Agrosta® Winterwood

Durofel Firmness and size measurement of soft fruits

The Agrosta®Wonderfast / Durofel version was designed in 2020 to provide a highly accurate and fully automated solution for testing the firmness of Cherries, Blueberries, Tomatoes, Cranberries, and Grapes.

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Thanks !

Many thanks for having acquired an Agrosta instrument
Your package contains :

- The Agrosta®Wonderfast / Durofel machine
- 2 turntables (Depending on your request, either two identical turntables or two different ones)
- A user manual with a certificate of conformity
- A 110V / 220V power supply
- A USB stick containing the software
- A USB cable

We highly recommend reading the user manual, as it provides clear and concise instructions to help you maximize the use of the device.

Product Overview

Design & Manufacturing : The **Agrosta®Winterfast / Durofel version** is **entirely designed and assembled in France**.

- The **motherboards** come from the **USA**.
- The **shield boards** are manufactured in **Hong Kong and the USA**.

Handling & Care: The **Agrosta®Winterfast / Durofel version is NOT waterproof**.It is a **precision instrument**, so please handle it with care and avoid **dropping or knocking** it.

Warranty: The **Agrosta®Winterfast / Durofel version** comes with a **two-year guarantee**.

Measurement Specifications :

- **Minimum Durofel**: **7%**
- **Maximum Durofel**: **100%** *(Shore A Scale)*
- **Resolution**: **±1%**
- **Size Measurement**: Provided in **mm** *(The user must enter the initial size between the sensor head and the bottom of the cup of the turntable)*

Compatibility : The software is compatible with Windows XP, Vista, 7, 8, 10 and 11

Fruit Measurement Impact : Fruits like Blueberries, Blackberries, Strawberries, and Raspberries are destroyed during measurement.This **does not affect the results**, as the machine records **only the maximum pressure**.

AGROSTA®Winterwood – Step-by-Step Guide

1. Install the Driver

- **Do not connect your machine yet**.
- Insert the **USB stick** into your computer.
- In **2023**, there are **two drivers** to install:
    1. **Install DRIVER1 first**.
    2. **Then install DRIVER2**.

2. Connect the USB Cable

- Plug the **USB cable** between the **instrument** and your **computer**.

3. Device Recognition

- **Wait a few seconds** until the device is recognized.
- The **driver will automatically link to the device**.

4. Install the Software

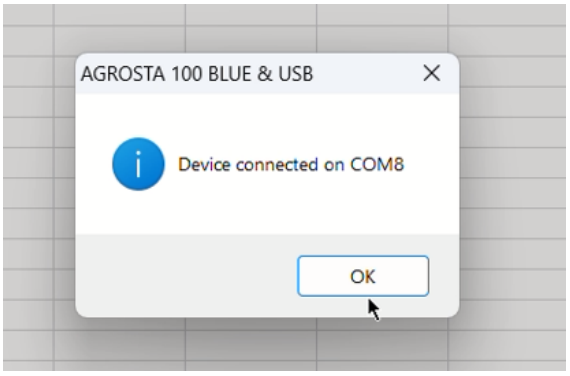
- Open the **USB stick** and **double-click** on **"INSTALL"**.
- **Follow the setup procedure** to complete the installation.

5. Connect the Power Plug

- Plug the **power supply** into the **machine**.

6. Start the Software

- Once installed, the **software will start automatically**.
- The **connection with the machine is automatic**.



7. Software Usage & Testing Procedure

The software comes with a **light version of Excel**, allowing you to:

- Open any **Excel file** or use the **blank sheet** that appears at startup.
- Click on the cell where you want the **data to start displaying**.
- Click on **"START NEW SERIE"**: This will add the **date, time, and column headers**.
- You can **click on any other cell** to add extra information *(e.g., sugar content, variety...)* or start another batch in a different part of the sheet.
- At the end of your tests, you can **save the Excel file**.

8. Barcode Reader Support

- You can use a **barcode reader** to scan references.
- **Select the target cell**, then scan the barcode to insert its reference.

