Version 3.2.2 Companion Document

Update Type

V3.2.2T1U3.2T1-PFX.stf contains the following upgrade details.
1. Controller Firmware V3.2.2
2. HMI Touchscreen 3.2 (User Interface)
3. Pro-forma file to suit version 3.2.2 (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

Based on feedback and insights gained from the release of V3.2.0, we have made several notable improvements. However, the primary focus of this update has been on AI Self-Learning.

In the previous version, no changes were made to AI Self-Learning, as we lacked the necessary feedback and data to guide the AI in determining relevant patterns. (please consider; the AI does not possess vision, hearing, or extensive heuristic memory).

With sufficient information now gathered, the two primary learning areas in this update are pulse learning and the delicate balance between Bulk Offset, Fine Speed, Fine Ramp Down, and Fine Final Phase. The AI will now use trial and error to establish a stable equilibrium between these settings.

Technical Notes

Important: Although your existing V3.x profiles are compatible with this version, you may find poor results. In this event, soft reset your profile and allow the system to relearn with the new settings and operation arrangement.
V3.2.2 is identical to V3.2.1 with the exception of the vibrator warm up speed.

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.

<u>TO SAVE YOUR CURRENT VERSIONS PROFILES BEFORE UPGRADING:</u>
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

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

DO NOT use a different SD card for the update. The installation process will place essential SuperTrickler files onto the SD card's folders, which must remain consistent for proper functionality.

Special Note regarding the powder.dbl file

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® **powered on** and from the main sub menu, remove the Micro SD card (tweezers are a great help).

2. Copy the V3.2.2T1U3.2T1-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 V3.2.0 to V3.2.1 & V3.2.2

What's New…

Pulse Instrument

Like other instruments, the pulse now has the ability to be **turned off**. In previous versions, this was not permitted, as the pulse served as a fallback or last-resort instrument. However, with the introduction of V3.2.0's Fine Low-Speed Final Phase, which enables powder dribbling, this limitation has been removed.

This new capability allows the pulse to be disabled while also setting the fine (and slow) offset to 0.00 internally, enabling the Final Phase to dispense powder precisely to the final target weight.

The control system functions the same as other instruments—simply select OFF from the Pulse Nominal Speed setting.

Self-learning

- In previous versions, the emphasis and bias were placed on running the pulse for a short duration at high power. However, it was discovered that this approach could lead to issues when the pulsing system needed to compensate for a significant difference between the start point and the fine target point.

  High-power pulses caused excessive loading in the vibrating tube, and as the final weight was approached, this buildup could result in an unexpectedly large discharge or "burp" of powder.

  To address this, we have adjusted the AI's learning process to prioritize longer pulses with lower power, helping to mitigate this issue.

- Another issue that became apparent as V3.2.0 placed less reliance on pulsing was that the system could miss learning opportunities before self-learning disabled itself after a set number of successful charges.

  To address this, the system will now intentionally generate a pseudo Fine Offset, ensuring the pulse system undergoes the learning process.

What Happens if you turn the pulse instrument off (important)

When you turn off the pulse instrument, the job of finalizing the charge will fall on the Fine (or Slow, if enabled) system. However, the Fine and Slow in-flight systems are disabled because the system can no longer anticipate the charge weight.
Typically, the Fine low speed is set below the threshold of continuous powder flow. This is to unload (purge excess powder) from the vibrating tube during the Fine low-speed final phase, preparing it for the pulse instrument. For this reason, the Fine setting may need to be adjusted to a level that gently delivers a dribble of powder and a longer Fine final phase maybe required.
In most cases, the system will automatically switch to a minimum flow value (measured during self-learning) when the pulse is turned off and will revert to a slower speed when it's turned back on.

For this reason, it is best to allow the system to self-learn with the pulse system enabled (ON) so that all parameters and speeds are fully recognized and optimized within the system.

Fine Instrument, fine-tuning.

To improve the consistency of the fine instrument, a careful balance is required between Bulk Offset, Fine Ramp Down points, and Fine Low-Speed Final Phase. While achieving this balance is not particularly difficult, the manual trial-and-error process can be arduous. However, it is relatively straightforward for the AI during self-learning.

