Version 3.2 Companion Document

Update Type

V3.20.0T1U3.20T1-PFX.stf contains the following upgrade details.
1. Controller Firmware V3.2
2. HMI Touchscreen 3.2 (User Interface)
3. Pro-forma file to suit version 3.2 (in two version to suit pre this version packaging)
4. Powder.dbl file NEW to this packaging format
This update includes all the patches (if any) applied to previous versions.

Purpose

Version 3.1 focused on improving pulse time accuracy in the pulsing system. In this version, the focus has been on the "Fine" operation, incorporating general operation practices from user feedback and adding backend features for future use. This includes an updated STF packaging format that now has the ability to carry the powder.dbl file. Overall, this version offers improved consistency and speed with a bit of fine-tuning. The aim was to enhance the fine operation; however, many other improvements evolved from the project. This version started out as Firmware Version 3.1.1; however, due to the probable requirement to change your existing profile and other extensive changes, it was released as V3.2.0.

Technical Notes

Important: Although your existing V3.x profiles are compatible with this version, you may find poor results. In this event, reset your profile and allow the system to relearn with the new settings and operation arrangement.

Important: Roll Back Strategy

With each version upgrade, as with any complex software system, the results may not always be desirable or beneficial. You may wish to 'roll back' to a previous version that yielded more favorable results. Generally, rolling back the software is not an issue; however, Version 3 introduced a significantly different powder and preset profile structure that is not compatible with previous versions. Version 3.2 requires you to adjust down your fine ramp-down values; therefore, it is recommended to back up your profiles. Before upgrading, please follow the directions to save the current version of your profiles in case you decide to roll back.

TO SAVE YOUR CURRENT VERSIONS PROFILES BEFORE UPGRADING:
When you take your Micro SD card out to load the upgrade file on it (as described in the Install section below), make a copy of the BIN folder, either on your computer or on the SD card. You can name it anything OTHER than BIN (e.g., BIN220 or BIN310). **DO NOT REMOVE THE ORIGINAL BIN FOLDER**. Complete your upgrade. If you find you want to roll back, simply rename the existing BIN folder to BIN311 or delete it. Then, rename your BIN220/BIN310 back to BIN, perform the rollback update, and you will be back to your previous state before the upgrade.

Installation Instructions

<u>DO NOT FORMAT or DELETE</u> any file from your SD card other than that described in the roll back section.

<u>Special Note regarding the powder.dbl file</u>

If upgrading from any version prior to V3.0, you will need to download and copy the new powder.dbl file onto the micro SD card. This file will replace the previous powder.txt file.

1.   With the SuperTrickler® **<u>powered on</u>** and from the main sub menu, remove the Micro SD card (tweezers are a great help).

2.   Copy the V3.20.0T1U3.20T1.02T1-PFX.stf file on the root (top level) directory of the Micro SD card (also the powder.dbl if required).

3.   Reinsert the card back into the SuperTrickler®.

4.   The system should automatically take you to the Upgrade screen. (System – Setup - System Core – Firmware Update)

5.   Press & Hold the Start button for several seconds until the process starts.

6.   WAIT for it to finish, do NOT power off the device or do anything else!

Changes from V3.1.0

What's New...

Vibrator Base Speed Offset

This system only applies to the Automatic Base Speed Setting and is disabled if manual settings are applied. Since the introduction of the Automatic Vibrator Speed Setting, the system has applied a -5 unit offset to the final value determined by the automatic operation. This offset ensures that the system can reduce the speed to a point where the vibrating tube can operate without delivering powder.

Important: Testing has shown that the fixed offset of -5 may not be optimal for various powders, so we have made this value variable. The optimal value for a given powder at this stage is undefined. Our testers used a trial and error method to determine the best value. If the system, particularly the pulse, was struggling with a given powder, they would change this value initially by 2 or 3 units up or down and then observe the results. If the system behaved better, they would fine-tune the value. If the system behaved worse, they would change it in the opposite direction.