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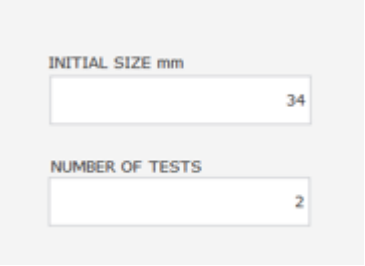
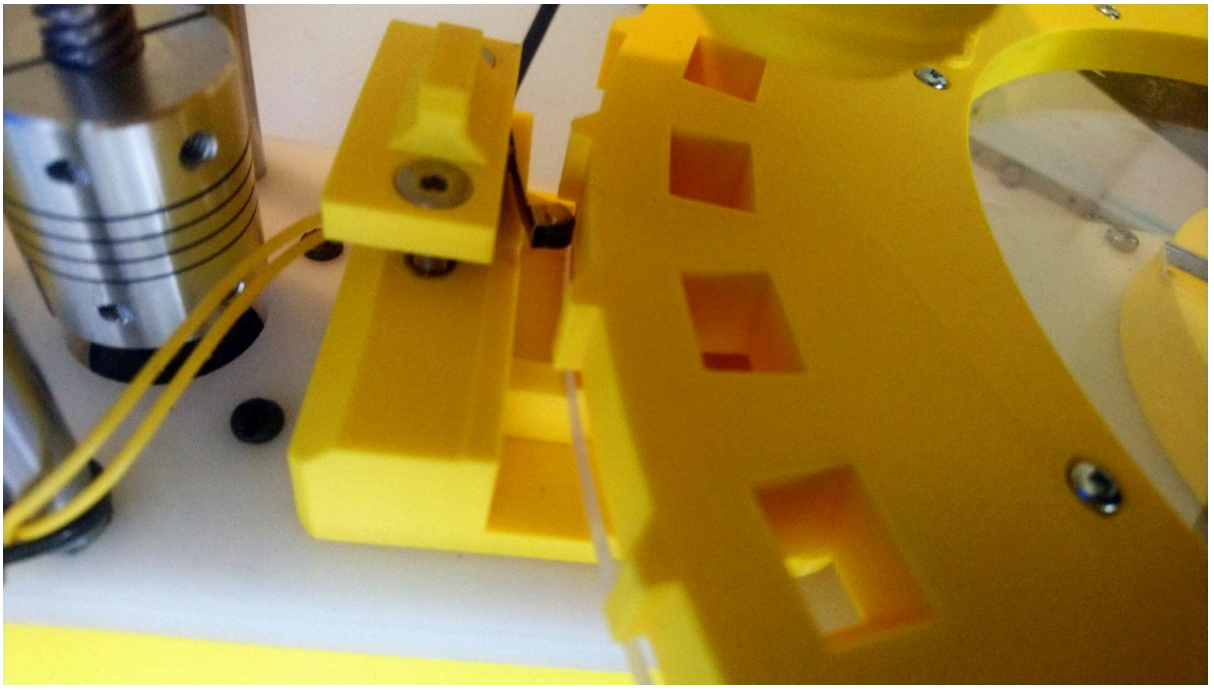
9. Launching a Cycle

1. **Define the number of tests**
    - Enter the **number of fruits** placed on the table (between **1 and 32**) in the corresponding field.
    - 

    - Example for **blueberries**:
        - If the table is **full of fruits**, enter **32**.
        - For **continuous testing** *(removing and replacing berries during the cycle)*, enter a **higher value** like **1000**.
        -
2. **If you need to stop the cycle**
    - You can **stop anytime** by clicking on **"STOP CYCLE"**.
    - If the machine does not stop properly, unplug the **USB and power cable**, then reconnect and restart the software.

