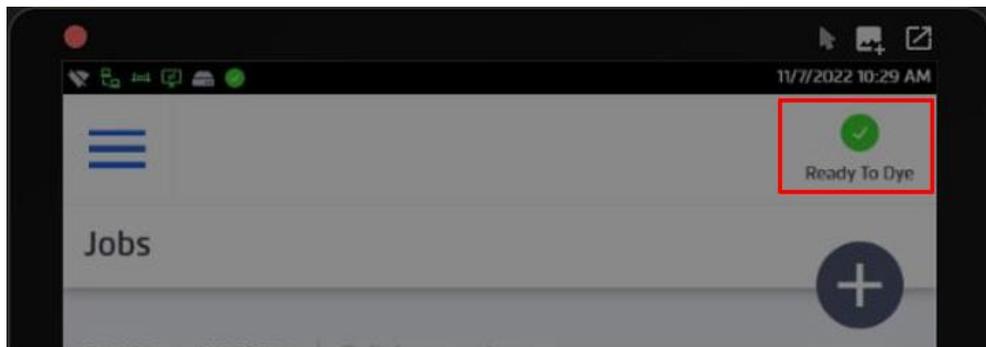


Figure 6: Ready to Dye indicator

2.2.2 Powering Down

During normal operation there is no need to power down the system. The TS-1800 enters standby mode when not in use. However, it is necessary to power down the system during routine maintenance in order to replace or clean parts.

⚠ CAUTION

Note that after powering down the system, it can take up to 30 minutes for the machine to cool down to a temperature suitable for working on the machine.

There are several ways to power down the TS-1800.

- **From the front panel**

Press the **Power** button (see Figure 5)and hold for approximately five seconds until the blue light turns off.

- **From the main menu of the PPC**

Tap the **Power** button at the bottom of the main menu and select **Turn Off** to power down.

This process takes approximately 45 minutes.

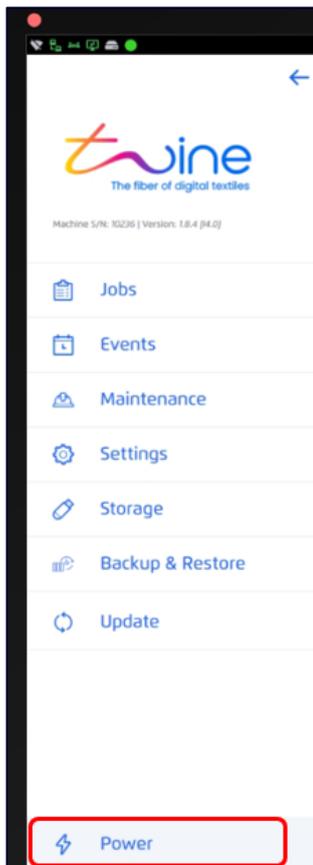


Figure 7: Turning off the machine from the PPC



SELECTING RESTART FROM THE PPC SCREEN WILL RESTART THE PPC ONLY. YOU CANNOT RESTART THE SYSTEM FROM THE PPC.

- The Emergency Button (EMO)
- The EMO button is a safety mechanism used to shut off the machine in an emergency when it cannot be shut down in the usual manner. It is not safe to use for a routine shutdown.

⚠ CAUTION

Do not use the EMO button for routine power down. Only use the EMO button in an emergency situation.

2.3 Loading the TS-1800 with Ink or Lubricant

NOTE:

Although “Lubricant” is not an ink color, it is consumable and is therefore included in this section.

You can load the following TDI™ ink cartridges/bottles:

- Cyan (C)
- Magenta (M)
- Yellow (Y)
- Light Cyan (LC)
- Light Magenta (LM)
- Light Yellow (LY)
- Black (K)
- Transparent Ink (TI)
- Lubricant (L)
- Load ink in the following situations:
 - ◆ Before using the TS-1800 for the first time.
 - ◆ When the PPC displays a low ink level.
- The procedure for loading ink cartridges is the same for all of the above-mentioned cartridges.

⚠ WARNING

Handle cartridges with care and avoid situations that can damage them!

2.3.1 Preliminary Steps

1. To determine if the machine needs ink, check the PPC. If the color tank empty message (see Figure 8) is displayed at the top of the PPC, load the indicated ink color.

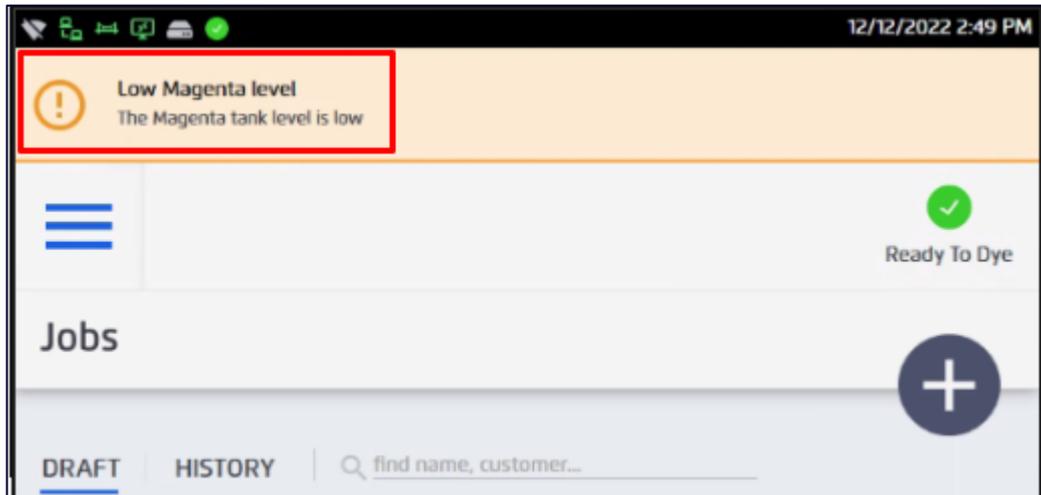


Figure 8: Low ink message

NOTE:

You can also check the status of the ink level in the maintenance/diagnostics screen on the PPC.

NOTICE

IF THE TS-1800 IS CURRENTLY IN OPERATION, YOU MUST MAKE SURE THAT WASTE EMPTYING IS NOT IN PROCESS. IF THE TS-1800 IS NOT CURRENTLY OPERATING, SKIP TO STEP 2.3.2 BELOW.

2. Determine if waste emptying is in process by checking the PPC. If the first message below is shown, wait until the second message appears.

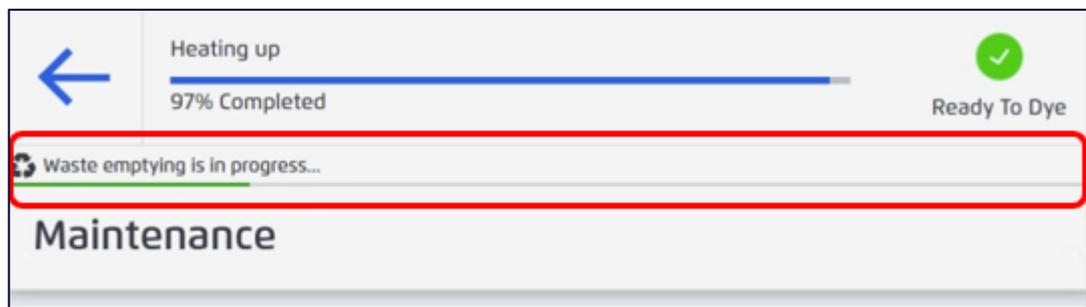


Figure 9: Waste emptying in progress

⚠ CAUTION

Never open the cartridge cover while waste emptying is in process!

2.3.2 Loading an Ink Cartridge

To load an ink cartridge, do the following:

1. Open the Cartridge cover.
2. If there is an ink cartridge in the slot, remove it.
If there is an empty waste cartridge slot available, you can insert the removed empty ink cartridge into the waste cartridge slot. the direction in step **Error! Reference source not found.** below.
3. Insert a full ink cartridge into the upper ink loading cartridge slot as shown.

NOTICE

THE CARTRIDGE MUST BE ORIENTED CORRECTLY TO BE INSERTED. DO NOT FORCE THE CARTRIDGE INTO THE SLOT. THIS MIGHT DAMAGE THE CARTRIDGE.



Figure 10: Loading an ink cartridge

Make sure that the cartridge locks into place. You will hear a click as the latch locks.

When properly inserted, the LED indicator to the left of the ink cartridge will blink once.



Figure 11: Ink cartridge loaded

4. Close the cartridge cover.

The TS-1800 will ask you to approve which TDI™ ink cartridge has been inserted.

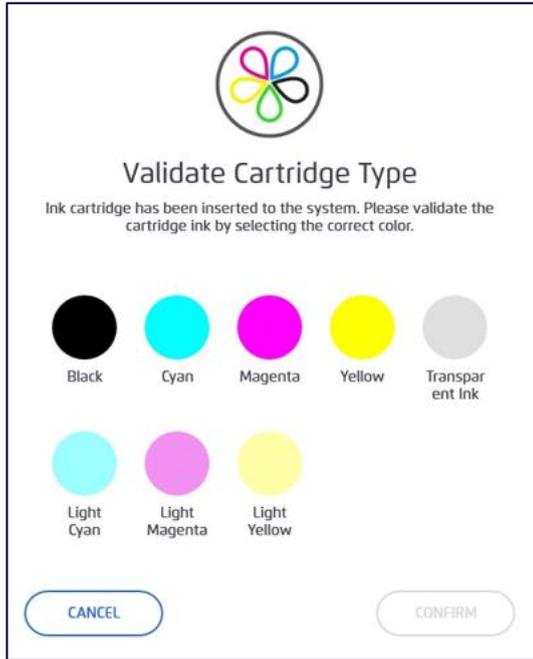


Figure 12: Validate cartridge type

Validate the cartridge ink by selecting the correct color and proceed with the Confirm button as shown in Figure 13.

Relevant ink selection will be highlighted from the other ink options.

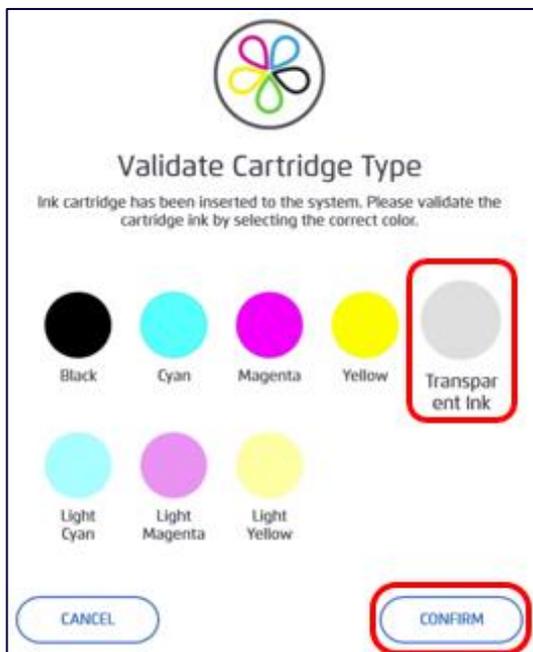


Figure 13: Ink selection

Ink loading begins and a progress bar appears on the PPC screen.

The ink filling process takes up to 10 minutes.

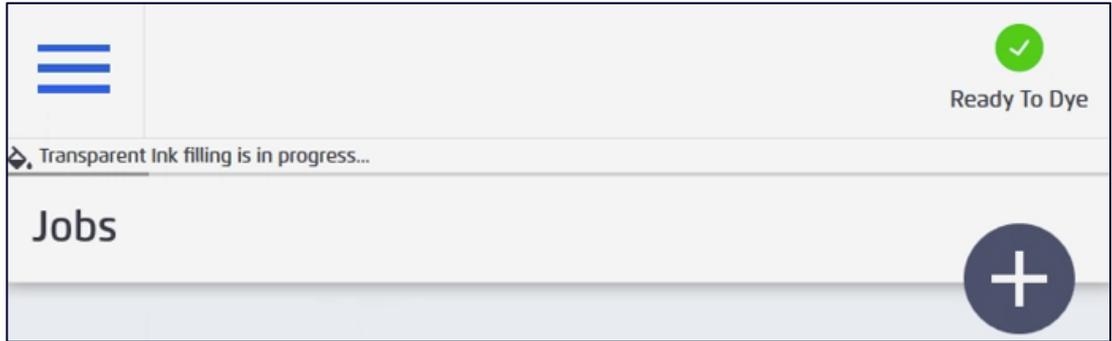


Figure 14: Ink filling progress

When the process is complete the LED indicator will turn off. The following message is displayed:



Figure 15: Ink filling progress completed

5. Push the **OK** button, open the cartridge cover, and remove the empty ink cartridge.

The **Waste** icon in the Current Status section of the Maintenance screen will show a dotted gray outline for each empty waste cartridge slot (Figure 16).

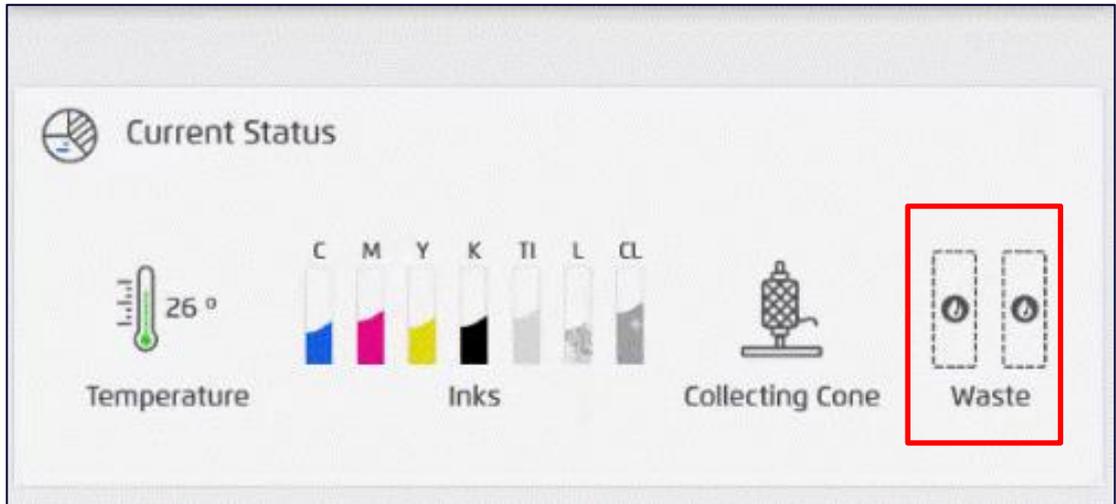


Figure 16: Waste Cartridge icon

6. When promoted by a PPC message to insert the Waste cartridge, do so into an available slot. If there is no empty slot, store the empty ink cartridge in an allocated cabinet.



Figure 17: Empty ink cartridge moved to a waste cartridge slot



Figure 18: Slide waste cartridge into slot



Figure 19: Empty waste cartridge inserted. Blue LED is ON.

7. Close the cartridge cover.

The Waste icon on the Current Status section of the Maintenance screen should show a **green** V check outline when a waste cartridge is inserted.

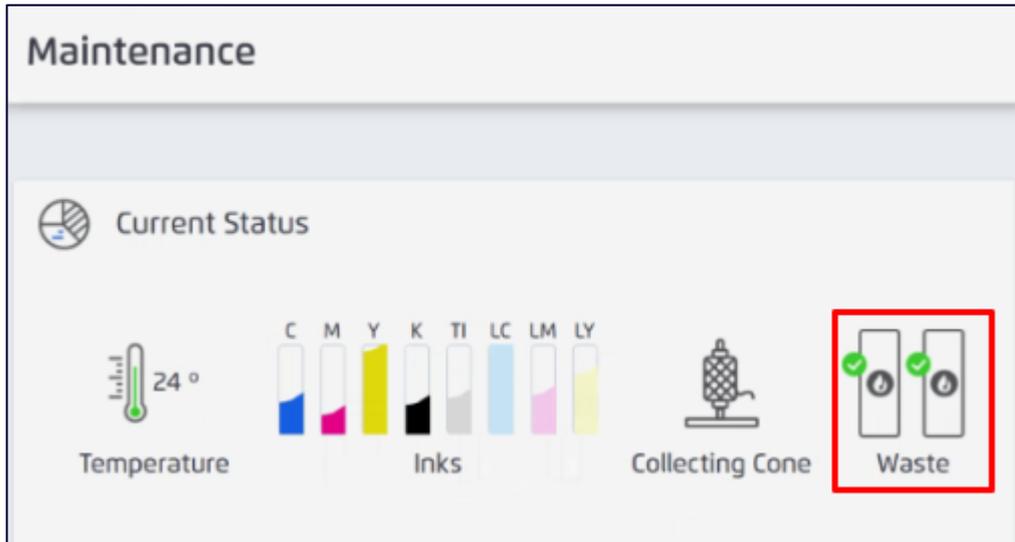


Figure 20: Waste cartridge icon marked inserted

⚠ CAUTION

The ink is hazardous to humans. Follow the MSDS and local disposal regulations carefully when disposing of ink.

2.4 Handling Waste

Byproducts of the dyeing process are automatically pumped into the empty ink cartridges in the waste cartridge slots. When these cartridges are full, remove them and replace them with empty ink cartridges.

⚠ CAUTION

The waste includes hazardous materials. Follow the MSDS and local disposal regulations carefully when disposing of the waste cartridges.

2.4.1 Removing a Waste Cartridge

To remove a waste cartridge:

Check the PPC. If the first message below is shown, wait until the second message appears:



Figure 21: Waste emptying in progress

Filling completed.

⚠ WARNING

Never open the cartridge cover while waste emptying is in process!

1. Open the cartridge cover.
2. Check the LED indicators on the left-hand side of the waste cartridges.



Figure 22: Check LED status

The LED indicator turns off when a waste cartridge is full.

3. Remove the full waste cartridge.
4. Insert an empty ink cartridge.



Figure 23: Empty waste cartridge inserted

5. Close the cartridge cover.

The following message is displayed:



Figure 24: close cartridges cover

2.5 Lubricant Filling

Refill the lubricant when the Low Lubricant level alert pops up.

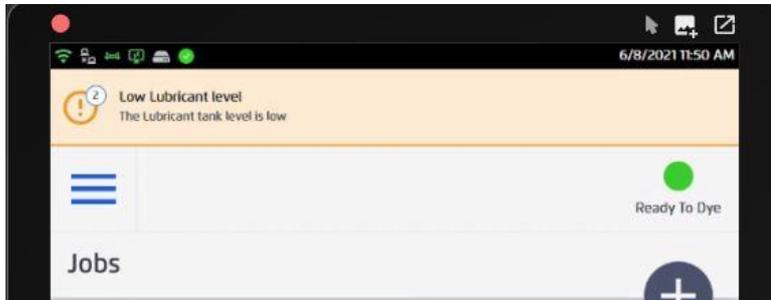


Figure 25: Low Lubricant alert

A lubricant bottle is included with the set of ink cartridges.



Figure 26: Lubricant bottle

To refill the lubricant:

1. Open the TS-1800 operating panel (PPC) door.
2. Open the lubricant container cover by releasing the 2 lock screws.

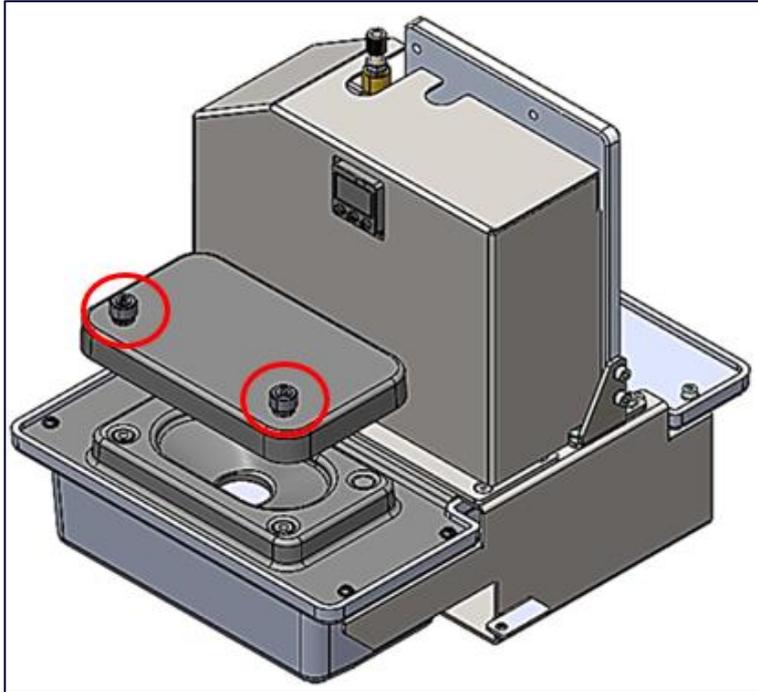


Figure 27: Opening the cover

3. Use a complete 1-liter lubricant bottle to fill the lubricant as shown in Figure 28.



Figure 28: Filling the lubricant

4. Close back the lubricant container cover.

2.6 Thread Loading steps

The initial thread loading procedure is performed when:

- Thread breaks, gets stuck, or is torn inside the machine.
- There is no thread in the machine.
- All other times follow the procedure in section 2.8 “Replacing the Thread”.