When does the offset apply and how does it work

At the end of the Automatic Base Speed detection the offset is automaticaly applied to base speed value. From the base speed setting the system will auomatically take you to the high speed limit setting where the ability to change the offset can be carried out.
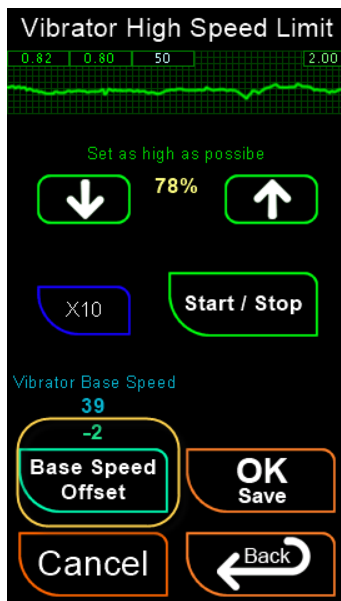

From this screen, the Vibrator Base Speed is shown along with the offset value. The base speed is displayed with the offset value applied. In the event you choose to change this value, pressing the Base Speed Offset button will enable a new value between -20 to 0 to be applied. If you fail to make the value a negative number, the system will convert it automatically. An out-of-range value will result in the default offset being applied.

Important: The offset can be changed at any time without the need to redo the base speed. The change will be applied to the actual value recorded and not the displayed value. For example, if the displayed value is 39 with an offset of -2, and you change the value to -3, the resultant value will be 38.

Default Vibrator Base Speed Offset

When making changes to the profile default the vibrator settings are unavalible so for this reason we have placed the default vibrator offset in the deep settings.
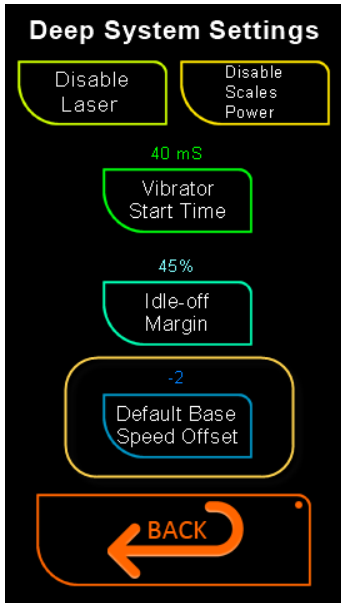
Vibrator Warmup Option

We have added the ability to run the vibrator at absolute full speed to warm up the rubber mount. An optional timer can be set (and retained) in seconds. This option allows you to leave the warm-up screen and proceed with other tasks such as choosing a powder or profile, etc.

WARNING: To avoid a powder spill, ensure there is no powder in the hopper before running the warm-up.
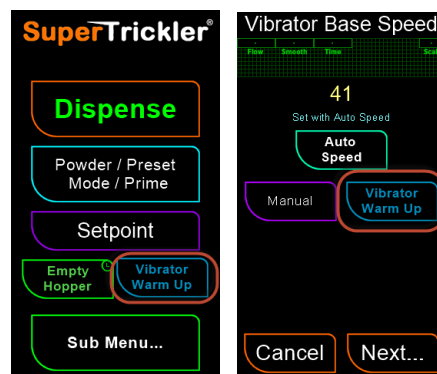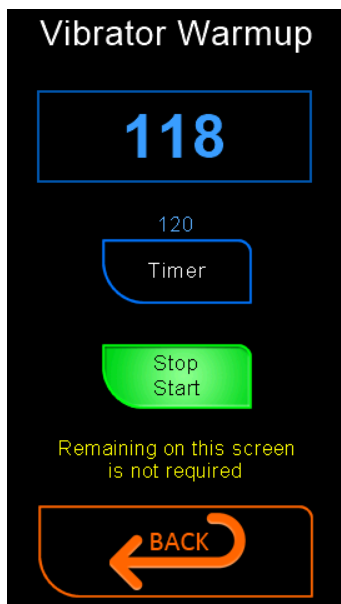
There are two access points to the warmup screen, the Main Menu or the Vibrator Base Speed screen.