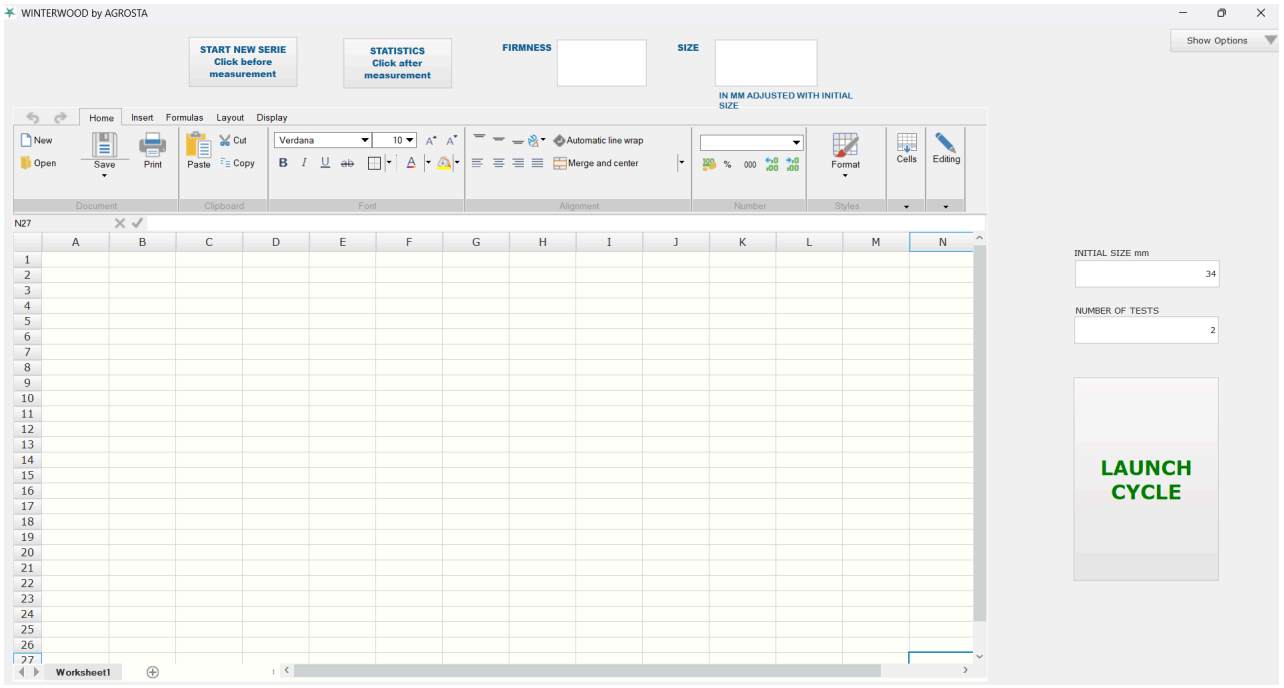
3. **Position the turntable**

   - Switch between **two cups** as shown in the reference photo.
   - The machine **always starts** with the **cup on the right side**.



4. **Start the cycle**

   - Click on **"LAUNCH CYCLE"**.
   - The machine will begin testing based on the selected parameters.



10. Adjusting the Size Measurement

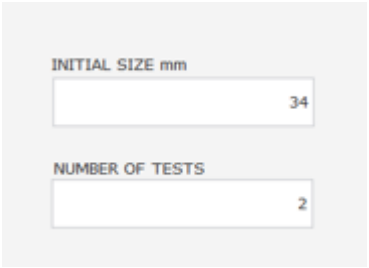
To ensure accurate fruit size measurement, you need to **enter the initial size** in millimeters.