Preliminary steps:

1. From the tablet menu, select **Maintenance** then tap **Thread Loading Wizard**.

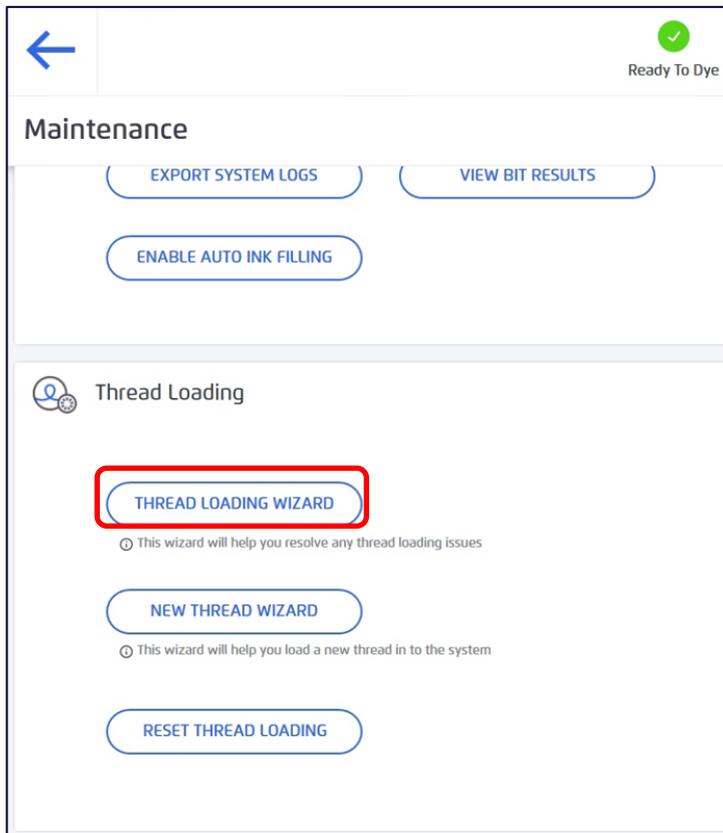


Figure 29: Thread Loading Wizard

Follow the Thread Loading Wizard instructions on the machine PPC.

NOTE:

Make sure to remove all thread residue from the inner thread path before pressing the loading button.

2. If the Thread Loading process fails to complete, press the **Reset Thread Loading** button and wait for the process to end.

The blue light on the **Load** button flashes slowly while the TS-1800 performs internal processes to prepare for thread loading.

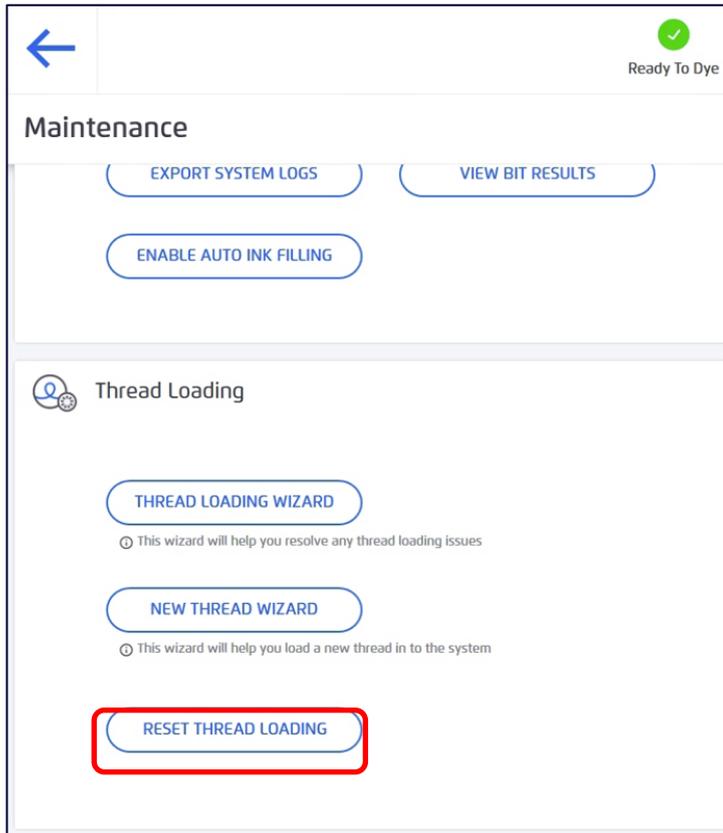


Figure 30: Reset Thread Loading

NOTE:

This process can take up to a few minutes to complete.

When these processes are complete, the following message appears:

Ready for Thread Insert

The blue light on the **Load** button stops flashing and remains *ON*.

NOTE:

If something goes wrong during the thread loading (the thread gets stuck, tears, or any other thread issue), refer to the troubleshooting section of the *Thread Break Wizard* and follow the instructions there.

Procedure

1. Place a full cone of undyed thread in the thread guiding unit (TGU).



Figure 31: Undyed thread in the TGU

To feed the thread through the TGU path, follow the corresponding numbered steps in the image and in the procedure below.



THE STEP NUMBERS USED IN THE IMAGE AND THE PROCEDURE CORRESPOND TO THE NUMBERS PRINTED ON THE TS-1800.

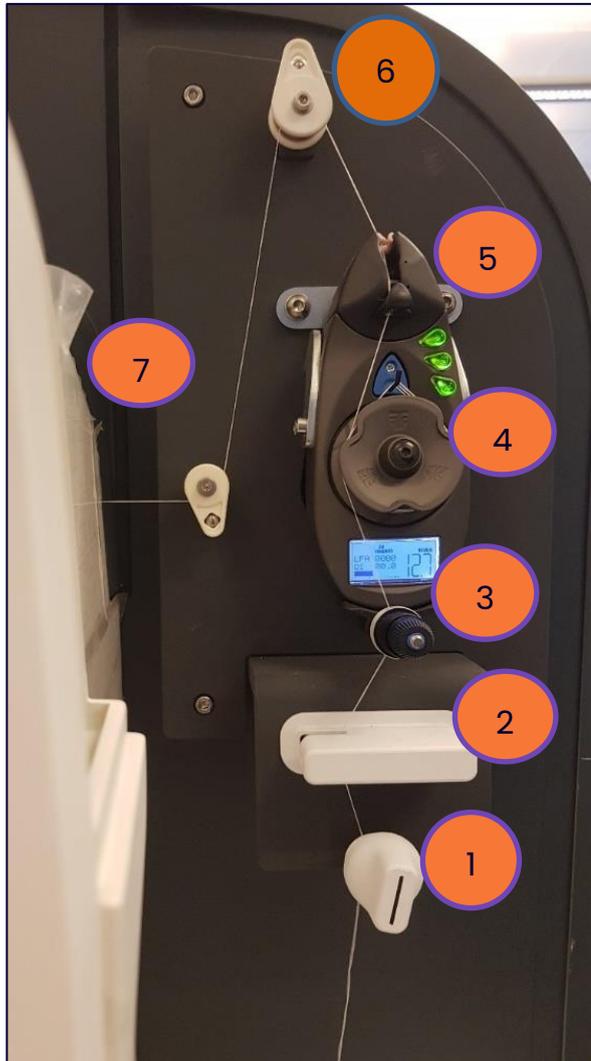


Figure 32: Wind the thread as shown

2. Clip the thread into the first thread guide lock as shown in Figure 33 (1).
 - a. Separate the two discs by pulling the outer disc away from the inner disc.
 - b. Pull the outer disc away far enough so that you can feed the thread underneath the "hook".
 - c. Feed the thread under the plastic "hook" (Figure 34).
 - d. Release the discs.
3. Clip the thread into the Brake sensor (2).
4. Clip the thread (from left to right) around the BTSR tensioner as shown in Figure 35 (3).

5. Feed the thread through the BTSR wheel by turning it 3 times around the wheel as shown in figure 35 (4).
6. Feed the thread through the BTSR top hook (5).
7. Feed the thread through the top retaining ball (6).
8. Feed the thread through the lower retaining ball (7).



Figure 33: Feed the first guide lock

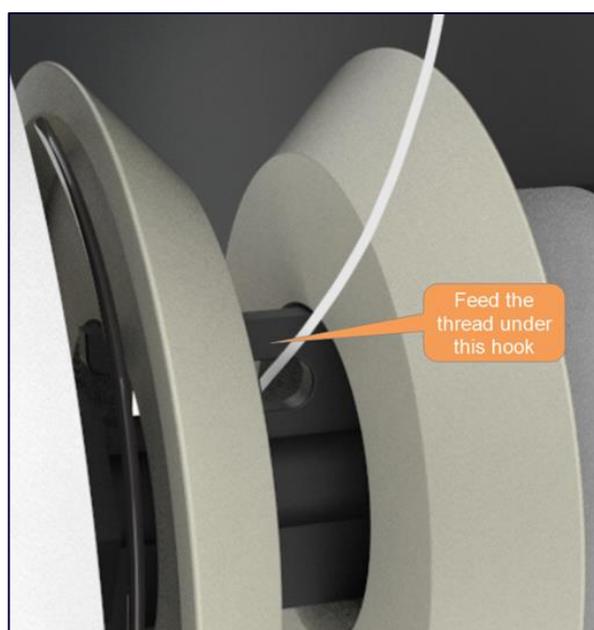


Figure 34 Feed the thread under the hook



Figure 35: Feed the Thread through the B TSR tensioner and B TSR wheel

9. Open the top two covers:

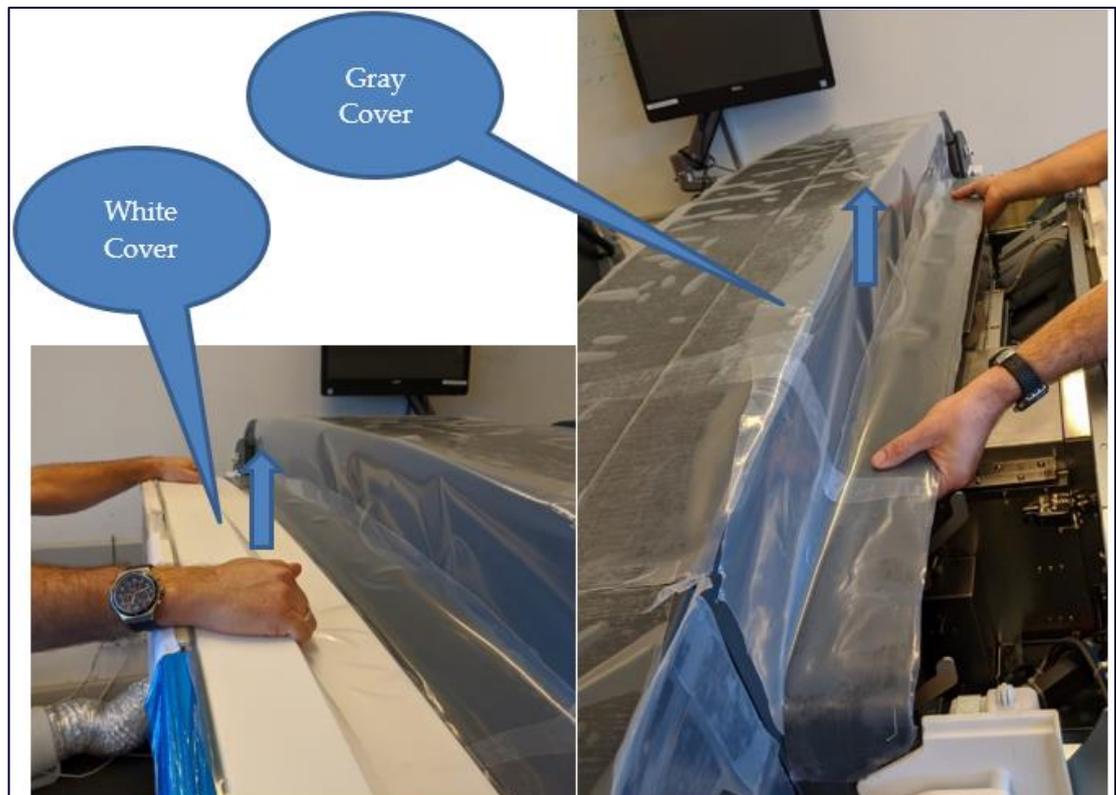


Figure 36: Opening the two top covers

10. Open the Arc Cover by releasing the lock screw and pull the cover up



Figure 37: Open the Arc cover lock screw

11. Open the Dyeing tunnel by opening the 3 latches and lifting the dyeing head cover.

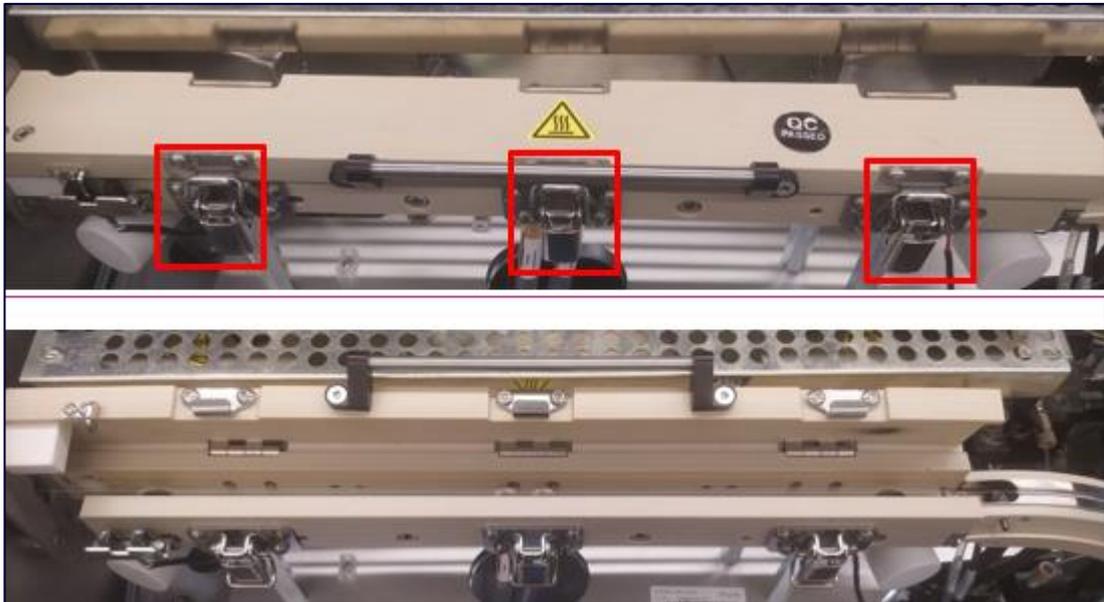


Figure 38: Open the Arc Dyeing Head

12. With the upper door of the dryer open and the Thread feeding wheels lifted, insert the thread along the dyeing head.



Figure 39: Open upper door of dryer

Make sure the thread is guided below the bearing wheel as shown in Figure 40.

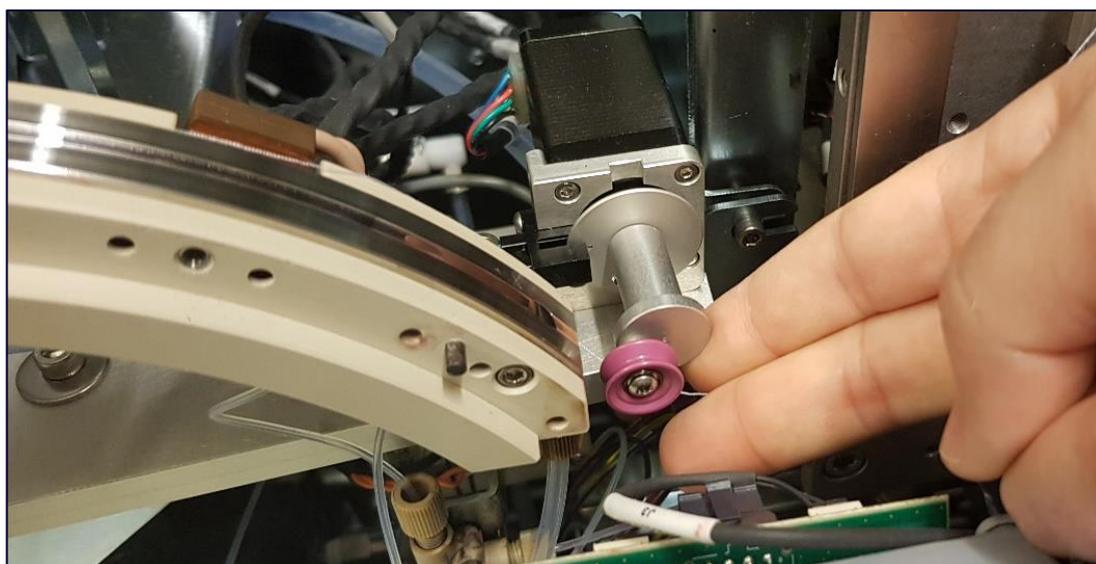


Figure 40: Guiding the thread below the bearing wheel

13. From the Dryer exit point (1) feed the thread through the Gripper unit (2)
14. Feed the thread through the Lubrication system (3)
15. Feed the thread under the dancer arm (4)

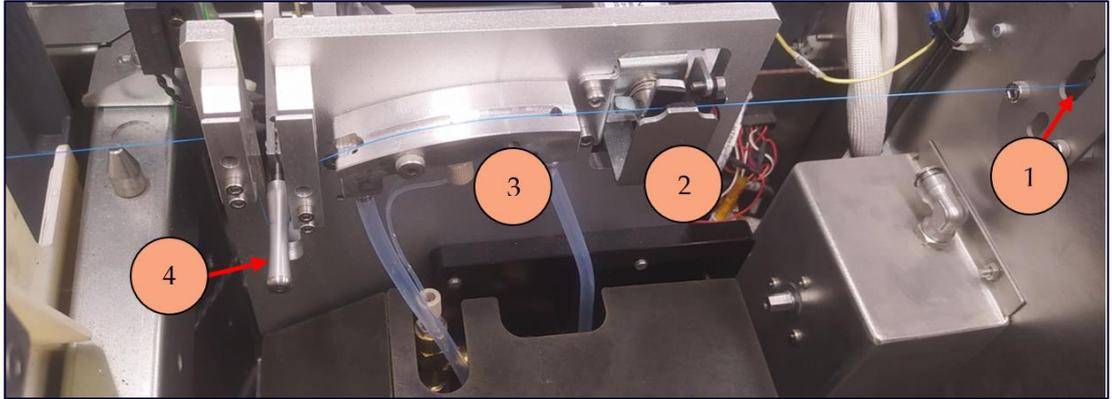


Figure 41: Thread guided through the lubrication system

The completed thread guiding path at the LTFU is shown below.

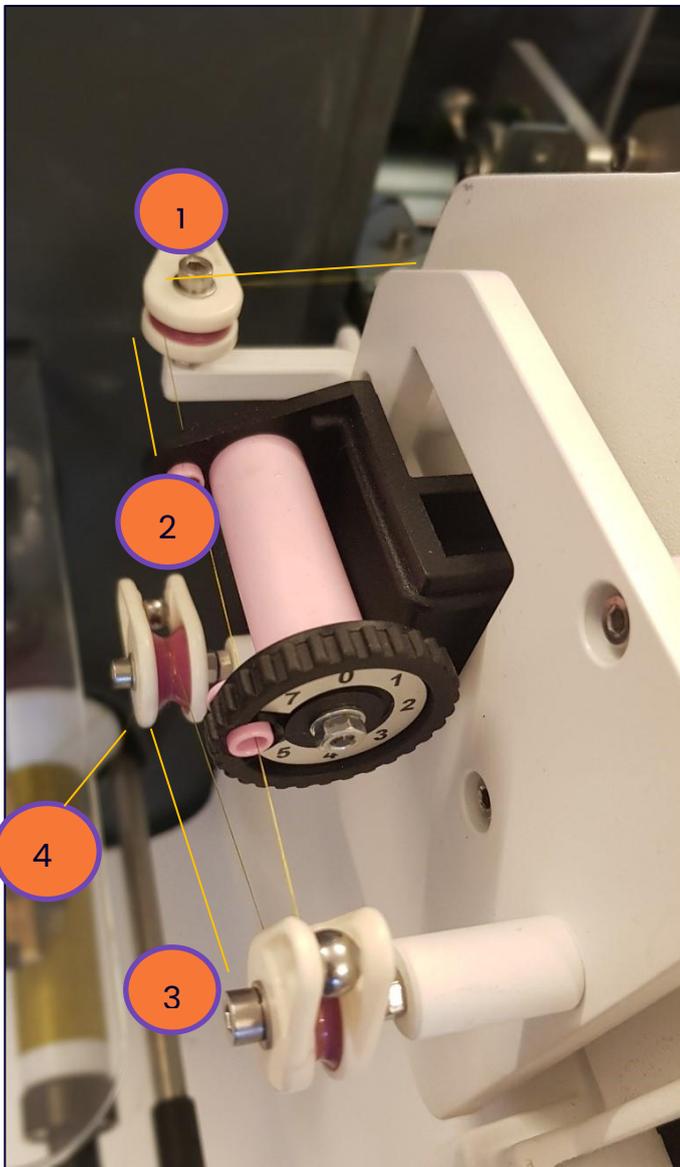


Figure 42: LTFU thread guiding path

16. Feed the thread through the upper retaining ball (1).
17. Feed the thread through the two pink holes of the tensioner (2).