Charging Timeout

The "Profile More" (sub-option) has a new feature that allows the operator to set a timeout that will automatically abort the charge if this time is exceeded. Although this feature may not be perceived as useful by everyone and is turned off by default, it becomes essential for robotic (external control device) operation. In the event of a standing wave occurring during the powder drop, this setting can prevent the charging and filling operation from halting
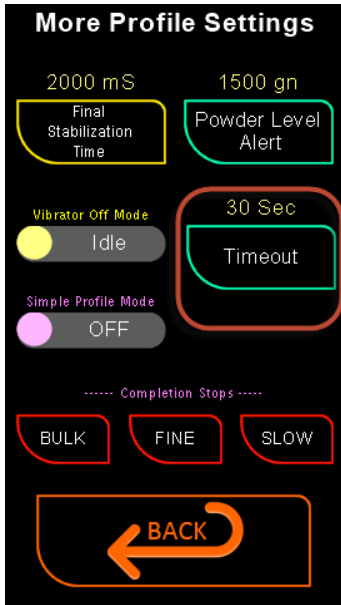
Press the Timeout button to set the time in seconds or to turn it off.

Inflight Tracking Deadband

Some users prefer to disable the inflight tracking function as they find it more of a hindrance than a help. The inflight tracking feature is designed to adjust for changes in hopper powder levels over time, which affect the pressure and consequently the powder flow to the tubes. However, with continuous changes in Bulk, Fine, and possibly Slow inflight tracking, these adjustments can counteract each other, adversely impacting overall performance.
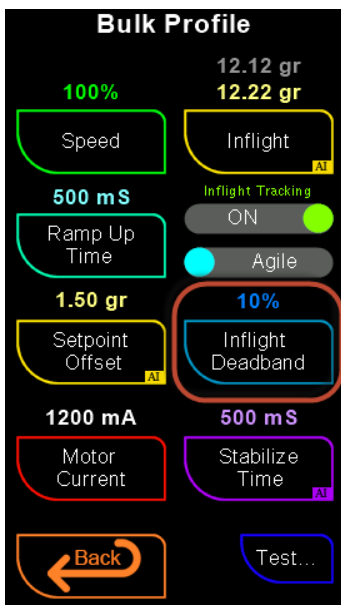
A new deadband control has been added to the Bulk, Fine, and Slow profile, allowing variations within the deadband percentage to be ignored by the inflight tracking. A 10% deadband means 10% above and 10% below the current inflight tracking value.

In the log files, under the inflight mode, the following will be displayed:
-       Inflight tracking is OFF.
A db%   Agile and the deadband %.
S db%   Sedate and the deadband %.

Bulk Instrument

The Bulk Setpoint Offset initial setting is now calculated by the AI.

Fine Instrument

The **Fine Instrument Offset** has been removed, and in its place, a new control called **Low Speed Final Phase** has been added. The purpose of this new control is to set the number of grains remaining after the ramp-down, during which the tube will run and hold at the low-speed setting. This adjustment helps achieve a more stable inflight value and a more consistent de-loading of the powder, whether for slow or pulse operation as required.
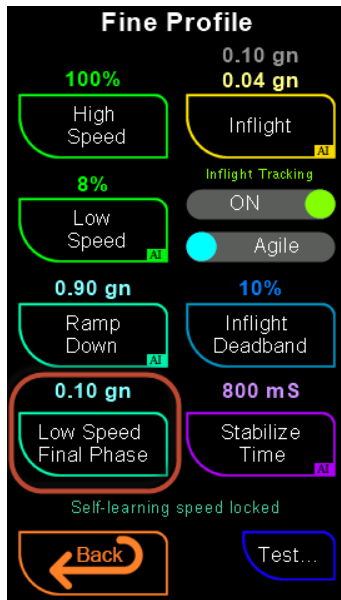
Fine Control Speed Operation
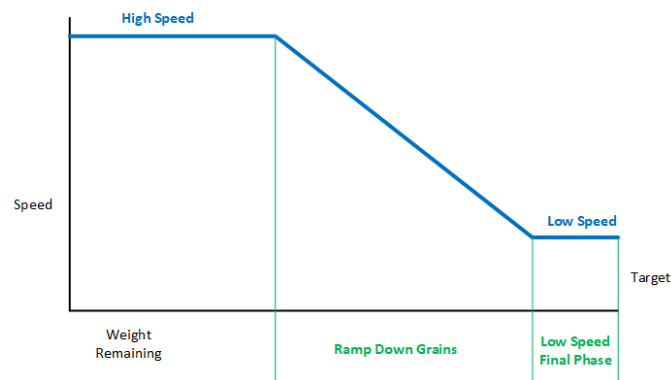
IMPORTANT

The Fine profile system and AI operation have been substantially upgraded and refined to be faster and more stable. As a result, the ramp-down can be significantly reduced.