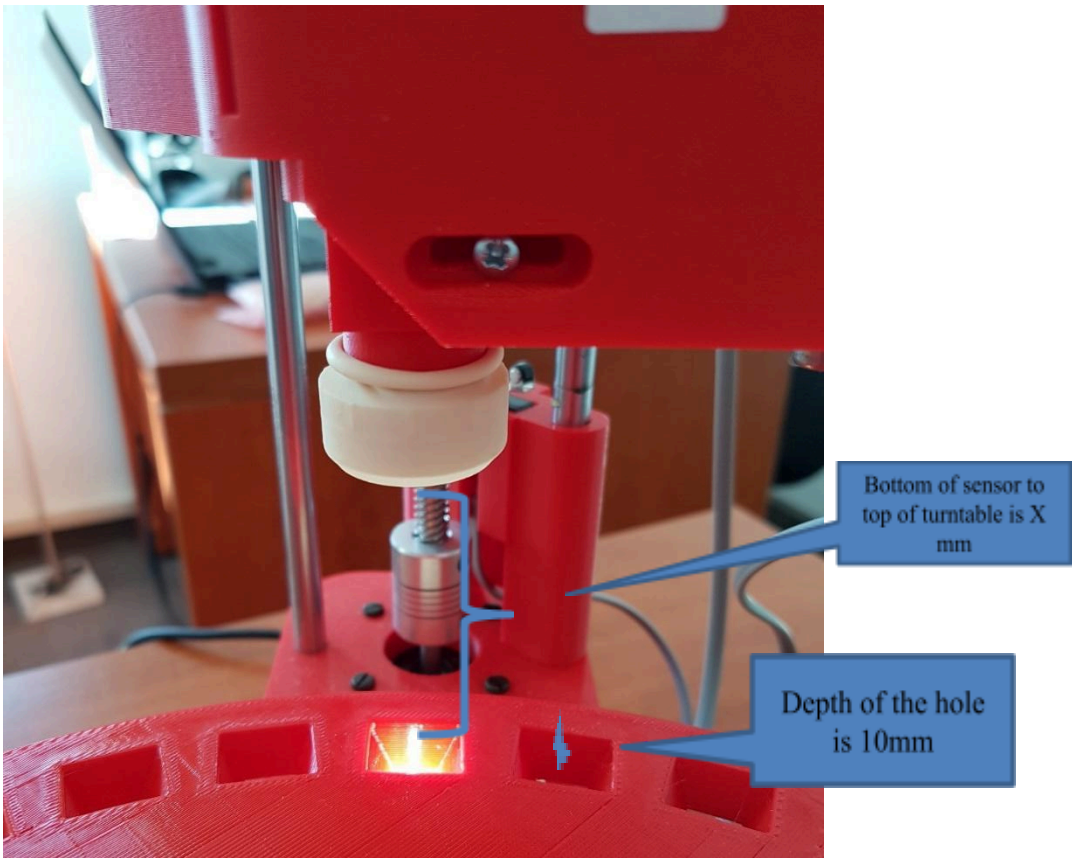
Setting the Initial Size

- This value corresponds to the **distance between the sensor head and the middle of the cup height** of the turntable you are using.
- Enter this value in the **"Initial size"** field in the software.

Calibration & Adjustment

- Perform **test measurements** with fruits of a **known size**.
- If needed, adjust the initial value:
  - **Adding 1 mm to the initial size will add 1 mm to the measured fruit size**.
  - Adjust accordingly until the measurements match the actual fruit sizes.
  -





Differences in Measurement Values Between the Handheld Agrosta®100 and the Agrosta®Winterfast / Durofel Version

Measurement Differences on Blueberries

The **difference in measurements** occurs **only on blueberries**, due to the **handling method**:

- **With handheld devices (Agrosta®100)**:
  - The blueberries are held between **two fingers**, which applies **overpressure**, leading to **higher values**.
- **With the Agrosta®Winterfast / Durofel version**:
  - The blueberries are placed **freely inside the turntable cups**, resulting in **lower values**.
  - The difference is approximately **16%** based on experience.
  - To **compensate**, multiply the values obtained by **1.16**.
  - However, the variation depends on how users **hold the fruit** with handheld devices.

Effect of Fruit Breaking During Measurement

- **Mature blueberries may be crushed** by the machine during the test.
- This **does not affect the measurement**, because:
  - The machine **detects** when it touches the fruit.
  - It **records the maximum pressure every 100 milliseconds**.
  - If the fruit **breaks**, the pressure drops, but the **maximum pressure is already stored**.

Cleaning & Maintenance

- Remove and **clean the tip daily** to prevent fruit juice from **blocking the system**.
- **Be careful** when **screwing and unscrewing** the **plastic abutment** to avoid damage.

Minimum Fruit Height Requirement

- The fruit **must exceed the turntable level by at least 3 mm**.
- If the fruit is **too small**, the tray may **touch the endstop before completing the measurement**.

How the Sensor Moves

1. The **sensor detects the fruit**.
2. It must **move down approximately 3 mm** after touching the fruit.
3. If the sensor **touches the endstop** after only **1 or 2 mm**, the tray **goes back before finishing the measurement**.

"TOO SMALL" Error Message

- If the sensor **cannot move 3 mm**, the software displays **“TOO SMALL”**, indicating an **incomplete measurement**.
- Ensure that the fruit meets the **minimum height requirement** to avoid this error.