18. Feed the thread through the front retaining ball (3).
19. Feed the thread through the left retaining ball (4)
20. Insert an empty collecting cone into the machine.

For instructions on how to do this, refer to section 2.7: "Inserting an Empty Cone".

21. Press the **Load** button on the machine panel.

The TS-1800 performs automatic thread loading. When it has completed the process, it is ready to start a new job and the following message displays:

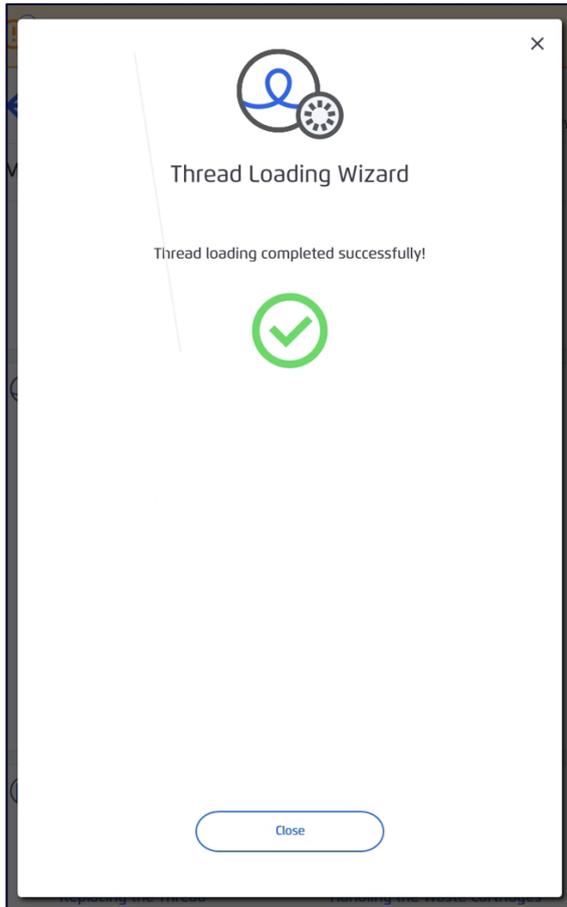


Figure 43: Thread Loading Completed

IMPORTANT!

The automatic thread loading process can take a few minutes. The blue Load button flashes slowly during the process and you can hear the machine performing mechanical actions inside the machine. **DO NOT** press any buttons while this is happening. Wait until the Load button blue light is ON and has stopped flashing.

To check that you have set up everything correctly, press the **Jog** button for a few seconds to confirm that the thread is winding correctly onto the winding cone.

2.7 Inserting an Empty Cone

A new cone should be inserted when:

- Loading thread for the first time
- The cone fills up
- You want to start a new color on a new cone

To insert a new cone:

1. Starting at the wider end of a new collecting cone, feed the thread through the inside of the cone.



Figure 44: Feeding the thread through the wide end of the cone

2. Allow a short piece of thread to protrude through the small end of the cone.
3. Push the winding arm all the way back.
4. Holding the cone in your left hand, pull the cone support arm all the way out with your right hand.

Make sure that the thread remains inside the cone.

5. Place the cone into its position in the winder.
6. Release the cone support arm, making sure that it seats correctly into the end of the cone.

2. Make sure that the end of the thread is protruding from the small end of the cone.

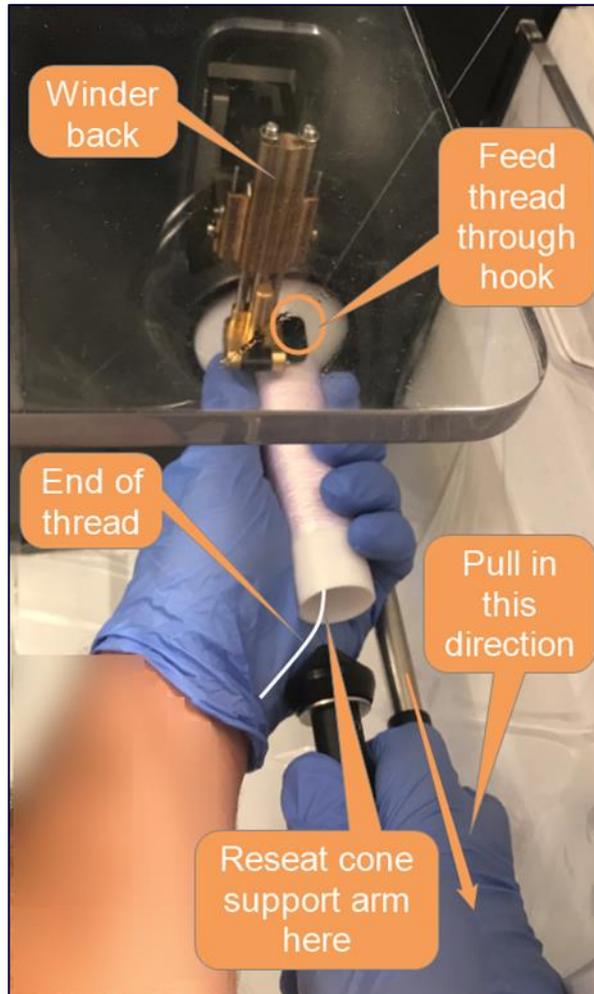


Figure 45: Inserting the cone into the winder

7. Feed the thread through the hook on the winding arm.
8. Cut off the end of the thread protruding from the small end of the cone.
9. To take up any slack in the thread, rotate the cone in a clockwise direction as far as you can.

The thread winding unit is now ready to continue the **Automatic Tread Loading** process.

10. Continue the automatic thread loading sequence by selecting the current thread type and pressing **Continue** on the tablet message.

2.8 Replacing the Thread

When a new job requires a different thread to the one already loaded, tie a new thread to the existing one.

Procedure

1. Create extra slack in the thread by manually unwinding some of the thread from the feeding cone.

- Using a pair of scissors, cut the existing thread just after the feeding cone.

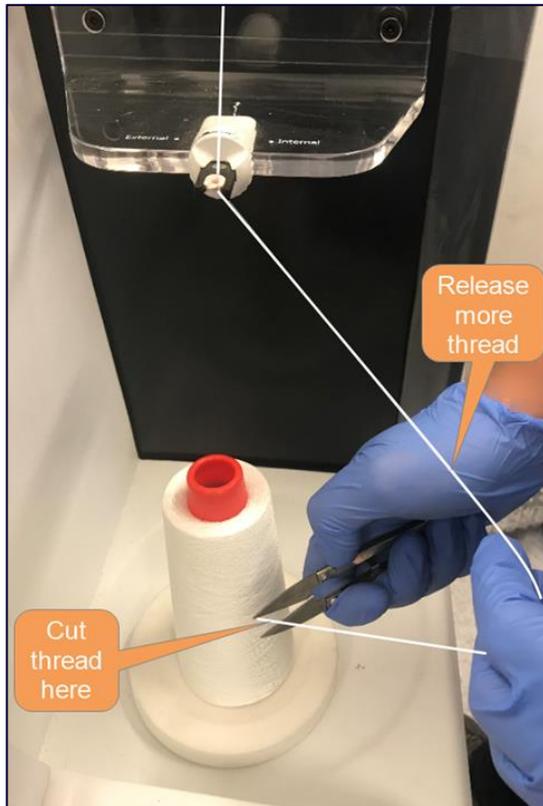


Figure 46: Cutting the thread at the feeding cone

- Remove the current feeding cone.
- Place a full feeding cone into the thread feeding unit.
- Unwind a portion of the thread from the new feeding cone.
- Tie a simple knot between the existing thread and the new thread by following the next seven (7) steps closely.

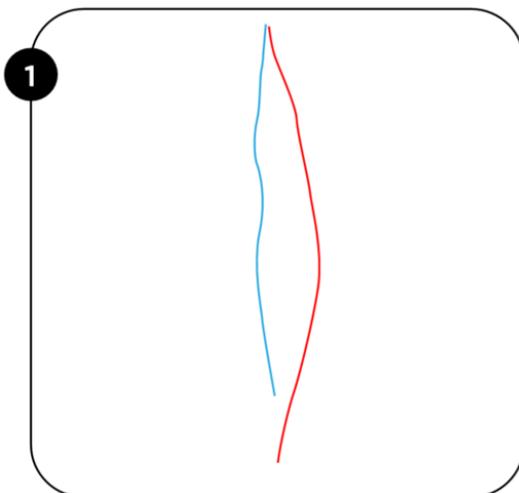


Figure 47: Place the ends of the two threads next to each other

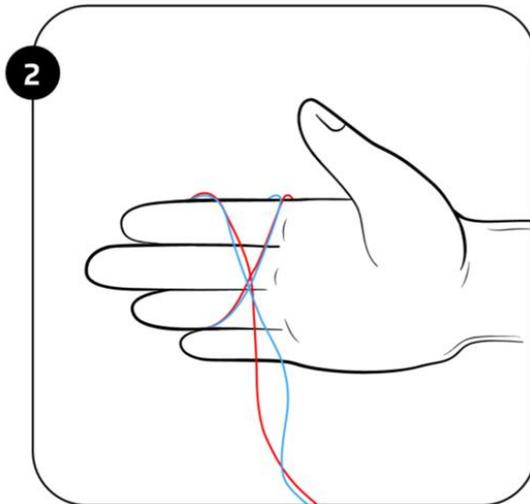


Figure 48: Hold the threads together and wrap them around your hand

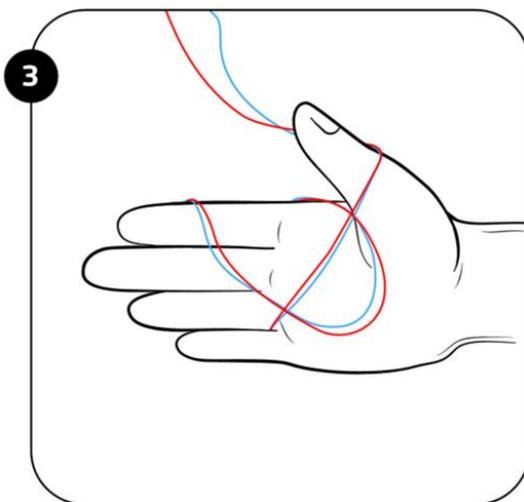


Figure 49: Pass the two ends through the inside of the loop

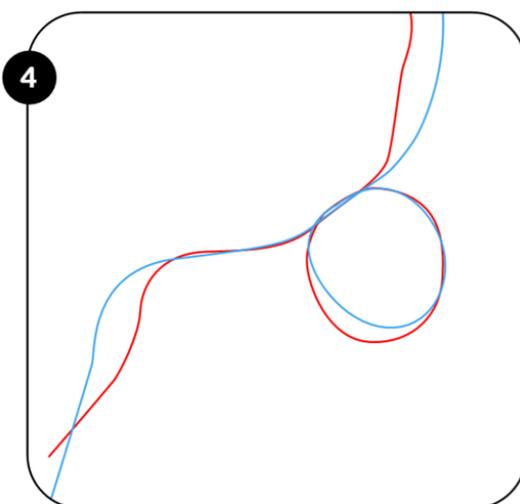


Figure 50: Remove your hand

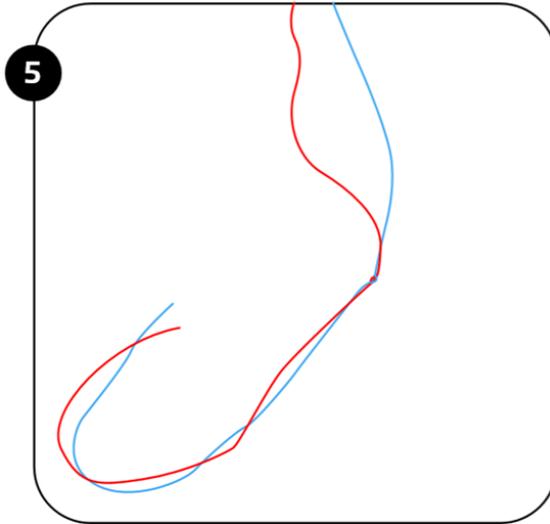


Figure 51: Pull on each side to form a small knot

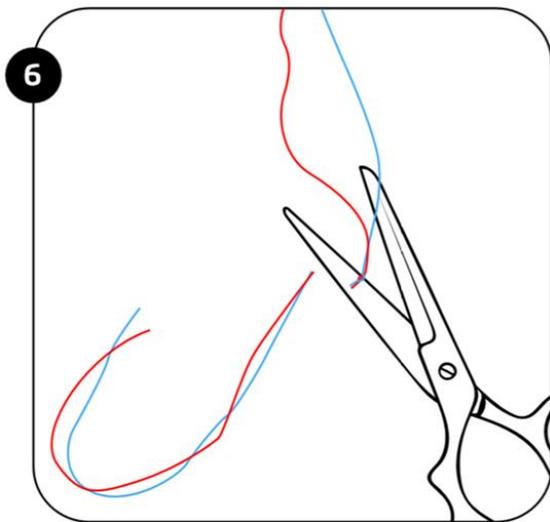


Figure 52: Cut the excess thread after the knot

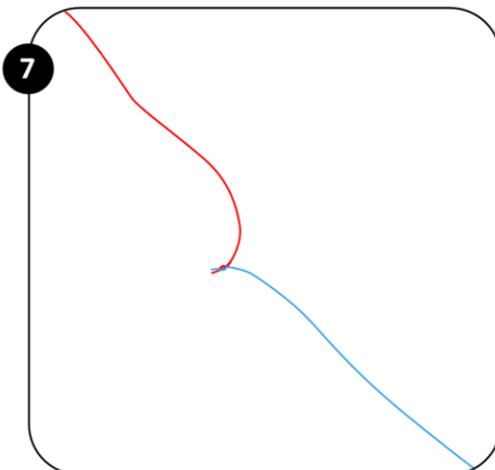


Figure 53: Pull on the two ends to make sure that the knot is strong

You can now proceed with the remaining steps of the procedure.

7. Manually wind excess thread back onto the feeding cone.

8. On the panel, press and hold the **Jog** button until the knot appears at the collecting cone.



Figure 54: Thread jog button

9. Cut the thread past the knot, near the winder.



Figure 55: Cutting the thread at the winder

10. To release the current collecting cone, refer to section 2.9 "Releasing the Current Collecting Cone".
11. To insert a new collecting cone, refer to section 2.7 "Inserting an Empty Cone".

2.9 Releasing the Current Collecting Cone

To release the existing collecting cone:

1. Unwind some of the thread on the collecting cone to create some slack in the thread.
2. To release the collecting cone, hold the cone with your left hand and, using your right hand, firmly pull the spring-loaded cone support arm in the direction shown in Figure 56.

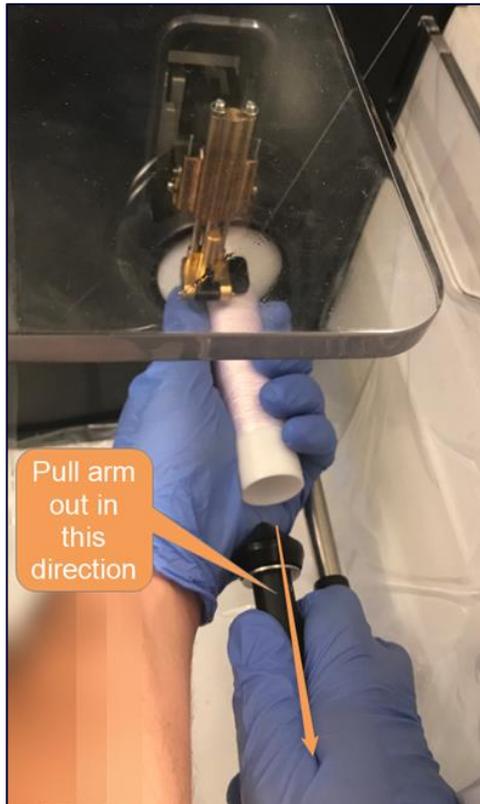


Figure 56: Releasing the cone

3. Release the cone support arm, allowing it to spring back to an unloaded position.
4. Release more thread from the cone so that thread can reach the built-in thread cutter.

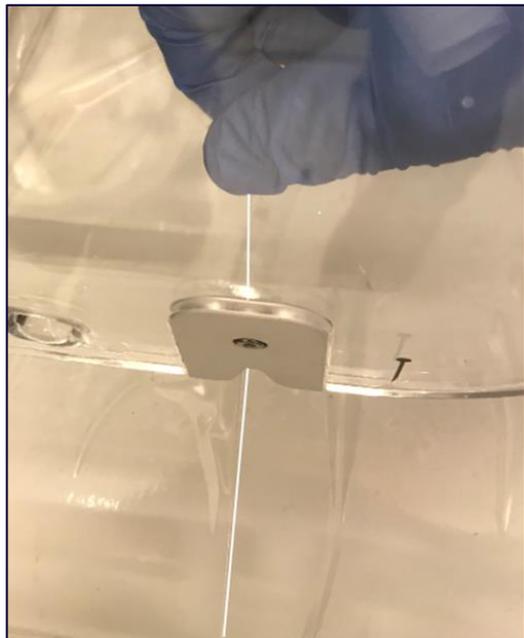


Figure 57: Cutting the thread at the winder

5. Cut the thread.
6. Remove the current collecting cone.
7. Store or reuse the current collecting cone.

To insert an empty or a new collecting cone, refer to section 2.7: "Inserting an Empty Cone".

3. Home Screen & Menu

The following sections describe how to operate the TS-1800 using screen layout, menus, as well as how to manage the job list.

3.1 Using the Home Screen

The home screen of the TS-1800 shows a list of previously created jobs which includes:

- **Name** – The name of the Job
- **Length (m)** – The length of thread in meters, required for the job
- **Colors** – The thread colors used for the job
- **Updated** – T date of the last job update

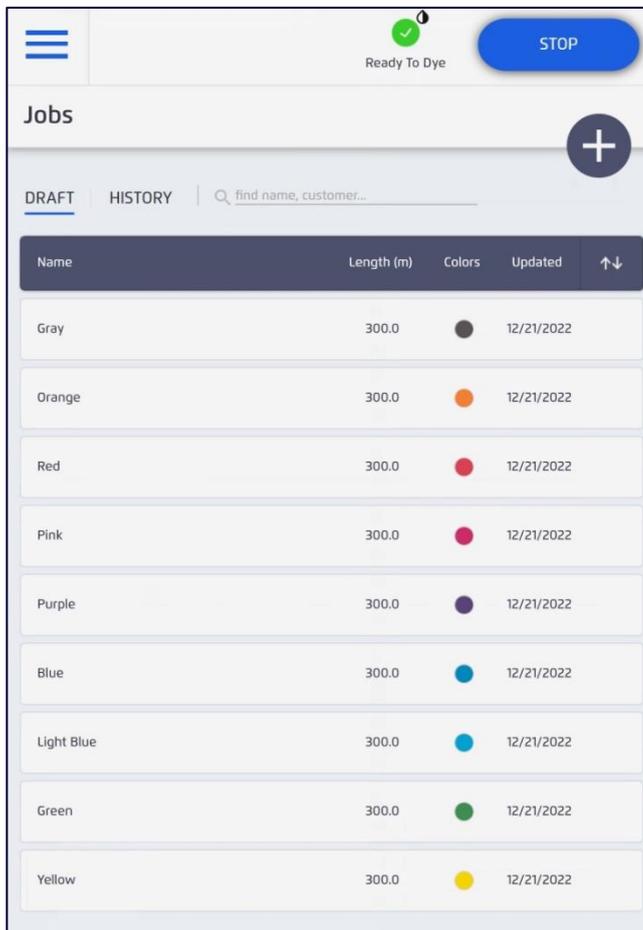


Figure 58: Job List

The **TS-1800 status** icon is shown on the top right side of the screen and indicates the current condition, as seen in the following figure:

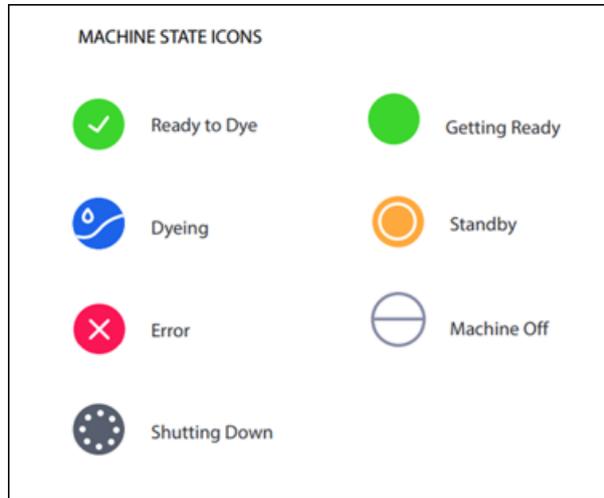


Figure 59: TS-1800 State

3.2 Using the Main Menu

To open the main menu, select the menu icon  in the top left corner of the home screen.