Unlike other systems where the ramp-down functions as a proportional controller, our system uses the ramp-down to de-load or clear the vibrating tube of excess powder in readiness for the slow or pulse, if needed. The new AI controller instructions can now manage this task more quickly, which reduces the values and increases the overall efficiency of the fine operation.

A rule of thumb for starting is to divide the existing value by 7 and then add 1.00 grains.

Example: If the existing value is 1.46, 1.46 / 7 = 0.208, then + 0.10 = 1.208 (rounded to 1.21) Once you have set the new value, you can then trim it up or down to optimize for speed (lower value) or stability (higher value).

Another method is to take the BULK inflight measurement and divide it by 7 as a starting point for the fine ramp-down.

Example: If the Bulk inflight is 7.78 grains, then 7.78 / 7 = 1.11, which can be rounded to 1.10 grains.

Trim the ramp down for speed (lower the ramp down) or consistency (increase the ramp down).

Conversely, the **Low Speed Final Phase** will need time to stabilize. If the ramp-down is too fast and too much powder is flowing when it reaches the final phase weight, the predictive weight mechanism may activate and halt the process prematurely, resulting in an inconsistent inflight amount. In general, we recommend a **Low Speed Final Phase** value of around **0.10 grains**; however, larger or more fluid powders may require a longer stabilization time (a higher grains value) than would a finer grittier powder.

Further to this, the default stabilization time for the Fine instrument has been changed from 700mA to 800mS to allow better stability for the following instrument if required.

Setup Tips

High Speed: In general, maintain a reasonably fast High Speed, considering how close the bulk is to the target and the amount of work required during the Fine phase. If the speed is too fast, the ramp-down might be ineffective (or require a longer ramp-down) and stability will be compromised, while too slow a speed will waste time. As a guide, 2/3 (66.6%) of the **Vibrator High Speed Limit** is a good starting point. Allow time and settings for the Low Speed, Ramp Down and Low Speed Final Phase to give you stable result, with rare use of the pulse instrument. If using the controls you find its difficult to obtain fine stability then reduce the Hight Speed. See fine tuning below.

Set the **Low Speed** as slow as you can while maintaining a very slow, consistent flow. The goal here is to achieve a very low and consistent inflight value. Running at this slow speed is preferable to using the pulse mode, if possible.

Set the **Ramp Down** as described above, but make observations to ensure the **Final Phase** operates clearly. Keep the ramp as short as possible to avoid wasting time; however, if the ramp is too short, it will interfere with the final phase, leading to inconsistent inflight values and potential overthrows.

Set the **Low Speed Final Phase** (default is 0.15 grains) to ensure it runs long enough to achieve a fairly consistent inflight value. However, setting it too long will result in wasted time.

Fine turning the **High Speed**: Once everything is stable and the pulse is rarely or not being used, begin gradually increasing the High Speed. Remember to look for trends rather than focusing on the results of a single throw. Continue to incrementally increase the speed until you either reach the High Speed Limit or start encountering unstable results, overthrows, and higher usage of the pulse.

Ultimately, the amount and consistency of the Fine inflight powder is a combination of the **Bulk Offset**, **High & Low Speed**, **Ramp Down**, and the **Low Speed Final Phase**. The more consistent the inflight, the faster your powder drop will be, as it will allow you to adjust the inflight down to the point where the pulse is hardly required.