4 / 29 / 2020	15 : 36
Durofel %	Size
37	20
48	23
TOO SMALL	11
41	20
40	16
31	16
43	15
41	22
41	21
44	18

Solution for Incomplete Measurements

If you encounter the **"TOO SMALL"** error or obtain **lower values**, the recommended solution is:

- **Use a turntable with smaller cups** to ensure proper support for small berries.
- When placing **small berries**, **block each fruit** in the cup to prevent it from **moving down during measurement**, as this leads to **inaccurate and lower values**.

Ensuring Proper Blueberry Positioning

- When placing **blueberries in the cups**, make sure to **LOCK each berry carefully**.
- If a berry moves **even slightly downward** during measurement, the **Durofel Index will be lower than expected**.
- Example:
  - A **0.25 mm movement** results in a **10% decrease** in the Durofel Index.
- This is why the device is supplied with **turntables of different cup sizes**, allowing proper adaptation for various fruit sizes.

Cleaning & Maintenance

Preventing Fruit Juice Contamination

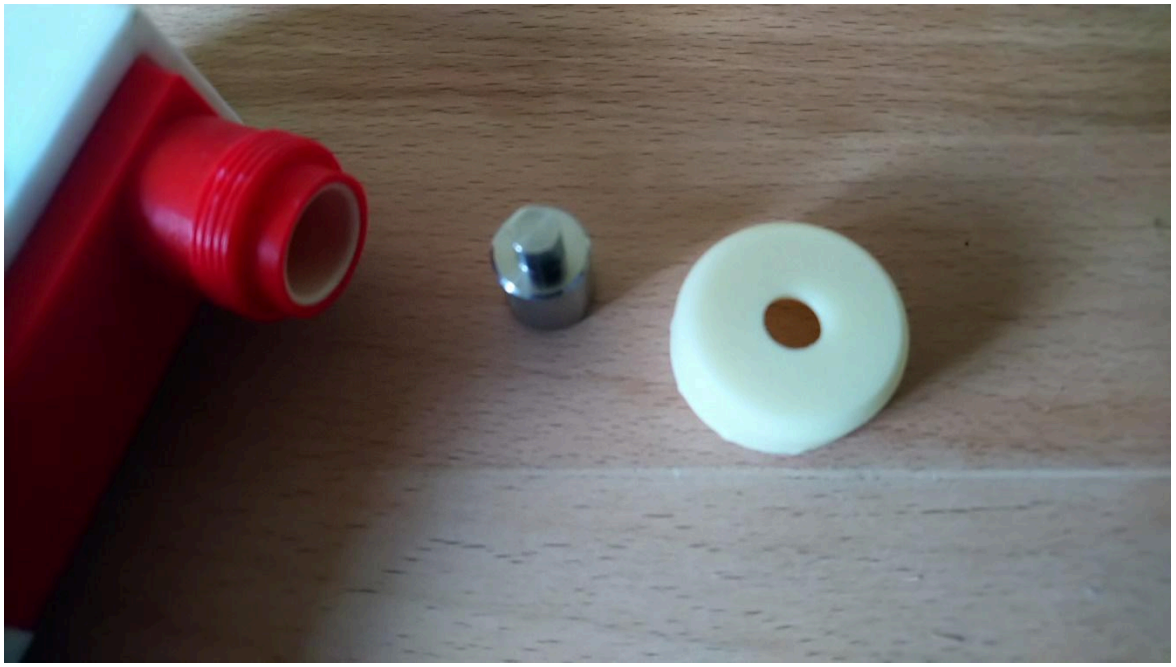
To maintain the precision of the machine, always keep it **free of fruit juice**.

Cleaning Procedure

1. **Unscrew the abutment** and remove the tip.
2. **Clean the tip and tip chamber** thoroughly with **hot water**.

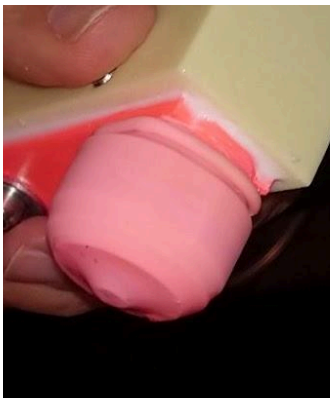
Using the Tip Protection (Protective Covering)

- The **protective covering** must be placed **before starting the machine** *(see reference photo)*.
- It should **neither be too loose nor too tight**.
- **For Blueberries**, using the protection is **mandatory**.
- **For other fruits, it is highly recommended**.