The main menu contains the following options:

- Jobs
- Events
- Maintenance
- Settings
- Storage
- Backup & Restore
- Update
- Power



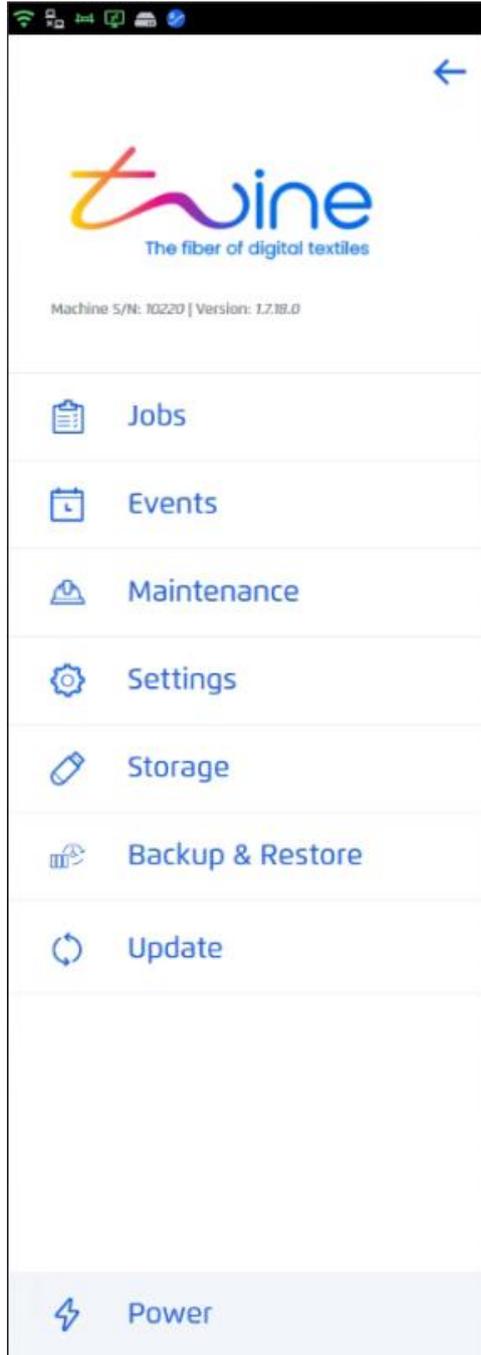


Figure 60: TS-1800 Main Menu



4. Creating a New Job

A **Job** is a sequence, or a unit of work, set up to be run by the TS-1800. The job consists of feeding the thread/yarn into the machine and dyeing it the specified color(s). The colors and other parameters are defined through the PPC.

 Prepare the TS-1800 for dyeing before running a job. For more information, see section 2: Operating the TS-1800.

To create a new job, complete the following steps:

1. Define the job including name and, thread type (white gap optional)
2. Specify colors and length

4.1 Defining the Job

To define a job, complete the following steps:

1. To add a new job, select the **[+]** button, in the top right-hand corner, of the home screen.

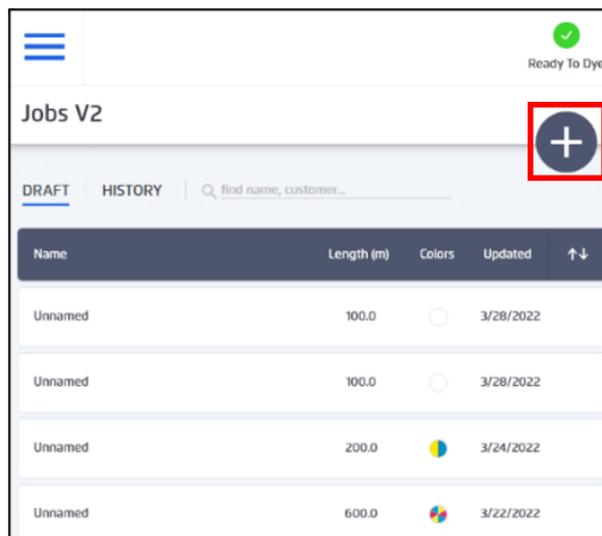


Figure 61: Add a New Job

2. The Job Details screen appears, the following parameters are required:
 - Job Name – Define the name of the job.



- Thread Type – Select from the list of supported thread types.
- White Gap (m) – Define the number of meters of white gap (optional).

Job Details

Job Name Job Test 1

Thread Type Coats Epic Natural 24 tex
Required tensioner level is 0

White Gap [m] 5

OK

Figure 62: Job Details

3. Enter the job details parameters, then select **Ok**.

4.1.1 White Gap (Spacing)

When dyeing more than one segment on a spool, you have the option of leaving some white space in between the colored segments.



The screenshot shows a 'Job Details' form with the following fields: 'Job Name' (Job Test 1), 'Thread Type' (Coats Epic Natural 24 tex), and 'White Gap [m]' (5). The 'White Gap [m]' field is highlighted with a red border.

Figure 63: Define the White Gap (m)

4.2 Color and Length

To define the color(s) and thread length for a job, complete the following steps:

1. To define the length of thread for the job per segment, enter the number of meters of thread needed (1).
2. Then to define which color(s) to use for the job, select **[+] Add Color** (2).

The screenshot shows the 'Color & Length' screen for 'Job Test 1'. It displays 'Segment #1' with a length of 300.0 meters. A red box highlights the length field (1). Below it, the 'Add Color' button is highlighted with a red box (2). The screen also shows a 'Ready To Dye' status and a 'DYE' button.

Figure 64: Color and Length

3. The Color Selection Tool screen opens. The following tabs are used to define the color(s):



- LAB
- RGB
- CMYK
- Catalogs



Figure 65: Color Selection Tool

i Default preferences can be set if you tend to use the same job type and/or color space/catalog for each job. For more information, see Job Settings.



4.2.1 Adding a Solid Color(s)

To add a solid color, complete the following steps:

1. Select the color workspace from the tabs: LAB, RGB, CMYK or Catalogs. For example, select **LAB**.

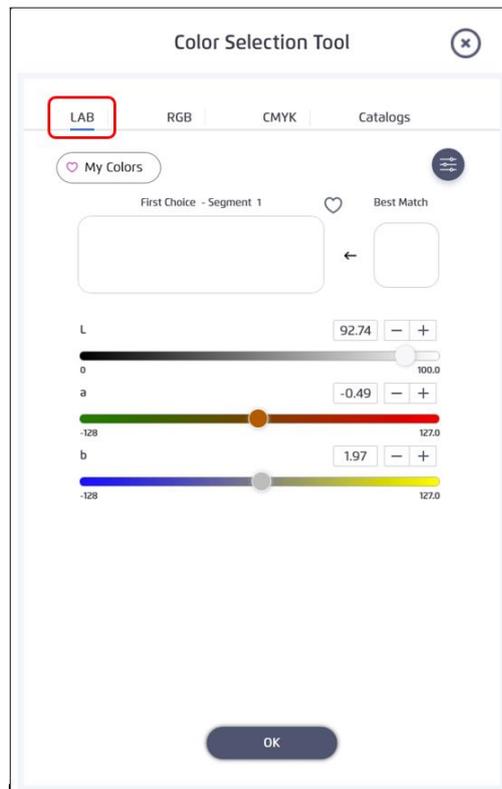


Figure 66: LAB Screen in Color Selection Tool

2. Enter the color coordinates or choose a catalog sample depending on the color space or catalog defined when creating the job.



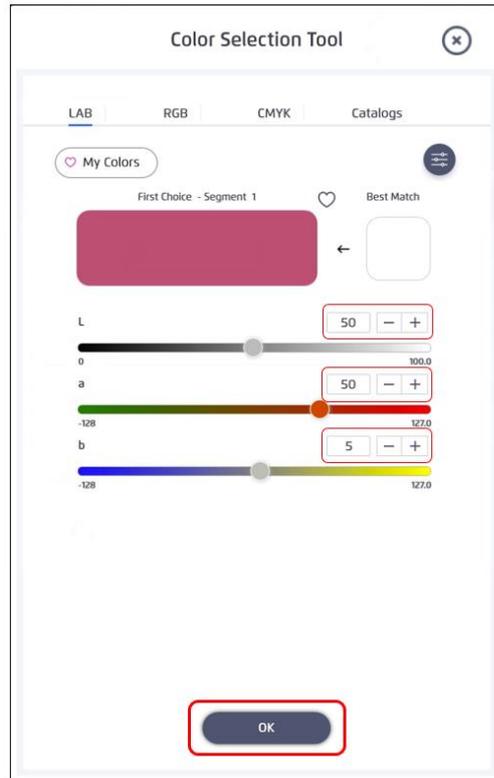


Figure 67: Enter the color coordinated in Color Selection Tool

3. Click **"Add New Segments"** as needed for the job.



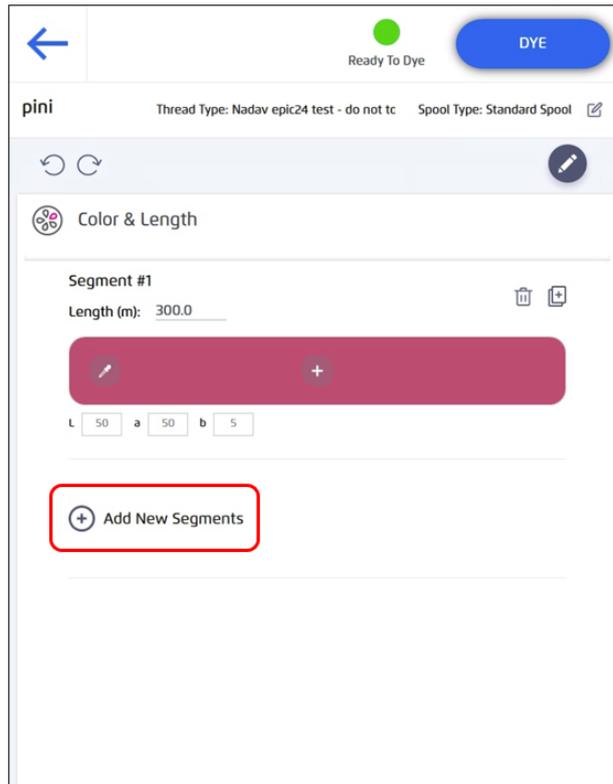


Figure 68: adding several segments to the job

4. Edit the new segment parameters, Length & Color



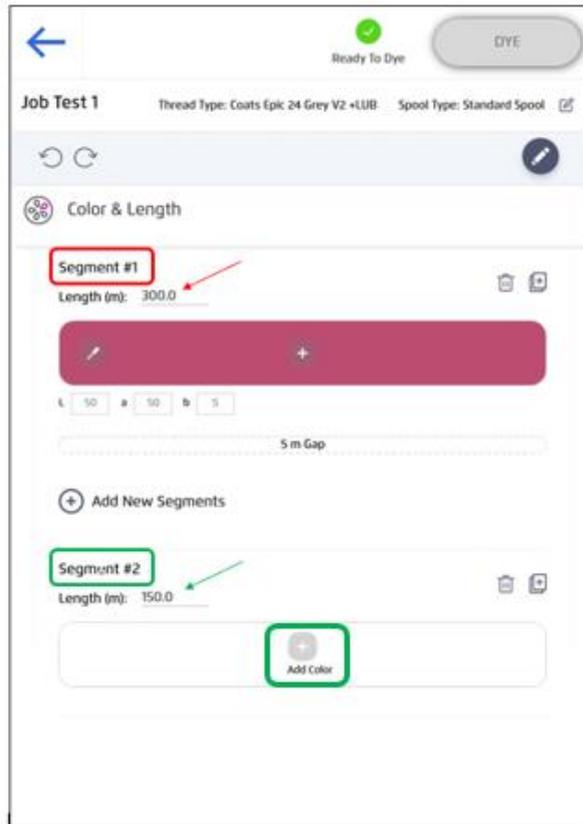


Figure 69: Editing segment #2 parameters

5. Once the new segment is approved, the Job Summary screen appears as shown in figure 70.



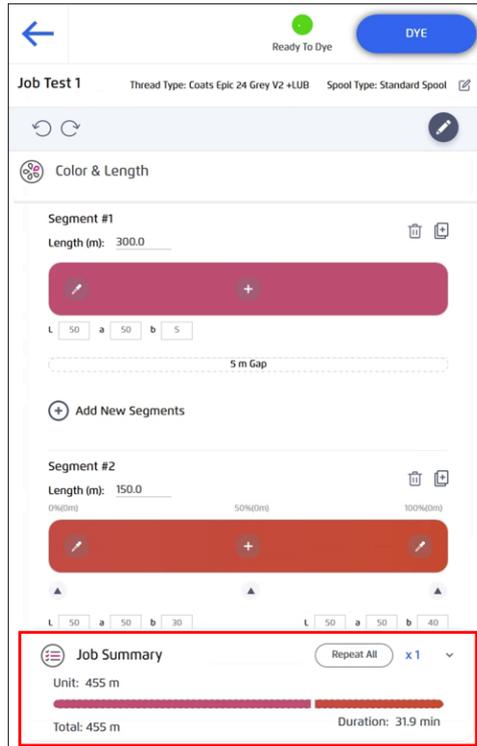


Figure 70: Job Summary

4.2.2 Editing a Solid Color(s)

To edit a solid color, complete the following steps:

1. Select the existing color segment that you want to change.
2. Then to edit the color segment, change the color coordinates or choose a catalog sample depending on the color space or catalog you defined when creating the job.



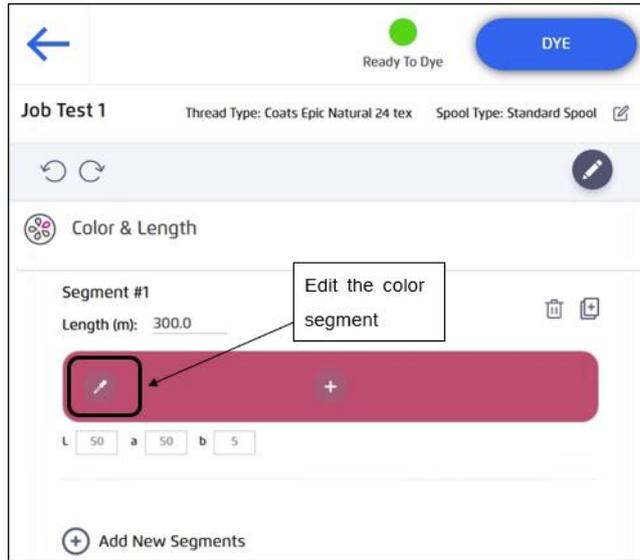


Figure 71: Editing a Color

In Figure 72, the **First Choice** (1), shows the original color segment. The **Edited – Segment 1** (2), shows the new color option following the new LAB parameters.

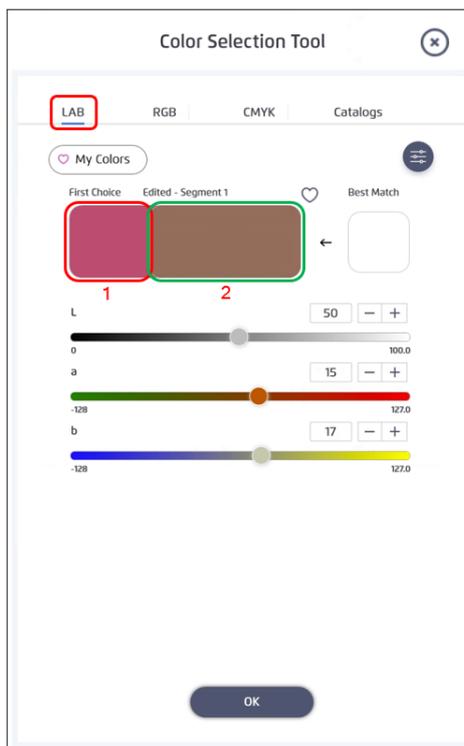


Figure 72: Editing a solid color



4.2.3 Unsupported Color(s)

In a case where the selected color is out of the TS-1800 supported color gamut, the TS-1800 will offer a “Best Match” for the unsupported color.

To use the “Best Match color for dyeing, select **OK** in the Color Selection Tool.

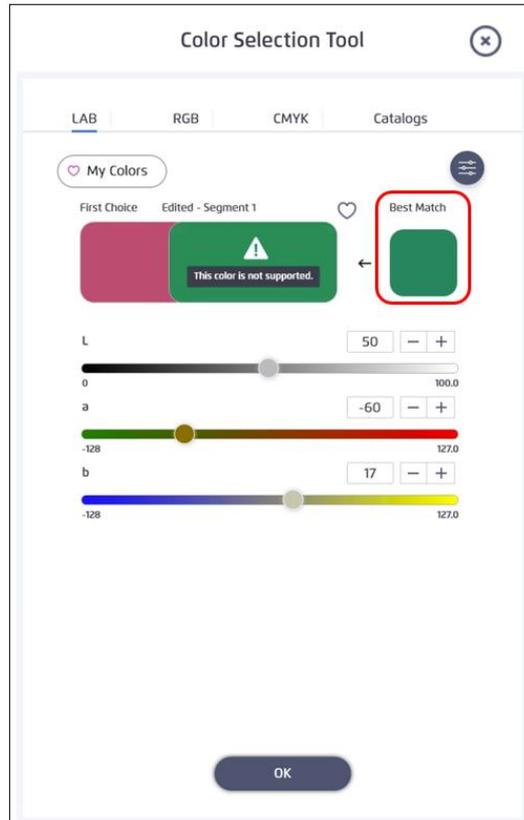


Figure 73: Unsupported Color

A window opens. To confirm permission for the system to enter the best solid color match, select **Ok**.

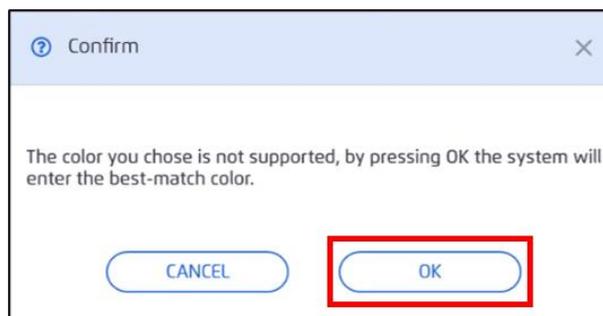


Figure 74: Confirm Best Color Match



Job Summary screen appears with the new color best match parameters set and ready to dye.