We have allocated additional memory to incorporate this refinement into the AI's learning stages. This trial-and-error adjustment will continue until the monitoring-only phase begins, even if Fine and Bulk indicate that self-learning has completed. This improvement should significantly contribute to a smoother and more consistent self-learning process.

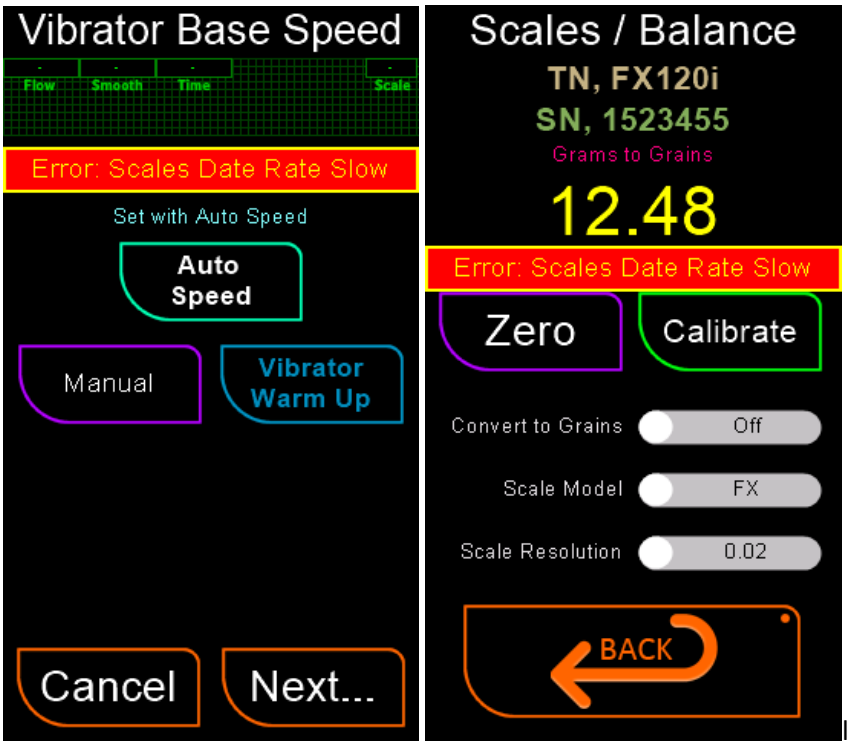
Final note: Due to forced pulse learning and fine instrument fine-tuning, the initial learning phase may take slightly longer than in previous versions.

Scale setup warning.

We have received reports from many users experiencing issues with the Vibrator Base Speed Auto function, where the vibrating tube continuously increases in speed without peaking or slowing down. The root cause has consistently been an incorrect configuration of the scale's data flow rate frequency.

For accurate flow calculations, the Data Rate frequency must be set to 20 times per second.

In this version, an error message will be issued on both the Vibrator Base Speed screen and the Scales / Balance screen to alert the operator that the scale has been incorrectly set.



limitaton

What's Improved or changed…

On screen statistical metrics

In previous versions, with a few initial exceptions, all successes and failures during the learning phase were recorded. However, this approach unfairly impacted the statistics, as failures during the learning process, particularly with the new trial-and-error fine-tuning method, skewed the results disproportionately.

To address this, the system has been updated so that any instrument still in the learning phase will no longer record overthrows.

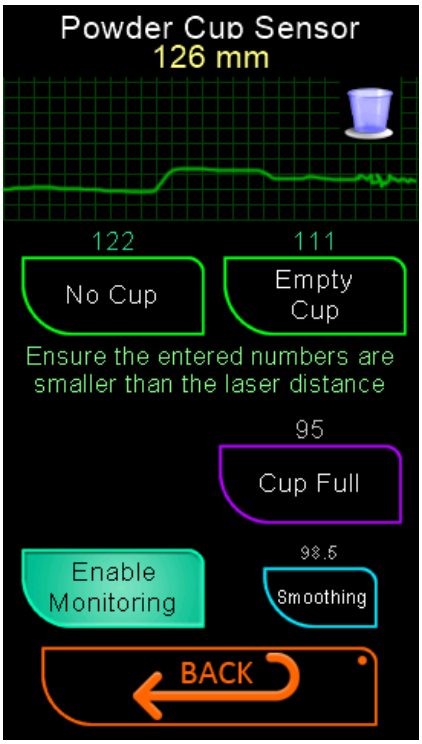
Laser High Level Monitoring

We have reinstated the laser's capability to monitor the cup during processes where it may become full. This functionality is now available in the following screens.