Sensor Protection & Juice Management

- The **sensor is highly sensitive to fruit juice**.
- You have two cleaning options:
    1. **Use a finger cot (recommended)** – A **standard disposable finger cot** found in most countries.
    2. **Manually clean after each juice spill** – This involves:
        - **Unscrewing the abutment**.
        - **Cleaning the tip, chamber, and abutment each time a fruit is broken and juice flows**.
- **Important:** If using a finger cot, replace it **immediately if it is damaged** to ensure proper protection.



Calibration Modification (For Experts Only)

⚠ **Warning:** Any modification in the calibration settings is **permanent**, and the machine will **lose its previous calibration**.

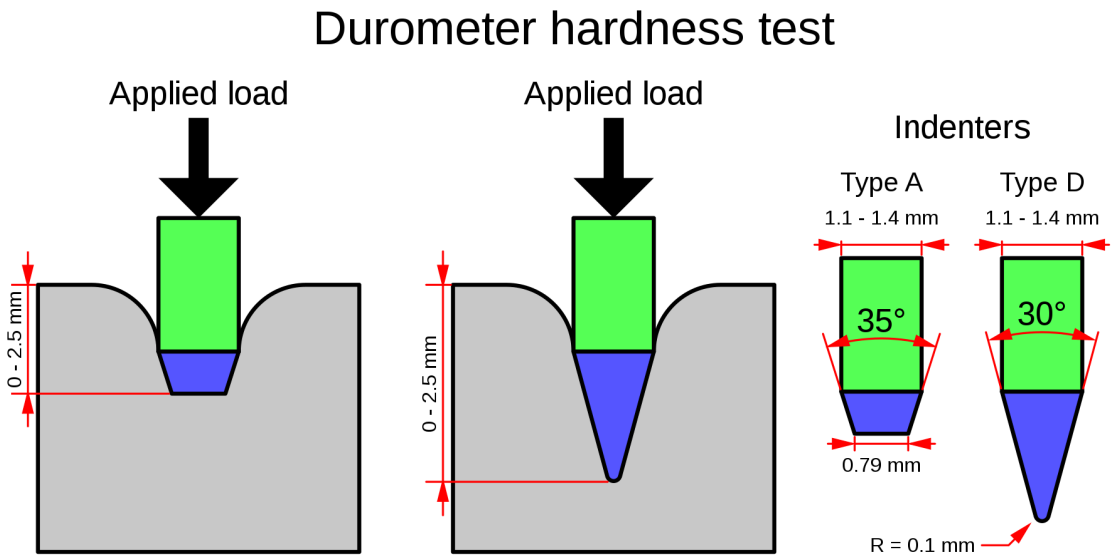
Calibration Check Procedure

If you follow the procedure below and obtain a **Durofel value between 96% and 100%**, your machine is correctly calibrated.

Why is this test reliable?

The **Winterwood machine** follows the **Durofel Standard**, which itself is based on the **Shore A hardness scale**.

- In the **Shore A Standard**, the **tip (in green and blue)** is linked to a **calibrated spring** that applies a **precise load**.
- The **tip retracts** depending on the **hardness of the sample**.



How Calibration Works in the Winterwood Sensor Head

- The **calibrated spring** is attached to a **calibrated load cell**.
- The **load cell measures the applied pressure**, which is interpreted as a **retraction length**.
- **100% Durofel** corresponds to **806 grams of pressure** when the tip is **fully retracted**.

Potential Calibration Failures

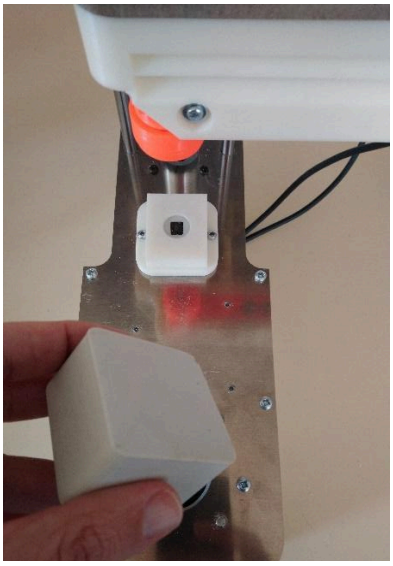
1. **Calibrated Spring Failure:**
    - If the spring becomes **too soft**, the tip **will not reach 806 grams of pressure** at full retraction.
    - The machine will **not exceed 96% Durofel**.
2. **Calibrated Load Cell Failure:**
    - If the **load cell provides incorrect values**, the pressure will never reach the correct level.