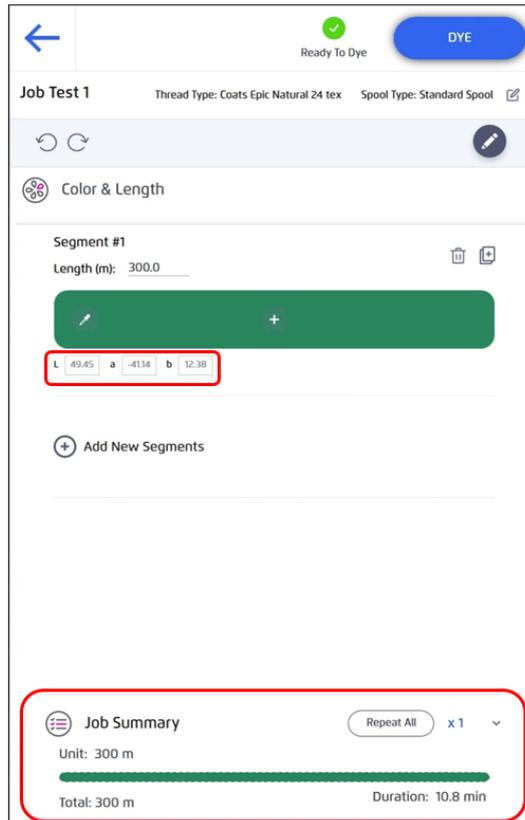


Figure 75: Job summary for color best match parameters

4.2.4 Selecting Color from a Catalog

To select a color from one of the pre-uploaded catalogs, complete the following steps:

1. Select the Catalog color space from the tabs.
2. Select a catalog from the list.



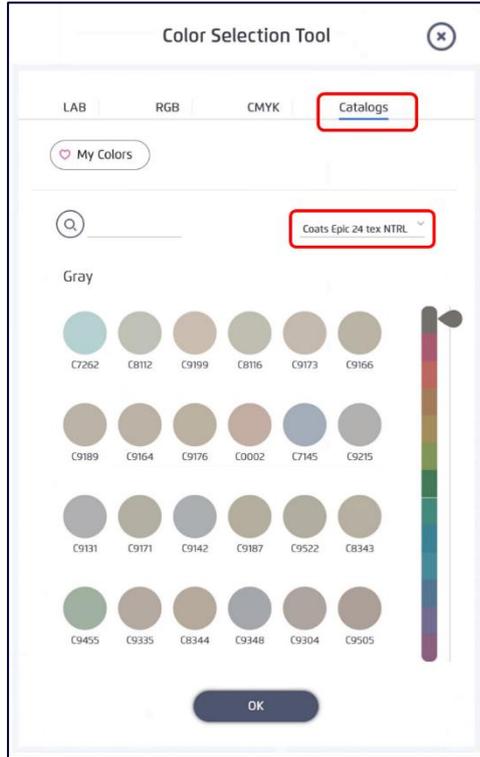


Figure 76: Catalog Selection

3. Move between color groups using the scroller and press on the desired color or use the search box to find a specific index and press next. The selected color will appear bigger (Figure 77).



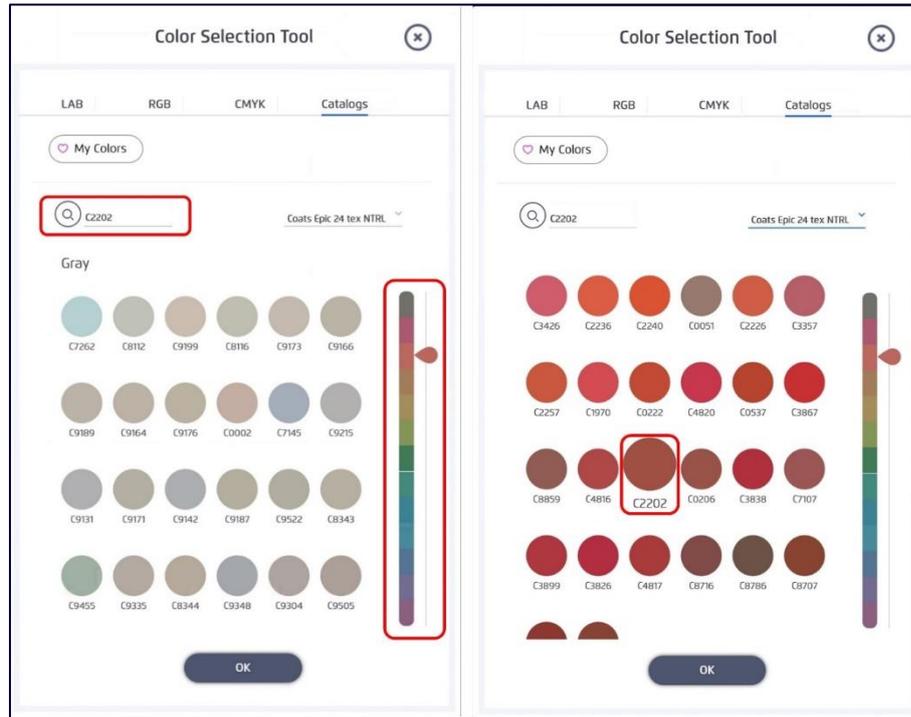


Figure 77: Color Search in Catalog

4. Press OK to insert the color to the segment.

4.3 My Colors Libraries

To add a color to the My Color Libraries, complete the following steps:

1. In the Color Selection Tool screen, select the **Heart** icon.
2. You will need to add color to an existing or new library. Choose an existing color library from the list- or create a new library by selecting **New Group [+]** (2). Create group name (3).
3. Once a color has been added, the heart icon will appear filled in (1) to label the color as added to a color library.



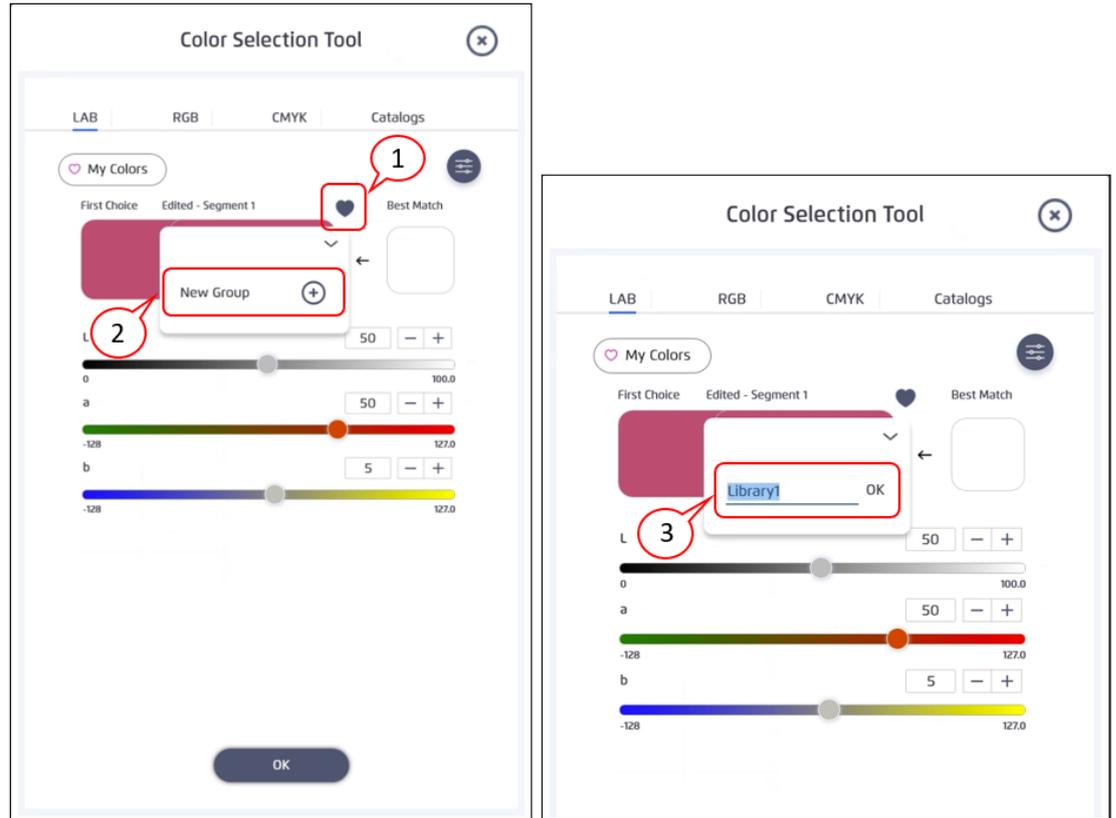


Figure 78: Add a Color to the My Colors Libraries

5. To load a favorite color, select **My Colors**.

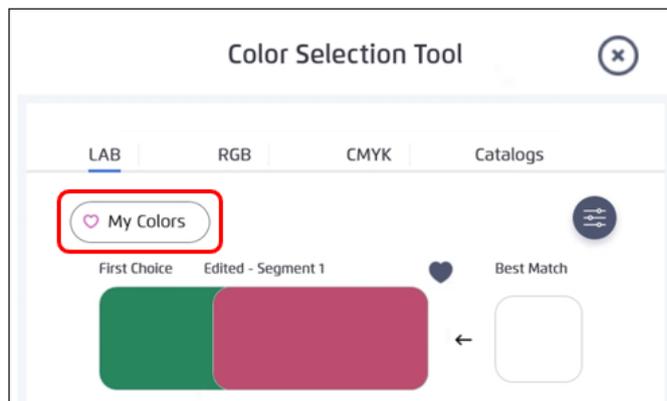


Figure 79: Open My Colors

6. The My Colors window opens, and the colors will be divided by each of the libraries they were placed in as shown in figure 80.

7. Click on the requested color to load.





Figure 80: My Colors screen

4.3.1 Edit my Color Libraries

To edit a color in the My Colors Libraries, complete the following steps:

1. In the Color Selection Tool screen, select **My Colors** to open the color libraries.
2. The My Colors window opens. You can rename a color, delete a color, or create a new color group.
3. To make changes to a color name, next to the library name, select the Edit icon.



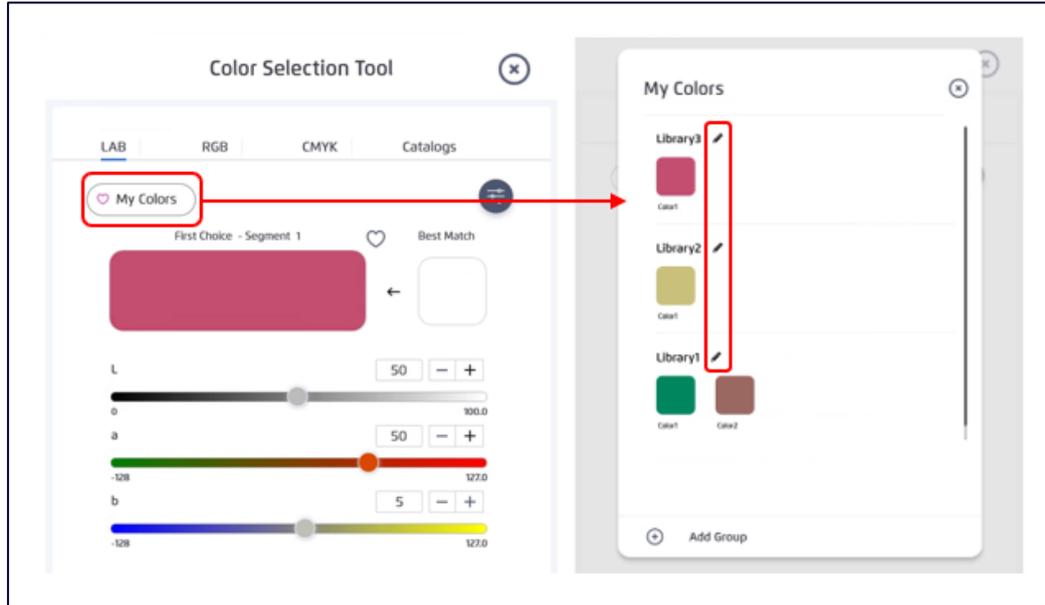


Figure 81: Edit a Color in the My Color Libraries

4. To edit a name, select the **Color Name** and make any needed changes. To delete a color, select the **Delete** icon in the center of the color.

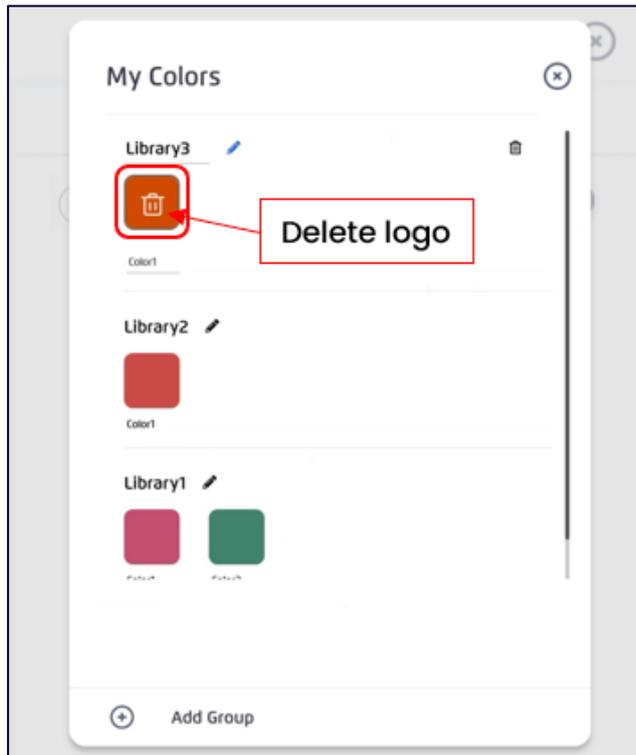


Figure 82: Delete Color from My Color Libraries



5. To delete all the libraries and their colors, in the top right-hand corner, select the **Delete** icon.

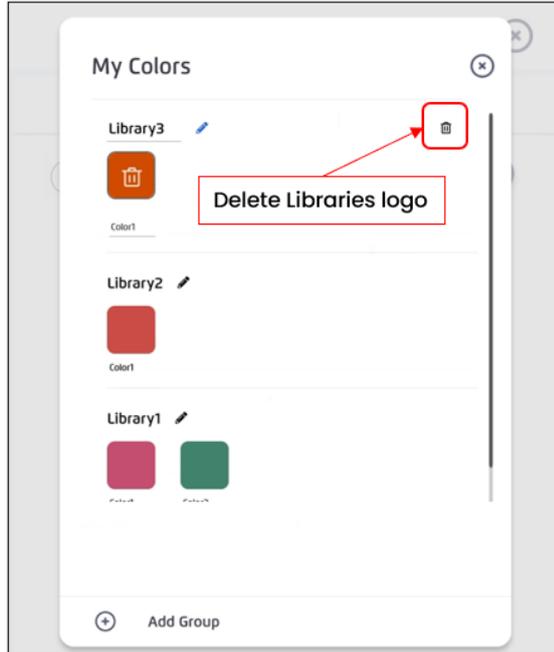


Figure 83: Delete Library from My Color

6. To create a new library, select **[+] Add Group**.

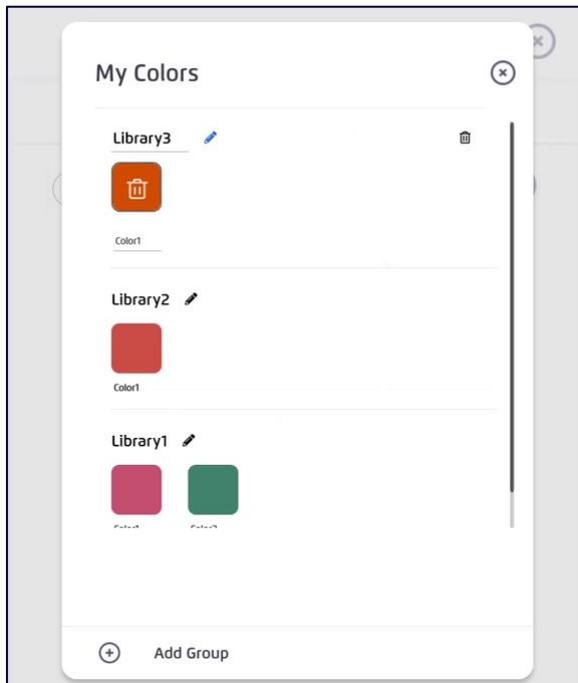


Figure 84: Add Group to My Color Library



7. Enter a name for the new library, then select Add.

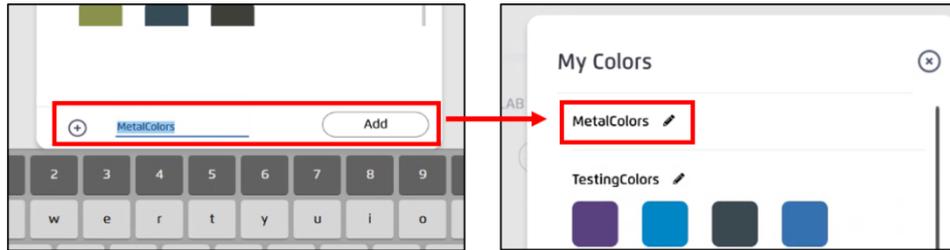


Figure 85: Add a new Group in my Color Library

8. The new group will now appear at the top of the My Colors list.

4.3.2 Creating a Color Gradient

A color gradient is defined as a moderate transition between two colors. Any additional colors required to be added in between will be displayed as two consecutive segments, created automatically by the system.

To create a color gradient, complete the following steps:

1. Select the **[+]** button in the middle of the first solid color.

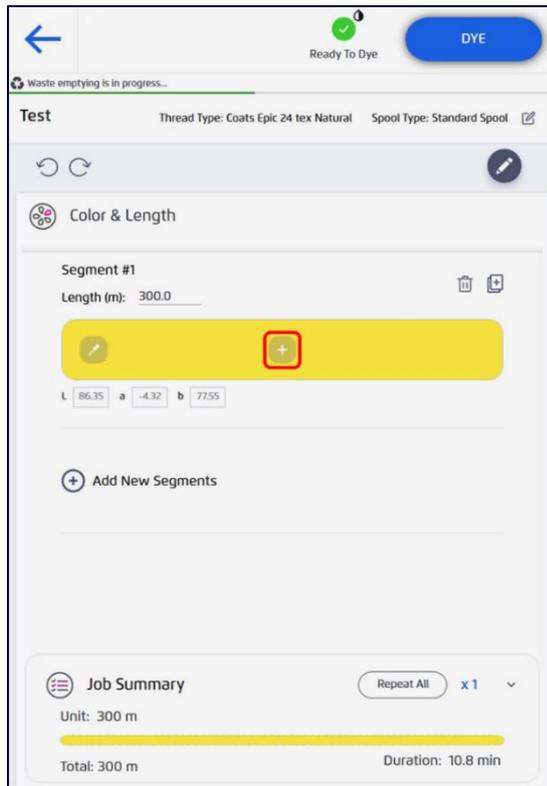


Figure 86: Adding a second color to create a gradient



2. Enter the **Color Coordinates** of the second color.

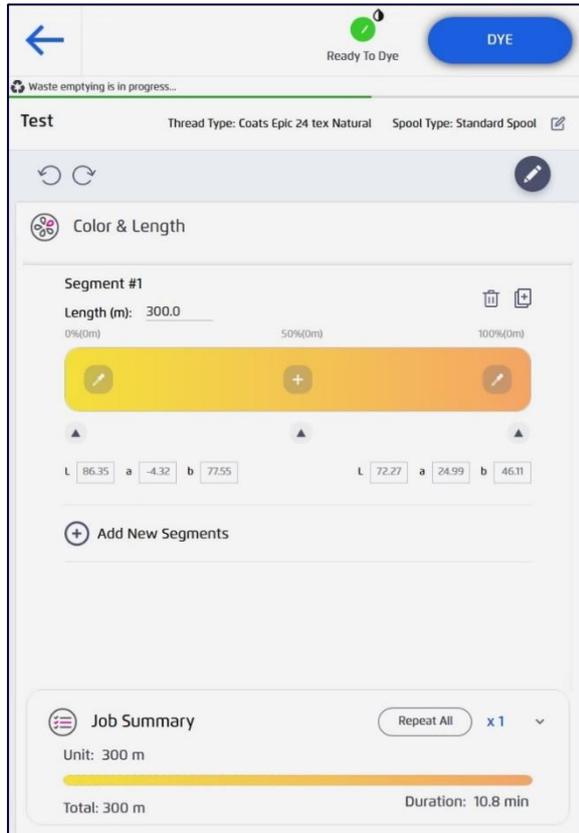


Figure 87: Gradient segments

3. Drag the arrows under the color bar to define the color transition length between the two colors.



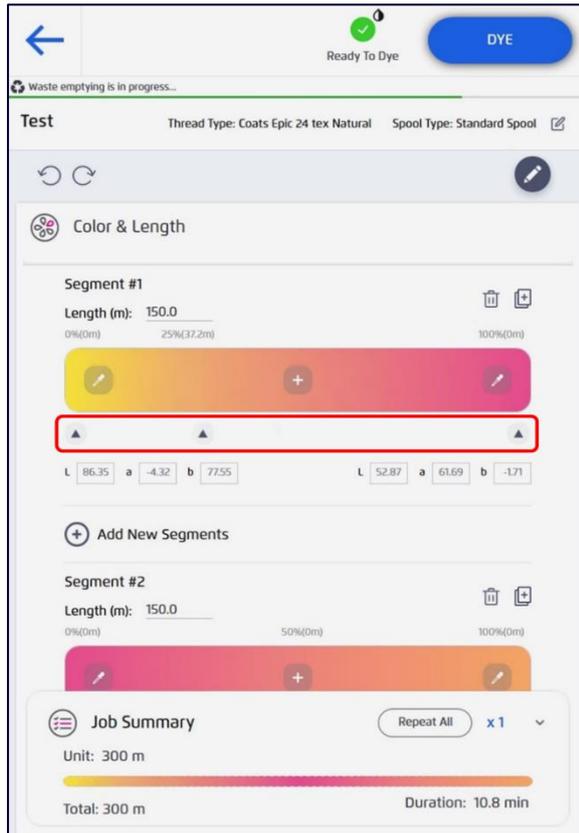


Figure 88: Set the Color transition length between the two colors

i If you add a third color, a window will open noting that the gradient segment will be split into two segments.