Slow Auto Speed

The Slow instrument has a new Auto Speed feature. The system will attempt to keep the slow flow speed

to around the one or two increments per second. Turning if off will use the fixed speed set by Slow Speed value and turning it on will use the initial slow speed setting however will change this value in order to keep the flow withing the operational range.
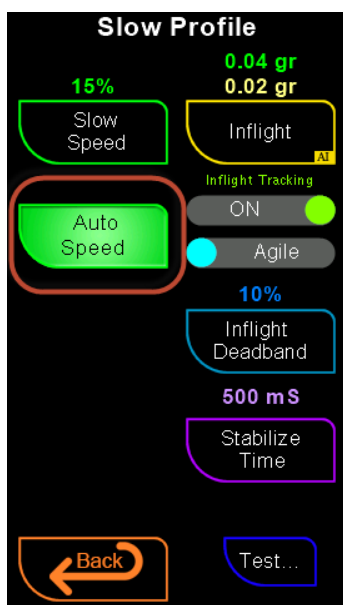
Log Files

1. The log files now include a new column called 'Charge' located just after the 'Setpoint' column. This value represents the actual charge weight of the powder drop.
2. The Inflight Mode columns will now also indicate the deadband percentage.
3. Fine Columns have been rearranged to suit the new controls.
4. The Slow Speed column will show if the speed is in Auto.
5. The instrument name has been added to each column.

What's Improved or changed...

Bulk, Fine & Slow screen layout.

The three full-flow instrument screens have been rearranged to accommodate the new controls and to improve the logical flow of the buttons.

Profile Reset.

The impossible task of trying to keep things simple while also providing flexibility is an ongoing struggle. We have always wanted to keep resetting the profile as simple as possible. However, feedback and testing have shown that this simplicity does not always meet the demand. As a result, we have re-arranged the profile resetting screen and added another reset option.
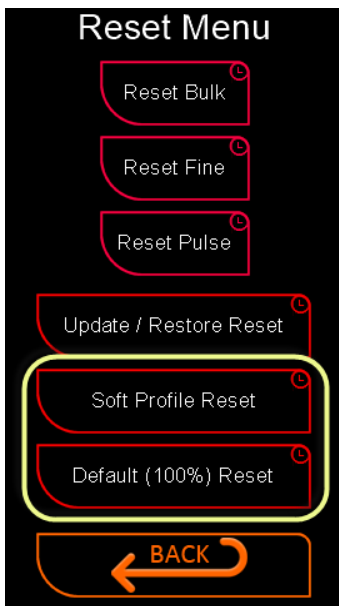
The top three small buttons will reset the respective instruments, and the three larger buttons will reset the profile (all instruments) in a distinctive way.

• **Update/Restore Reset** will reset the profile from the powder type information while retaining the Charge Setpoint, Cartridge Volume, and Hopper Alert values.

Use this as a first attempt as a fill restore (If the AI still struggles then try the next option).

• **Soft Profile Reset** will reset the profile from the default profile while retaining most of the settings such as Tolerance, Vibrator Stop Mode, Charge Setpoint, Cartridge Volume, and Hopper Alert values.

Use this as a second attempt as a fill restore (If the AI still struggles then try the next option)

• **Default (100%) Reset** will reset the profile from the default profile while only retaining the Charge Setpoint, Cartridge Volume, and Hopper Alert values.

Use this as a last resort to reset all operational parameters.

Firmware Updates

This version introduces the ability to include the powder.dbl file within the .STF package for future updates. Many users were not downloading the new powder.dbl file to replace the now redundant powder.txt file. Additionally, the pf.dat profile data file is now repackaged with the .STF file, making future downloads and firmware updates more efficient.

Please note, starting with this update, upgrading from versions earlier than V3.2 to future versions will require an interim V3.2 update or a double installation (install the future version once, then install it a second time).

During the User Interface screen update after this version is installed, a purple light will now slowly flash. No epilepsy warning is issued during this part of the operation, as the light will flash below the epilepsy-inducing frequency.

Other changes

1. **Improved Accuracy:** Enhanced rounding for the grams-to-grains conversion, where the scale data is received in grams.
2. Splash screen revised.
3. Fixed and issue with the pulse self-learning increasing the pulse idle speed excessively.
4. An issue that could allow the AI to adjust the Pulse Idle speed to an excessive value has been resolved.
5. Manufacturing changes that allow the SuperTricker to automatically recognized the Testing Unit.
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