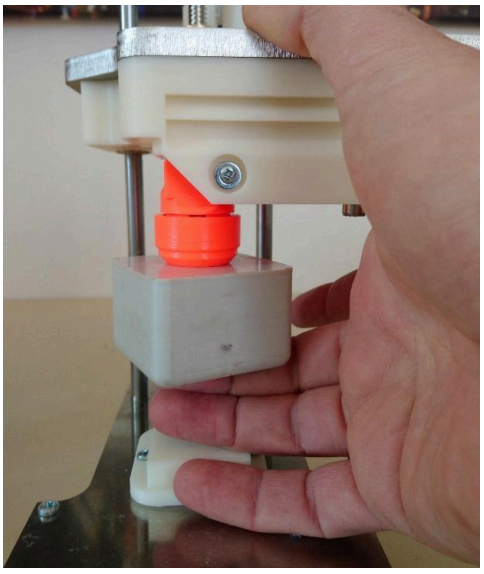
✅ **The only way to get a value between 96% and 100% with a faulty calibration** would be if **both components failed in opposite ways** and **compensated each other**.
❌ This scenario is **highly unlikely** because **wear typically causes both components to drift in the same direction**.

How to Check Calibration?

Step-by-Step Calibration Test

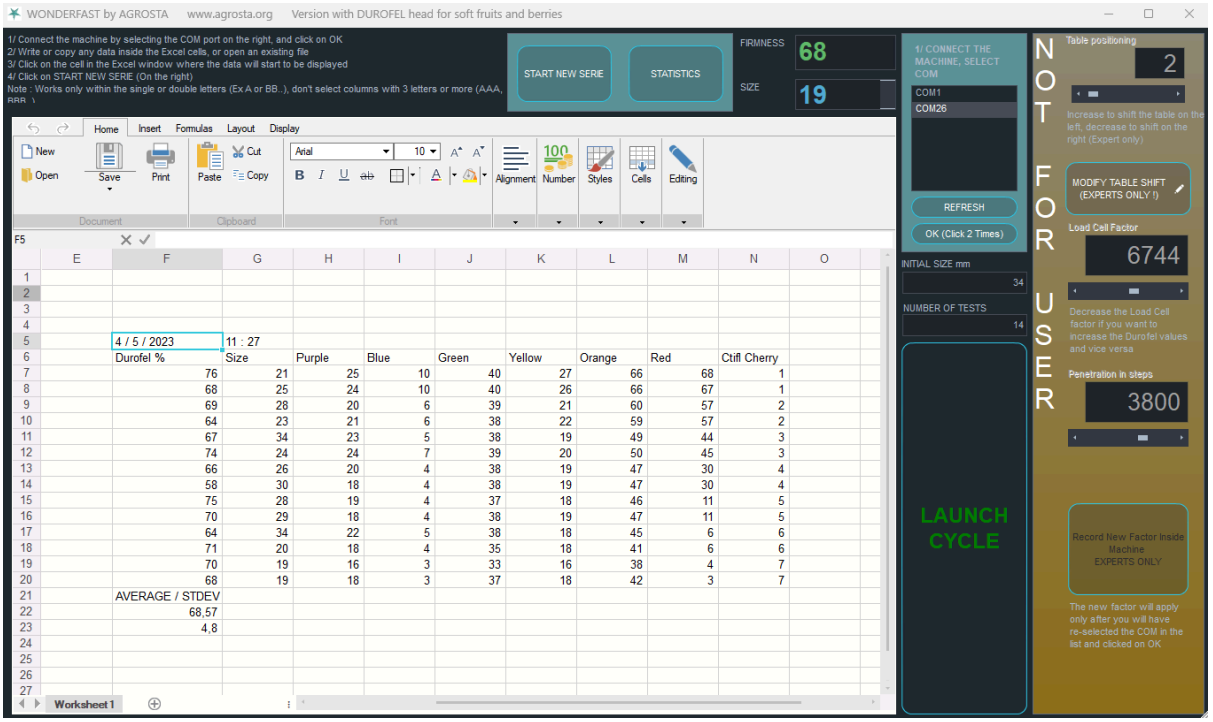
1. **Prepare a flat, hard surface** *(or use the calibration template if provided)*.
2. **Remove the tip protection** (if installed).
3. **Remove the turntable**.
4. **Open the software** and **connect the machine**.
5. **Start a measurement cycle**.
6. **During the sensor tray movement downward**:
    - Place the **flat piece** in front of the sensor.
    - **Press firmly** and hold for **one second**.
7. **Remove the flat piece** before the sensor tray reaches the bottom of the machine.
8. **Read the measured value**:
    - If it is **between 96% and 100% Durofel**, the calibration is **correct**.
    - If it is **below 96%**, the machine needs **calibration adjustment** or **maintenance**.