4.3.3 Color Fine Tuning Tool

The color fine-tuning tool is used for color correction after dyeing. First dye the thread with the TS-1800, then use the spectrophotometer (or colorimeter) to measure the output color by extracting the LAB values of the color. For more information on the spectrophotometer and measurement Tool, see the Color Measurement Guidelines and Specification in Appendix B.

If the measured color is not accurate as your target color, complete the following color adjustment steps:

1. In the **Color Selection Tool** screen, select the color workspace tab, for example the **LAB** tab.
2. Then select the Color Correction Tool icon.



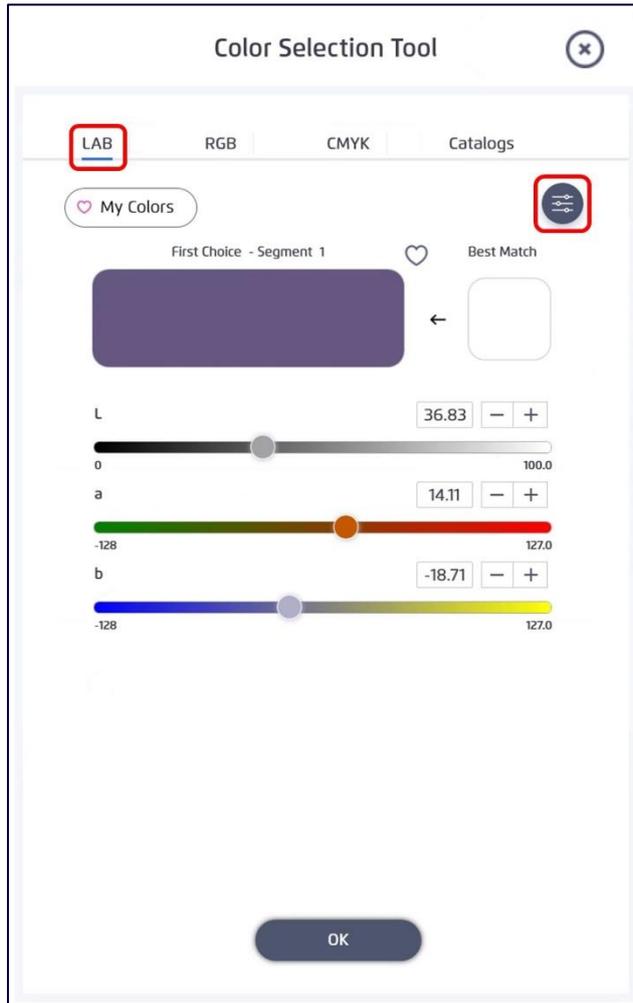


Figure 89: Select the Fine-Tuning Tool

The fine-tuning tool is only available after a color has been selected in the Color Selection Tool screen and only in LAB color space.

3. The **Color Correction Tool** screen opens, and the following sections appear:

- **Target color-** The LAB values of the color that you wish to achieve as inserted in the color Selection Tool.
- **Correction-** Measured LAB values of the last dyed trail, where you are required to manually insert the values.
- **Trails Log-** The measured LAB values, the matching recipe and the between targets and measured LAB values are documented in the trails log.



4. To run the next trail, press **Test**.
5. Repeat steps 3-4 until achieving satisfactory results.
6. select the desired trail and press apply.



Figure 90: Color Correction Tool

7. In the Trails Log section, select the **Trial Number** needed for the job, then select **Apply**. The selected color recipe will become the job color.



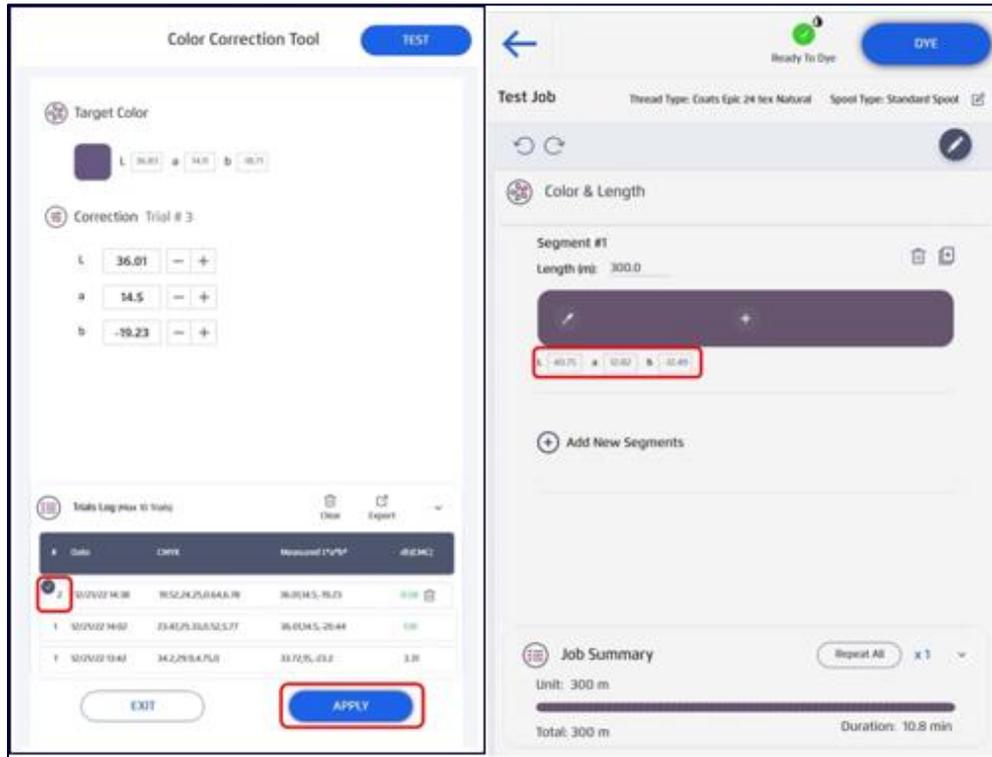


Figure 91: Job Summary

Notes:

- In case you didn't reach the desired color after 6 trails – whether the Delta-E (dE) stops decreasing or diverges- the Color Correction Tool has reached its limits. Please reach your local distributor for further assistance.
- Insert a portable storage device (USB) and press export to get trails log.

4.3.4 Job Summary

Select the **Expand** icon to display a graphic overview of the created job in the Job Summary section.

The job summary included the following overview parameters:

- The color and length of each segment
- The total length of thread used for the job
- The duration in minutes for the entire job
- The option to repeat the same job as many times as needed



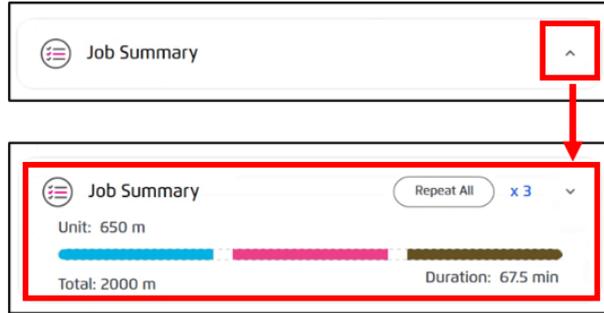


Figure 92: Expand Job Summary

4.4 Advanced Segments Management

4.4.1 Multi Segment Job Loading

A job that is made up of more than one segment can be entered manually (as described in the previous sections) or can be imported from a CSV file.

To load a job from a CSV file, complete the following steps:

1. Open the Excel file template, **Job Creation Template.xlsx**

The template has columns for segment color space, length, and up to two segment stops for gradients and columns for editing each component of each color space type – RGB, LAB, CMYK, and Catalog.

2. Edit the file to contain the needed color segment values. The maximum number of segments (lines) in the file is 200.

In the following example (Figure 93), the file contains three color segments:

- 100m solid RGB
- 150m gradient CMYK
- 400m solid LAB

	Color Space	Length (m)	Expected Color	Catalog Name 1	Catalog Item 1	RGB			LAB			CMYK			Expected Color	Catalog Name 2	Catalog Item 2	RGB			LAB			CMYK				
						R	G	B	L	A	B	C	M	Y				K	R	G	B	L	A	B	C	M	Y	K
1	RGB	100				25	0	0																				
2	CMYK	150											2	3	4	5									6	7	8	9
3	LAB	400							8	1	6	0																

Figure 93: Example Job Creation Template .xlsx:



3. Select **Save As** and choose type CSV to save the edited spreadsheet (Sheet 1) as a CSV file.



Figure 94: Save the Job Creation Template as a CSV File

4. Copy the edited CSV file to a **Removable Drive (DOK)**, then insert the DOK into the TS-1800 tablet.
5. Using the file storage module, browse for and select the **Edited CSV File**.



Figure 95: Select the Edited CSV File

6. A window Import CSV Job opens with the following required parameters:

- **Job Name** – Name of the job, e.g., **Test CSV**
- **Thread Type** – Select from the list of thread types, e.g., **QTT**
- Once the parameters are completed, select **Import**.



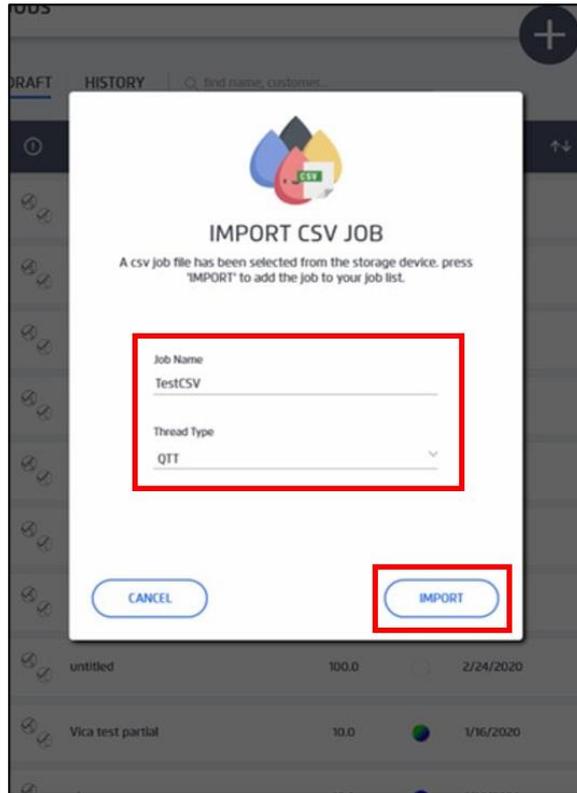


Figure 96: Import CSV Job

4.4.2 Segment Management

To manage segments, complete the following steps:

1. To edit an existing job segment, select the **Edit** icon. a list of the following actions will open:
 - **Copy** – copy a segment
 - **Paste** – paste a copied a segment
 - **Delete** – delete a segment
 - **Reverse** – reverse the order of the selected segments
 - **Repeat** – repeat the selected segments



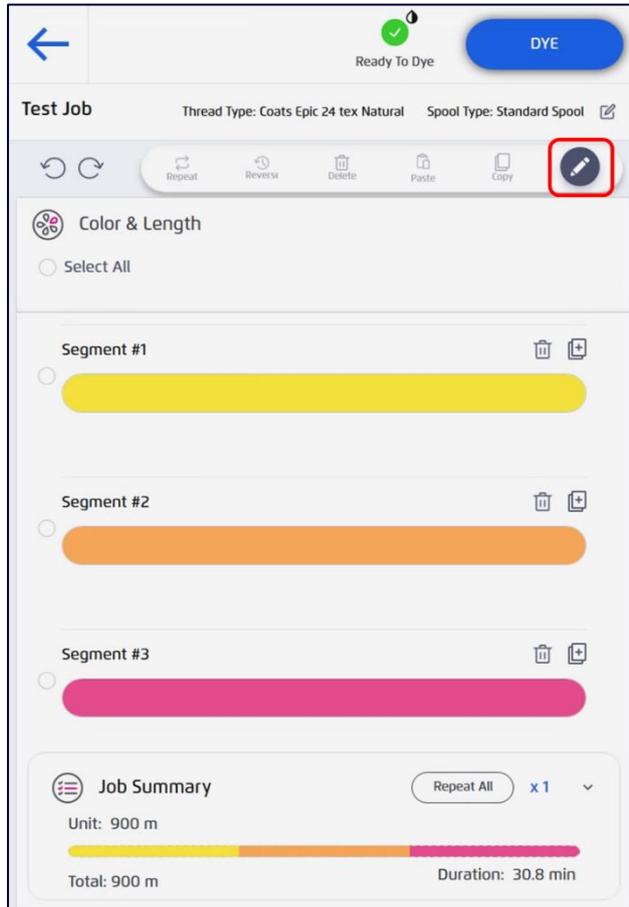


Figure 97: Enter Editing Mode

2. Add specific segments to manage by selecting the **Checkbox** next to each **Segment**.
3. To include all the segments, select the **Checkbox** next to **Select All**.



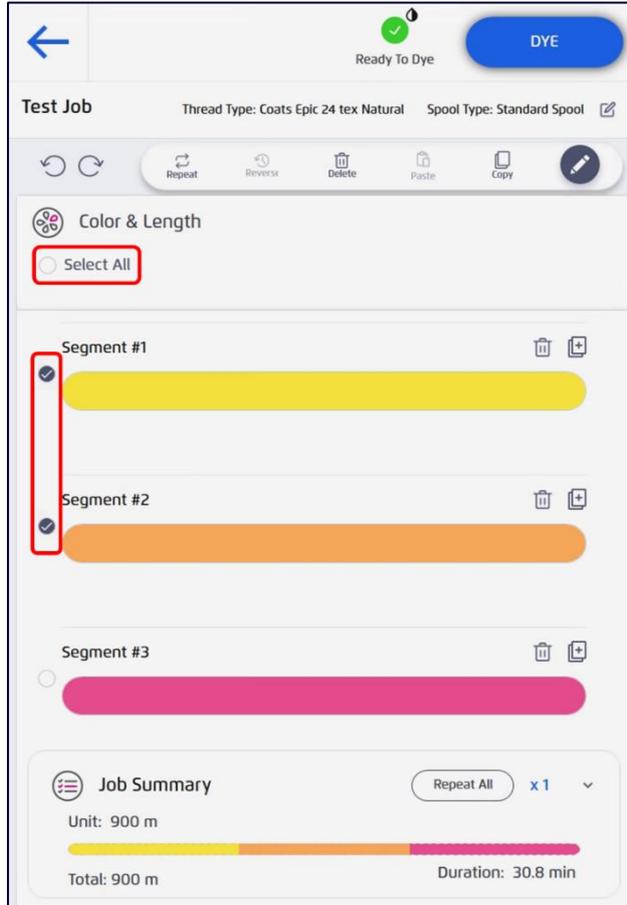


Figure 98: Choosing Segments to be edited

4. Selecting **Repeat** will group the checked segments into one segment.
5. To define the number of times to repeat a group of colors, edit the **Number** next to the group.
6. To ungroup a group of segments, select **Ungroup**.



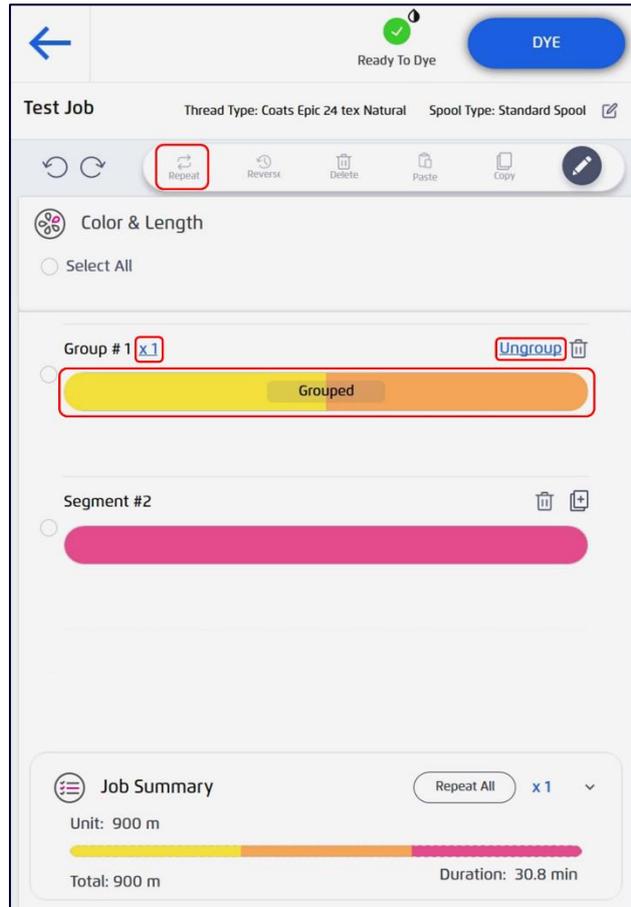


Figure 99: Group segment using Repeat

4.5 Managing the Job List

From the list of jobs in the Home Screen, you can select, edit, run or add new jobs.

To see a list of uncompleted jobs, select the **Draft** tab.

To see a list of previously run jobs, select the **History** tab.

To sort a list by **Name**, **Customer**, **Length (m)**, **Color** or **Date Updated**, select the respective **Heading Title**.

To search for a specific job, enter the name of the job, or customer, in the **Search Box**.





Figure 100: Managing the Jobs List

To Open a job, select the desired job name. The Dye Job screen appears with following job options:

- Edit
- Dye

To edit a job, select **EDIT**. Otherwise select **DYE**.

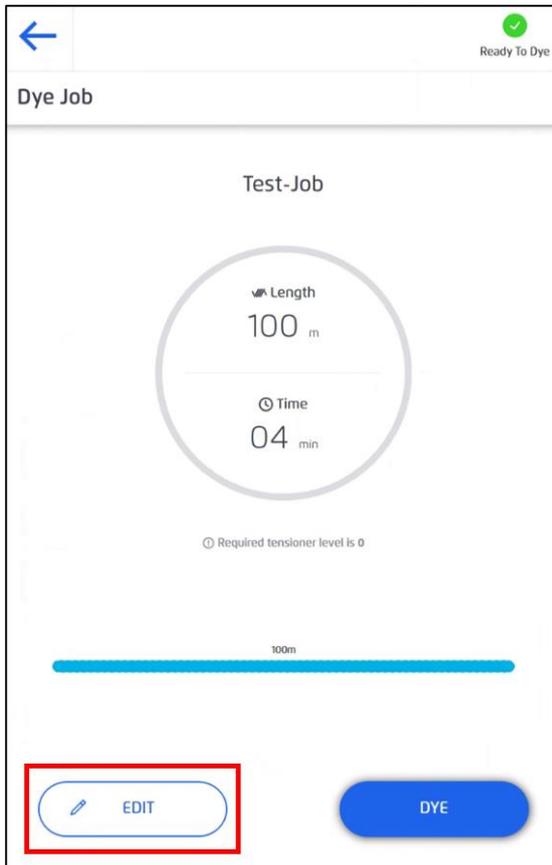


Figure 101: Options for Managing Dye Job



5. Update

It is important to keep the system updated with the latest software versions. A notification appears when updates are available. Follow the on-screen prompts to install the updates.