- Motor Flow/Test
- Motor Screen Priming
- Select Screen Priming
- Profile Bulk Test
- Profile Fine Test
- Profile Slow Test

Note: The laser will not stop the operation but will issue an audible and visual warning.

This will require the laser to be enabled and calibrated.



To calibrate the Cup Full, turn the standard SuperTrickler® cup upside down on the platen and use the base as the warning level.

Vibrator warm-up screen

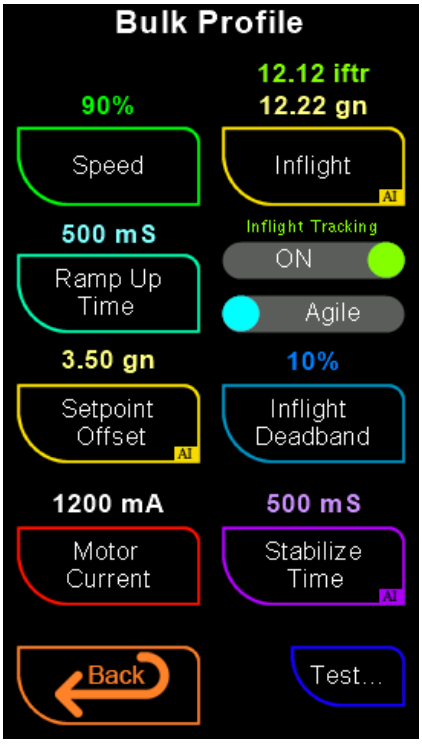
Will provide a warning to ensure the hopper is empty.

Vibrator Base Speed

We have updated the algorithm used to detect the base speed due to instances where the speed appeared excessively high. Unlike other areas of the profile, where speed is represented as a percentage, the base speed is measured in absolute units.
Within the profile, speeds of 1% or even 2% should not result in any powder output. This ensures the system establishes a known baseline for operations and self-learning.

Inflight Values

In previous versions, both the inflight value and inflight tracking value were postfixed with **gn** for grains. However, this led to confusion, as the two values were stacked on top of each other, making it difficult to distinguish between them.
In this version, on all applicable instrument screens, the inflight tracking value will now be postfixed with **ift** for inflight tracking



Data Logging

In the **analysis** file, the new fine-tuning abilities have been added, along with a review of the codes. Previously, all codes were in uppercase; however, we have now standardized formatting—using **uppercase** for the instrument name and **lowercase** for its specific settings
The codes are….

E	Undefined error in self-learning.
Bi	Bulk Inflight value
Bo	Bulk Offset, generally changed by the Fine Operation, fine-tunning system.
Fi	Fine Inflight value
Fs	Fine Low Speed value
Fr	Fine Ramp Down value
Ff	Fine Low Speed Final Phase value
Ps	Pulse Nominal Speed value
Po	Pulse Time ON value
Pd	Pulse Dither amount
Pi	Pulse Idle value
Pr	Pulse Ramping

Other changes

1. The ‘New Preset’ screen has been corrected to display "Missing Powder".

2. The Fine, Low Speed Final Phase button now displays the AI symbol.

3. V3.2.2 is identical to V3.2.1 with the exception of the vibrator warm up speed.

Other information

AI Self-Learning Limitations.

The AI self-learning system has inherent limitations. The SuperTrickler operates on a small microcontroller with very limited memory and computing power, which restricts its ability to function as a fully modern AI system. Unlike a human operator, the AI has no visual or auditory feedback—it cannot 'see' the powder flow or 'hear' whether it’s rough or smooth. All decisions are made solely based on weight data from the scales and any preset profile settings.

This system is far from perfect. Its knowledge base has been trained within a relatively narrow range to accommodate many powders, but there will always be exceptions—particularly with difficult or unconventional powders that fall outside its learning capabilities. The AI will attempt to balance speed and consistency where possible, but only within its programmed boundaries.

While the system performs well in most cases—often requiring little to no manual intervention for steady, reliable powder drops—it is important not to expect too much from it. Some powders may still require user adjustments to achieve optimal results.

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