Optional Colorimeter (Winterwood Model)

The **color measurement** is performed **from under the table**.



Color Measurement Details

- The device measures **six different colors**.
- These values are **relative** and follow a scale where:
  - **100 = Pure White** (Maximum value)
  - **0 = Pure Black** (Minimum value)
- The measured **wavelengths** correspond to:
  - **450 nm**
  - **500 nm**
  - **550 nm**
  - **570 nm**
  - **600 nm**
  - **650 nm**

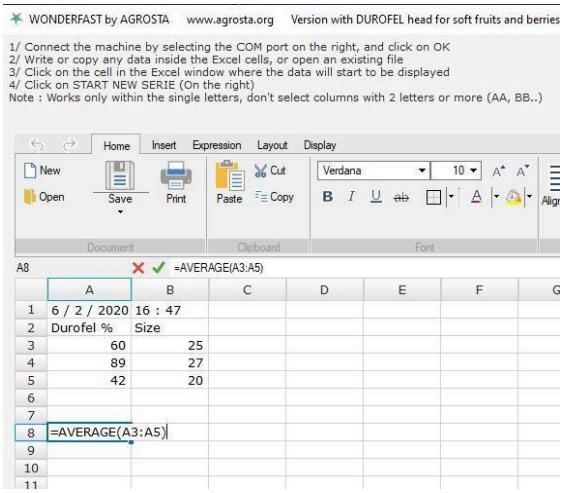
Excel Functions in the Software

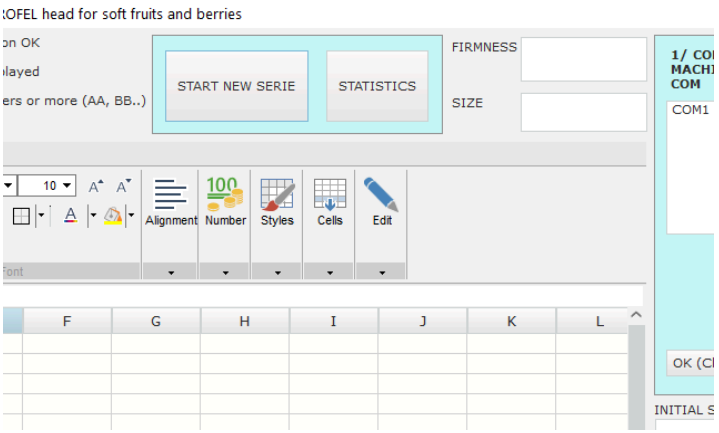
The software includes a **built-in light version of Excel**, allowing you to use all **standard Excel functions** such as:

- **=AVERAGE( )** → Calculate the average of a dataset.
- **=STDEV( )** → Calculate the standard deviation.
- **Many other functions** are available in the **"Expression"** tab.

Quickly Access Batch Statistics

- When you have **finished a batch**, you can obtain **quick statistics** by clicking on the **"STATISTICS"** button, located at the **top center of the window**.
- ✅ **This feature was introduced in 2021**.





Congratulations! 🎉 You are now ready to fully utilize the AGROSTA® Winterwood.

If needed, refer to the user manual for additional guidance and explore all the features offered by this device.

Happy measuring! 🍇🍒