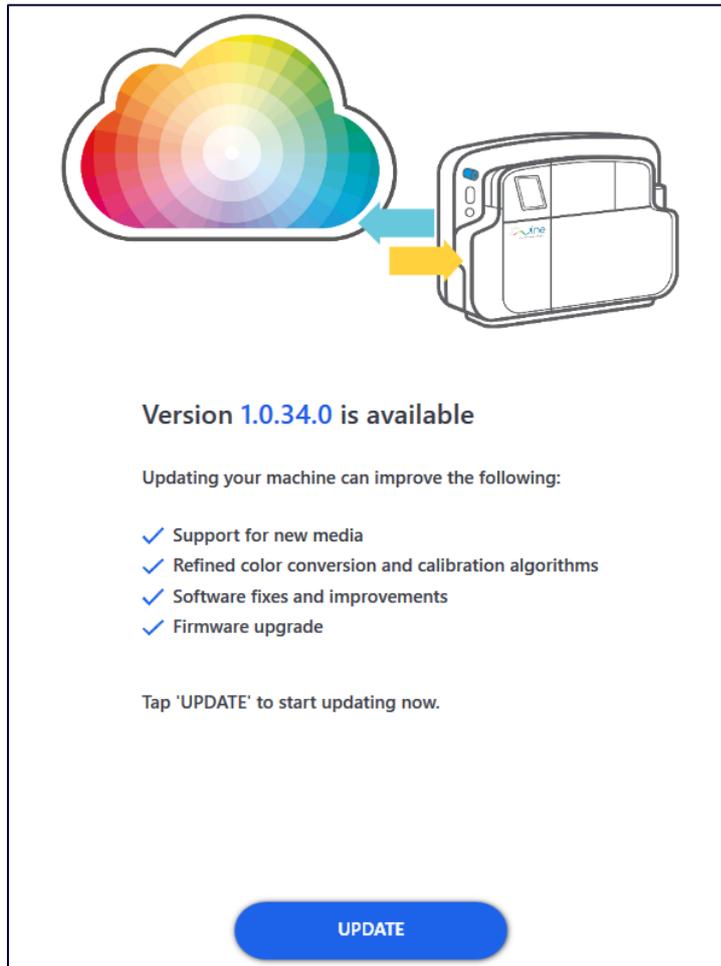


Figure 102: Software update screen



6. Maintenance

Maintaining your TS-1800 is important for best performance and long life of the machine. The maintenance procedures are done by the operator through the *Maintenance* menu. To access the maintenance menu, tap on the  tab at the right side of the screen and then on **Maintenance**.

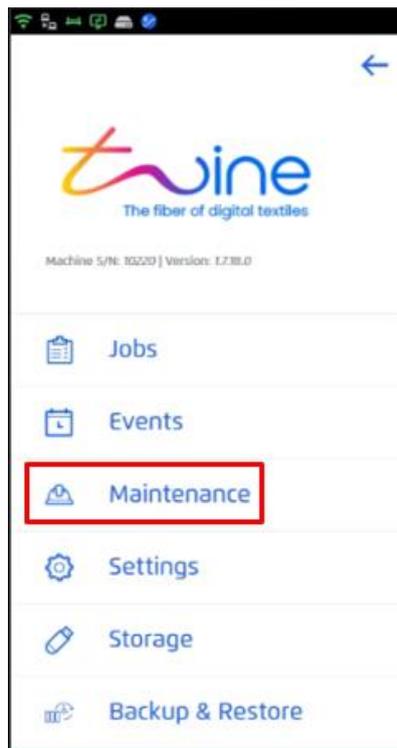


Figure 103: Accessing the maintenance menu from the PPC

The **Maintenance** page contains the following sections:

- Current Status: contains information about the current status of the machine
 - ◆ Temperature
 - ◆ Ink levels
 - ◆ Cone status
 - ◆ Waste



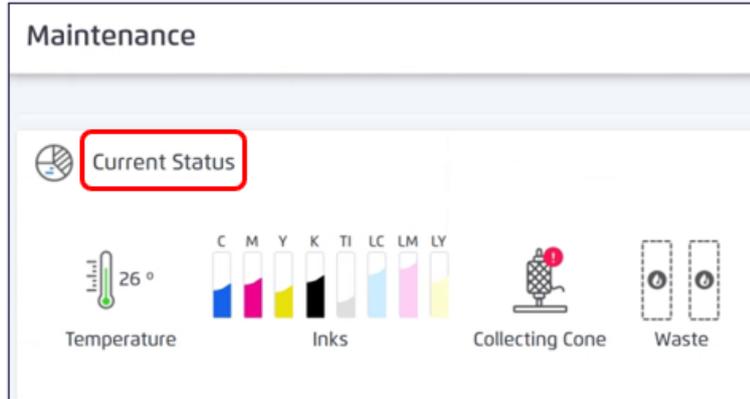


Figure 104: Current Status

- Actions: Performs the following maintenance procedures:
 - ◆ Run Head Cleaning procedure
 - ◆ Export System Logs
 - ◆ Enable Auto INK Filling
 - ◆ Dispense Cleaning Liquid (*refer to section 6.1)
 - ◆ View BIT Results

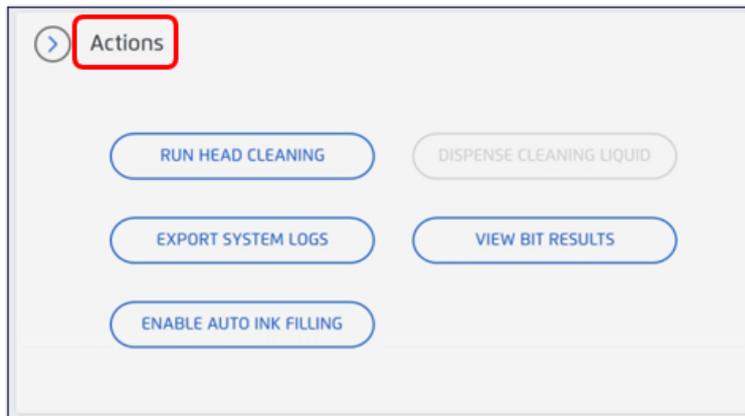


Figure 105: Actions

- Thread Loading: Wizard system for thread loading assistance
 - ◆ Thread Loading Wizard
 - ◆ New Thread Wizard
 - ◆ Reset Thread Loading



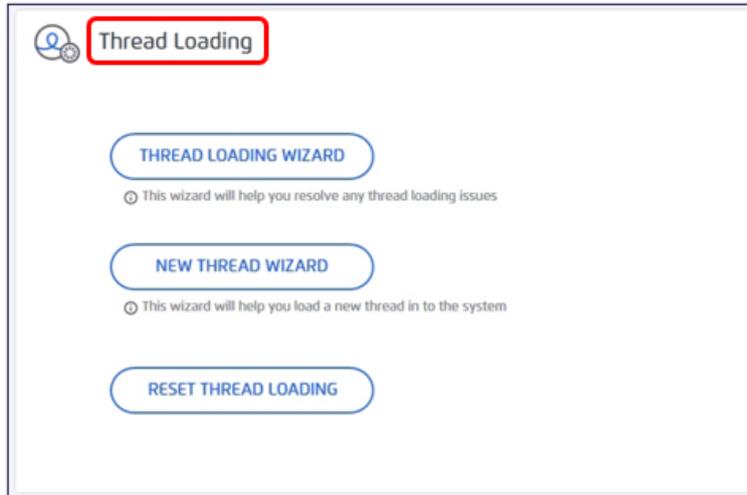


Figure 106: Thread Loading

- Guides: Step by step instructions for:
 - ◆ Loading an Ink Cartridge
 - ◆ Replacing the Thread
 - ◆ Loading New Thread
 - ◆ Replacing the Carbon Air filter
 - ◆ Handling the Waste Cartridge



Figure 107: Guides

- Dyeing counters showing:
 - ◆ Total Dye Time
 - ◆ Total Dye Meters





Figure 108: Dyeing Counters

6.1 Cleaning the Dyeing Head V Groove:

For best dyeing quality, clean the V groove periodically as follows:

1. Remove the two upper covers, both the white and gray covers.

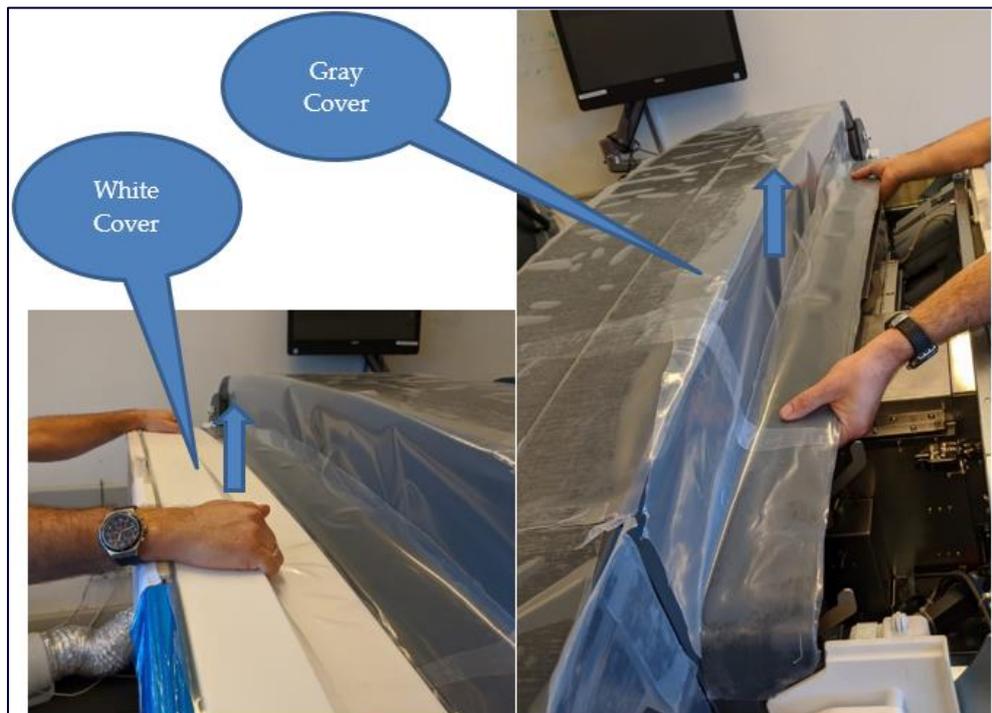


Figure 109: Opening covers to clean V groove

7. Manually open the Arc dyeing head cover.



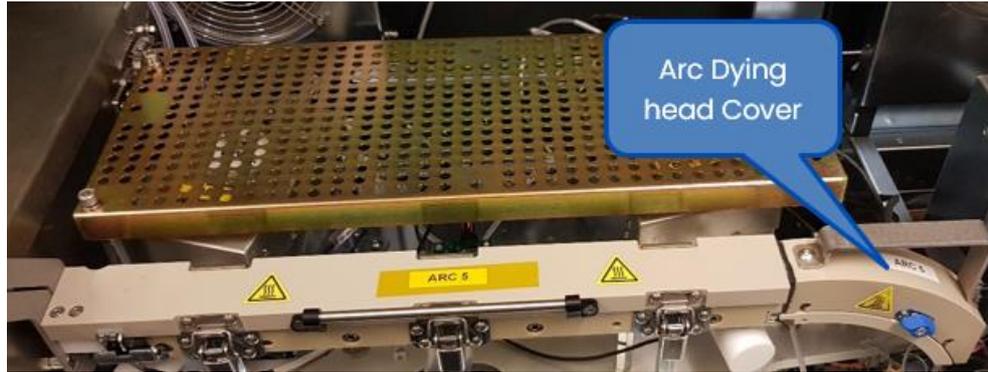


Figure 110: Open the Arc dyeing head

8. Put on safety gear including goggles and gloves.

⚠ WARNING !

Safety equipment **must** be worn when cleaning the dye head.

9. From the **Actions** section of the PPC Maintenance menu select **Dispense Cleaning Liquid**- * tab will be available once the Arc dyeing head cover is open.

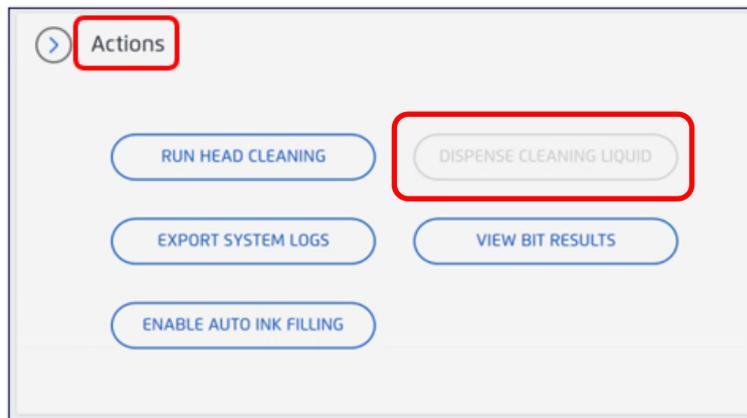


Figure 111: Dispensing V Groove cleaning liquid

10. In the Dispense Cleaning Liqueid window, click **Start**.



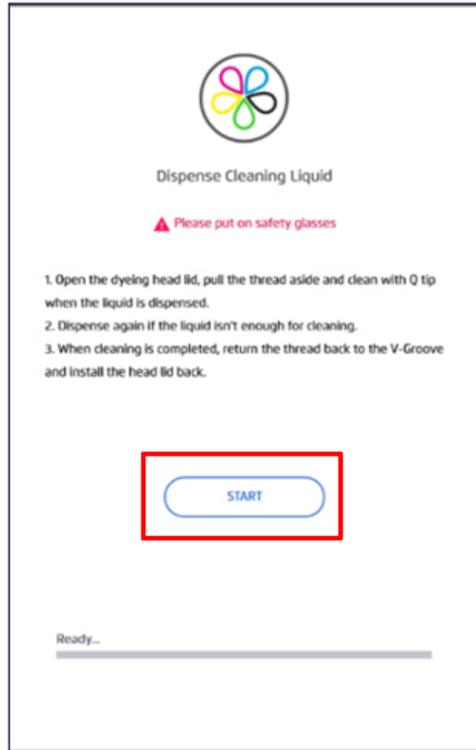


Figure 112: Start dispensing cleaning liquid

The machine will dispense a predetermined amount of cleaning liquid.

11. Clean the dyeing head with the stick as shown in Figure 113: Cleaning the dyeing head

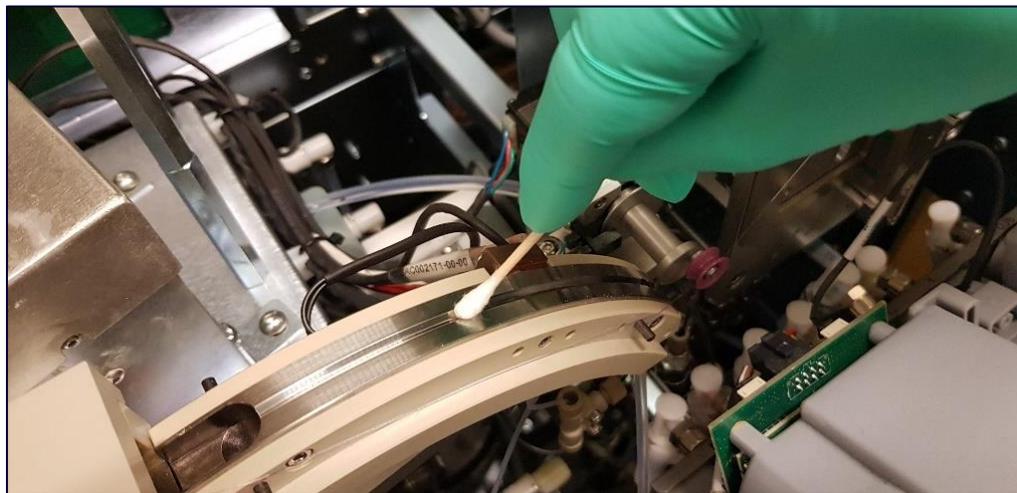


Figure 113: Cleaning the dyeing head

12. Return the machine covers to their original locations.



6.2 Cleaning the Dryer Inner Mesh Filters

Inside the dryer are two mesh filters, one square-shaped in the rear with complex access and another small ringed filter on the right side with easy access. To clean the dryer mesh filters, follow the steps below:

⚠ WARNING

Verify that the machine is **Off** and the dryer is at room temperature before opening the door and pulling out the mesh filters.

Pulling out the ring filter

1. Pull out the ring filter from the inner right side of the dryer.



Figure 114: Pulling out the ring filter

Pulling out the rear filter



Figure 115: Dryer Rear Filter



2. Lift the rear filter and slide it out following the arrows in Figure 115 through Figure 118 below:

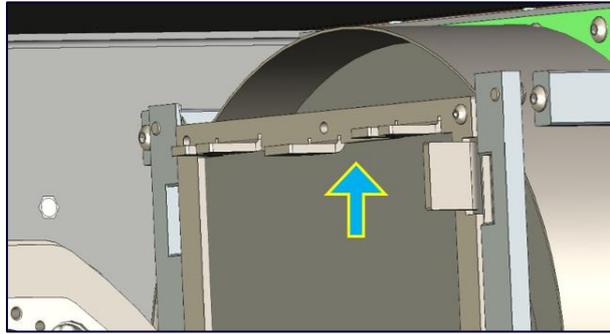


Figure 116: Lifting the rear filter (1)

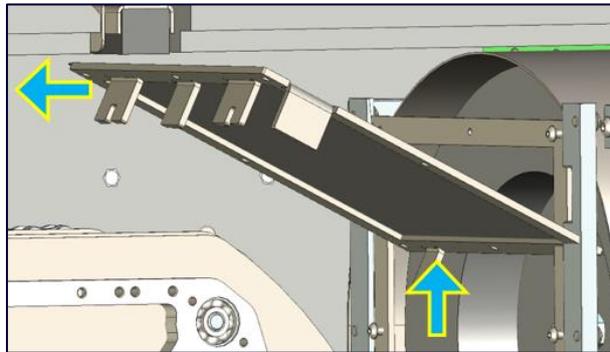


Figure 117: Lifting the rear filter (2)

3. The rear filter can be pulled out of the dryer when its lower corners meet the releasing slots of the filter rails.

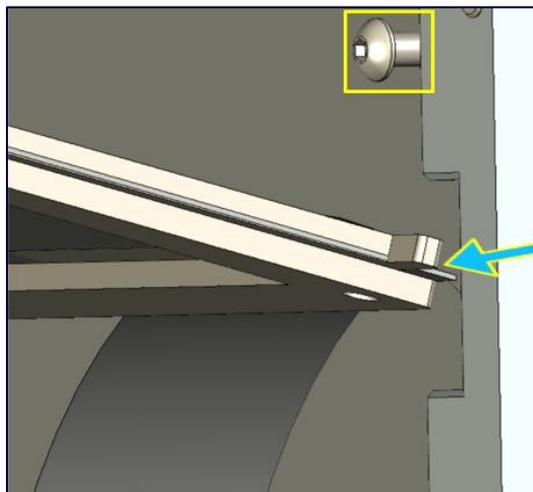


Figure 118: Filter corners and releasing slot



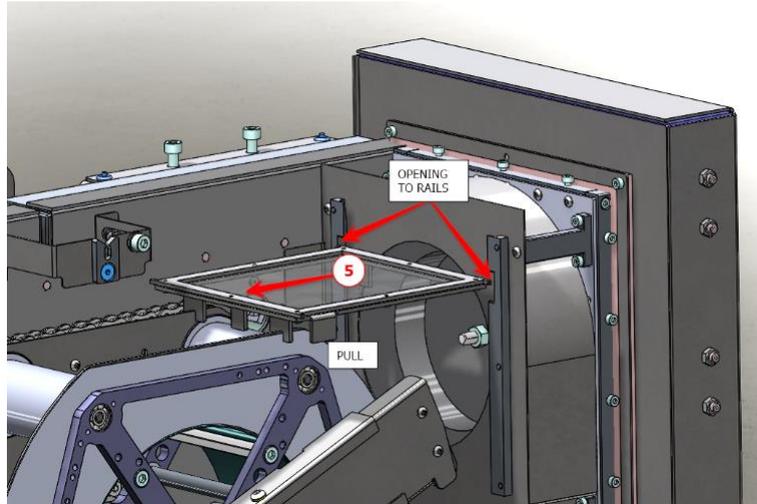


Figure 119: Pulling the filter out

4. Clean the filters with a dry brush followed by Isopropyl alcohol (IPA).

6.3 Cleaning the Dyeing Head

From the maintenance menu, tap **Run Head Cleaning**. This is an Automatic procedure that cleans the dyeing head. The process can take up to 5 minutes

6.4 Resetting Thread Loading

Selecting **Reset Thread Loading** is recommended before starting Automatic thread loading. It is an automatic procedure that can take up to 5 minutes.

6.5 Operators Guides and Machine Counters

The **Maintenance** menu provides links to operator guides which offer step by step instructions on performing basic operator procedures. To access the guides, tap on the procedure you want to perform.



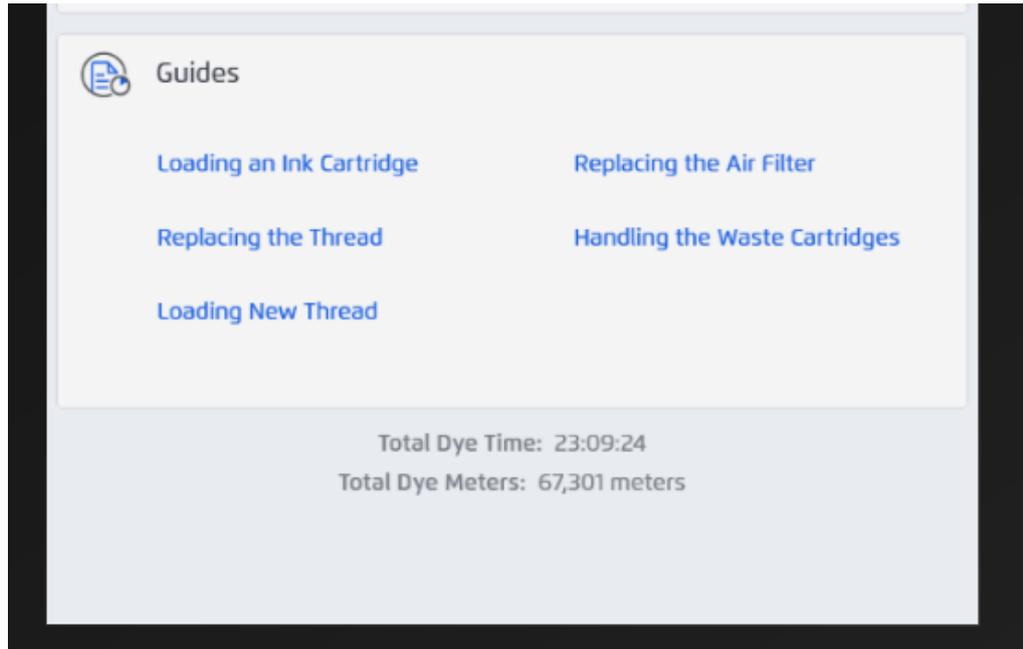


Figure 120: Operator guides and machine counters in maintenance menu

6.6 Cleaning the Lubrication Tunnel

To ensure high quality lubrication, inspect the lubrication tunnel visually to make sure it is clean (see figure 121).

If the lubrication tunnel requires cleaning, use a cloth soaked with IPA or 99% ethanol to clean the tunnel until there are no ink residuals.

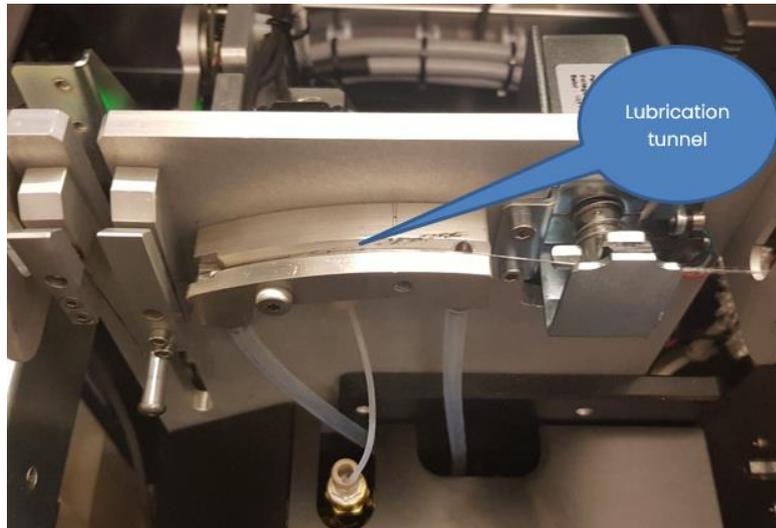


Figure 121: Lubrication tunnel



6.7 Replacing the Carbon Filter

The carbon air filter ensures that the air quality in the dyeing room remains at the correct level.

As part of the machine's routine maintenance, the filter needs to be replaced every six (6) months. A new filter will be supplied by your local service provider.

Replace the filter as follows:

1. Remove the used carbon filter:
 - a. Open the lower front cover by hand.



Figure 122 Opening the lower front cover

- a. Open the Waste Handling System front door by hand.

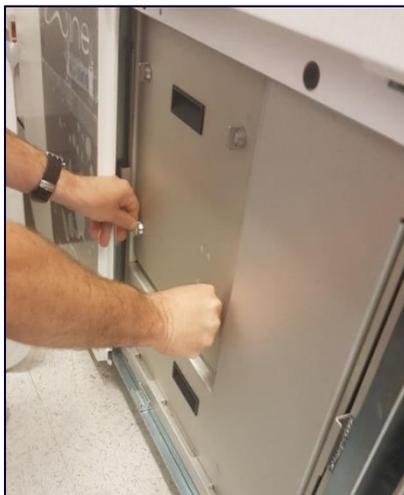


Figure 123: Opening the WHS door



- c. Lift the Filter handle.



Figure 124: Filter handle raised

- d. Pull out the filter.



Figure 125: Pulling out the filter

- 2. Install the new carbon filter
 - a. Remove the filter from the box.
 - b. Make sure the filter handle is up.





Figure 126: Filter handle raised

- c. Push the new filter into place and lower the handle.



Figure 127: Installing the carbon filter

- d. Close the Waste Handling System front door.
- e. Close the lower front cover.



6.8 Preventive Maintenance (PM) Table

This table defines the periodic PM by the relevant frequency.

Preventive Maintenance Table

Procedure Name	System	Arc Head Frequency
Dryers mesh filters (round & rectangle)	Dryer	Monthly
Lubrication Tunnel cleaning	Lubricant	Monthly
Head manual cleaning	Dyeing Head	Weekly
Carbon filter replacement	Waste Handling system	Determined by unpleasant odors & customer service recommendation.

6.9 View Built in Test (BIT) Results

Clicking on the BIT button will present the list of machine issues during the machine's power up sequence.

6.10 Collecting Cone not in place error

A warning sign on the Collecting Cone icon indicates that collecting cone is out of place on the winder. To correct this error, make sure the collecting cone is properly attached to the winder shaft.

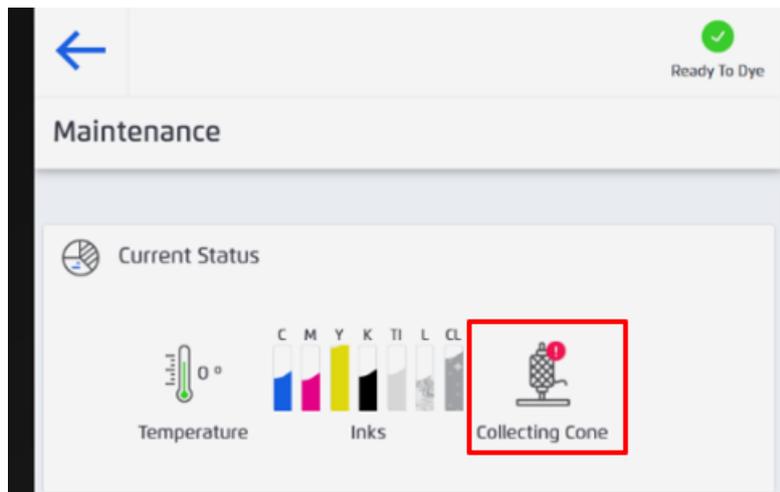


Figure 128: Collecting Cone out of place



All parts of the TS-1800 can be cleaned using one of the following materials:

- ISO PROPYL ALCOHOL TECH Grade
- ETHANOL 99.9% TECH Grade

⚠ WARNING !

When cleaning the system, the user must wear the safety gloves and goggles that were supplied with the system.



7. Appendix A: Technical Specification

7.1 Electrical Specifications:

- **Equipment Rating:**
200-240 V~ (W+N+PE), 50/60 Hz, 15 A
208 V~ (2W+PE), 50/60 Hz, 15 A, single phase
- **Short circuit current:** 5 kA
- **Mains supply voltage fluctuations:** -10%, +10%

7.2 Inputs and Outputs

- 1 Electrical Power Socket as described in 1.8
- 1 network LAN connection
- Wi-Fi connection

7.3 System Environmental Conditions:

- **Operating temperature:** 5° C to 40° C
- **Relative humidity:** 20 – 60 %
- Indoor use
- Altitude up to 3000 m
- OVERVOLTAGE CATEGORY II
- POLLUTION DEGREE 2
- **Maximum sound level:** 65 dB

7.4 Safety Hazards

The following table indicates the specific safety hazards that you might encounter during the operation of the TS-1800 system.



Notice	Description
  Electric Shock Hazard	<p>Bypassing, removing, or deactivating protective equipment.</p> <p>It is strictly prohibited to operate the system if any of the protective equipment or safety guards are dismantled or are not operating properly.</p> <p>Repairing and maintaining the system must be done by qualified personnel only.</p>
  Electric Shock Hazard	<p>This product contains components connected to hazardous voltage levels. Touching these components will cause an electric shock that could be fatal.</p> <p>Removing Covers</p> <p>Before removing the electric cabinet, cover and opening the electric cabinet door:</p> <ol style="list-style-type: none"> 1.: Power down the TS-1800 by pressing and holding the power button on the panel. 2. Turn off the main power switch at the wall socket. 3. Disconnect the plug from the wall socket. <p>Charged Capacitors</p> <p>Beware of charged capacitors; Wait a few moments after the power is disconnected to allow all capacitors to discharge.</p> <p>Powering Up</p> <ol style="list-style-type: none"> 1. Insert the wall plug. 2. Make sure all doors are closed and covers are in place. 3. Turn on the main switch.
  Hot Surfaces	<p>Certain parts of the TS-1800 reach high temperatures during operation.</p> <p>Do not touch any surface marked with a “Hot Surfaces” warning without wearing safety gloves. It is recommended to wait until you see a temperature on the PPC display below 40°C before touching.</p>
  Hand Crush hazard	<p>Beware of moving parts that are automatically operated by the system. They could move at any time deliberately or due to faulty operation. These parts are generally protected by doors or covers that provide protection against inadvertent contact.</p> <p>Proceed with caution when operating this product.</p> <p>Do not put your hand or fingers behind covers.</p> <p>Do not put your hand in front of moving parts.</p>



<p>CAUTION</p>  <p>Hands, fingers, hair, and clothes entanglement hazard</p>	<p>The system contains some rotating parts such as shafts. There is a risk of injury if you touch these parts or if you are snagged by these parts.</p> <p>Caution must be taken when moving around these parts while the TS-1800 is operating. Follow all safety instructions for each specific rotating part.</p> <p>Find out where the Emergency power button (EMO) is located.</p> <p>It is strictly prohibited to put your hands near any rotating part while it is operating.</p> <p>If it is necessary to clean, maintain, or repair these parts, turn off the TS-1800 and unplug it first.</p> <p>When working with the TS-1800:</p> <ul style="list-style-type: none"> • Wear tight-fitting clothes. • Roll up your sleeves. • Do not wear loosely hanging pieces of clothing, like long belts, ties, scarves, or pullovers. • Secure loose, hanging hair using a hair net, a hat or a cap. • Do not wear jewelry, watches or other similar objects.
<p>CAUTION</p>  <p>Heavy load hazard</p>	<p>The air filter weighs in excess of 11 kg.</p> <p>Do not attempt to lift the air filter if you have any back-related medical issues.</p>
<p>CAUTION</p>  <p>Foot Crush hazard</p>	<p>Wear safety shoes while unpacking, transporting and installing the TS-1800.</p>
<p>CAUTION</p>  <p>Sharp cutting blade</p>	<p>Exercise care when handling the cutter at the winder.</p>
<p>CAUTION</p>  <p>Inhalation hazard</p>	<p>When handling ink spilled from a cracked or dropped cartridge, avoid inhaling ink.</p>



<p>CAUTION</p>  <p>Skin Irritation</p>	<p>When handling spilled ink from a cracked or dropped cartridge, wear proper clothing, gloves, and safety goggles to avoid contact with skin.</p>
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8. Appendix B: Color Measurement Guidelines and Specification

At Twine, the **Datacolor 850** spectrophotometer is used to measure color samples. The spectrophotometer is constantly calibrated, and performance is monitored via the **DataColor® Guardian** service.

The measurements are performed on winding card, as they provide the best results for thread and yarn color measurements.

8.1 Setup and Measurement

The setup and measurement parameters used at Twine are as follows:

- **Manufacturer and Model** – Datacolor® 850
- **DE Formula** – cmc 2:1
- **Color format** – CIE Lab
- **Light Source** – Reflectance
- **Standard Illuminant** – D65
- **Standard Observer** – CIE 1964 10°
- **Aperture Size** – LAV 30mm
- **Specular Component** – Included Three flashes of the spectrophotometer lamp are required for each sample
- **Glass Compensation** – Off
- **Correlation** – Off
- **Datacolor® Guardian** – Able to correlate to the Datacolor master instrument to meet the weekly supply chain requirements



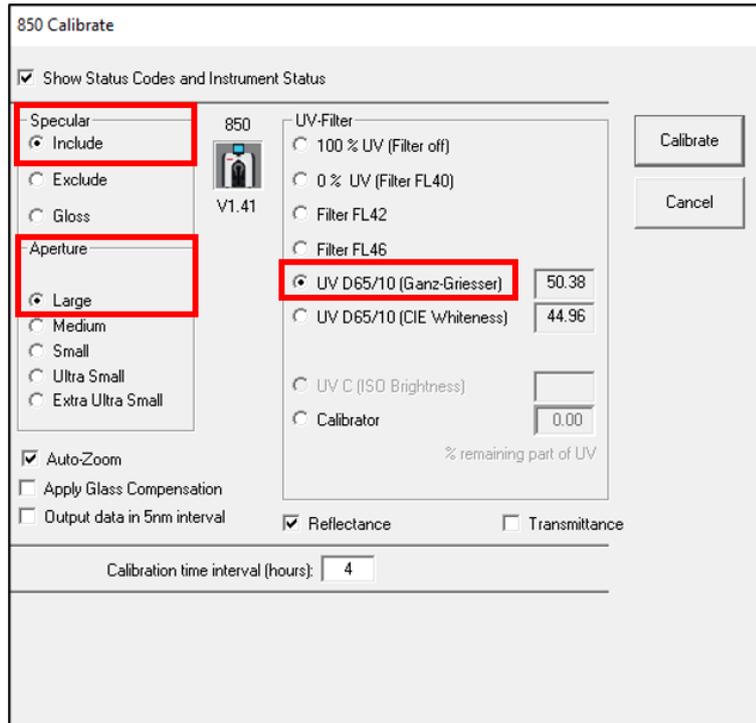


Figure 129: Datacolor 850 Setup

8.2 Preparing the Card for Measurement

The thread is wound round a cardboard card of the following size:

- **Width** - 4.5cm
- **Height** - 5.5cm
- In general, it is optimal to wind the thread around the card twice. For thinner thread, it will be necessary to wind the thread around the card more than twice so that background card will not be seen beneath the thread and interfere with the reading.



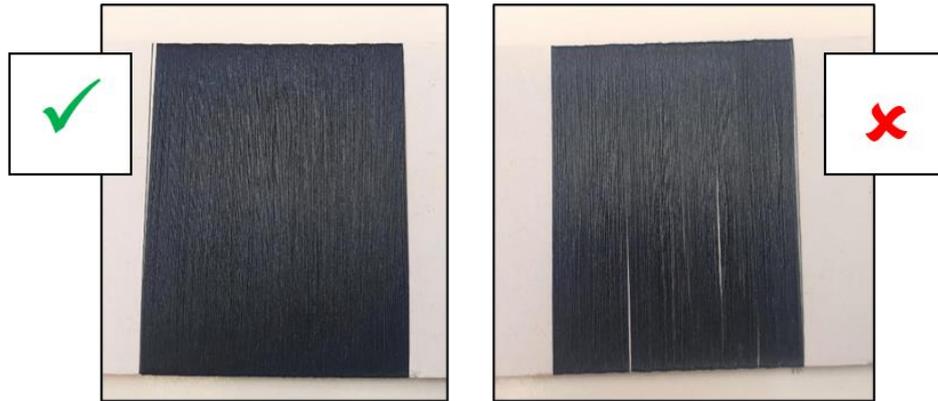


Figure 130: Full Density vs Lack of Density

The spectrophotometer requires the following four measurements:

- 2 x vertical measurements
- 2 x horizontal measurements

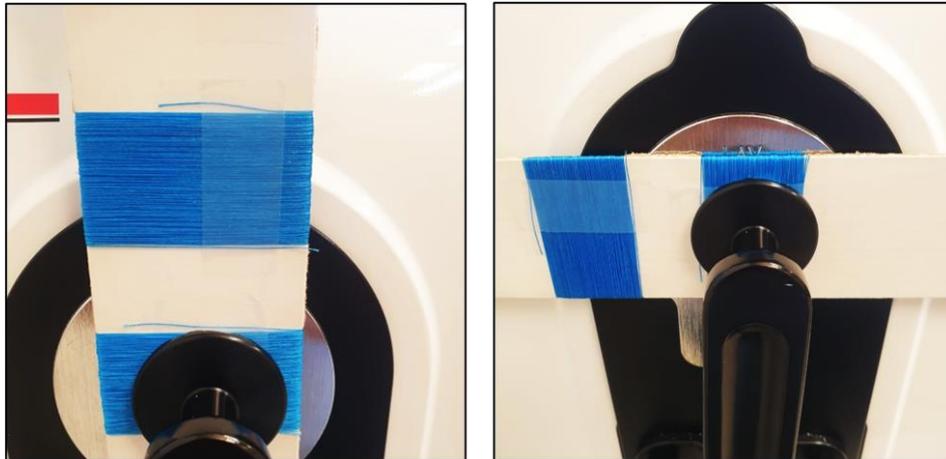


Figure 131: Vertical and Horizontal Measurements



The average of all four measurements are taken as part of the LAB analysis.

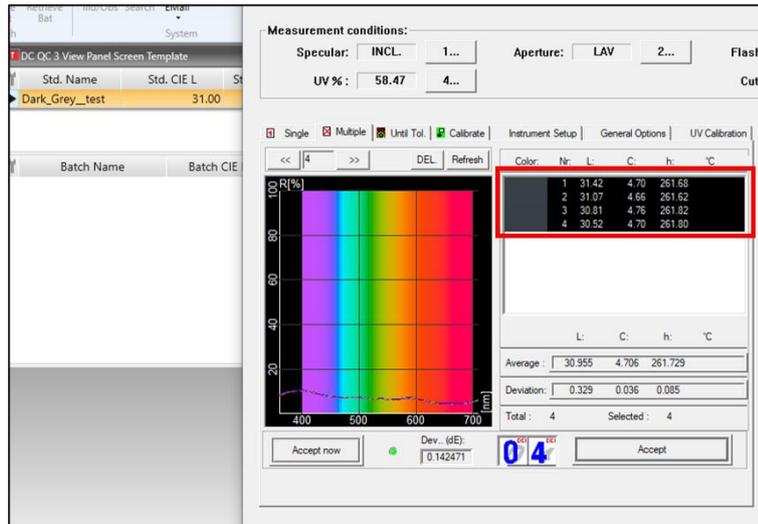


Figure 132 The Spectrophotometer Measurements

Then a ΔE CMC is derived from the measurements.

1. L^*a^*b target value
2. L^*a^*b measured value (average)
3. ΔE CMC result

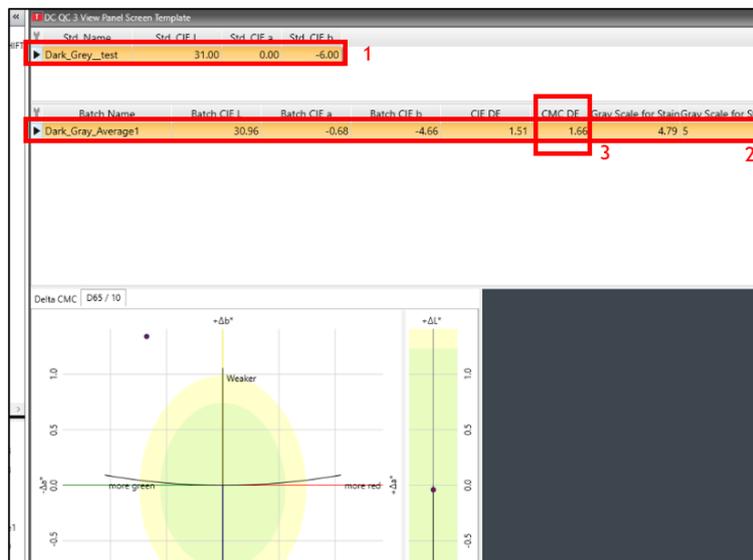


Figure 133: The ΔE CMC View Panel



9. Customer Acknowledgement

The undersigned acknowledges and agrees that any non-compliance with the requirements specified in this document may result in additional charges which will be incurred by the undersigned. In the event that such charges are incurred by Twine, the undersigned will reimburse Twine for any costs actually incurred by Twine.

Full name:

Company signature:

Date:

