Space / Time Control

Width Calibration Manual

Table of Contents

1. Preface

The goal of groove width calibration is to align the depth signal sent by the software with the actual movement of the dynamic depth adjustment mechanism.

The SDMS head suspension box enables both mechanical and electrical adjustments for groove depth. The mechanical adjustment sets a base groove depth, while the electromagnetic system allows for dynamic and fine-grained depth control, which can be automated by the software.

> ℹ️ Due to the V-shape geometry of a groove, its width is always twice its depth. Although the electromagnetic system technically controls groove depth, STC uses **GROOVE WIDTH** as the primary measurement for groove geometry, since this is what can be observed directly through the groove inspection microscope.

> ⚠ Read and follow the instructions below carefully. If unsure about a step, please contact our support. The signals sent to the system during the calibration procedure can potentially damage your system. You will perform all calibration steps at your own risk.

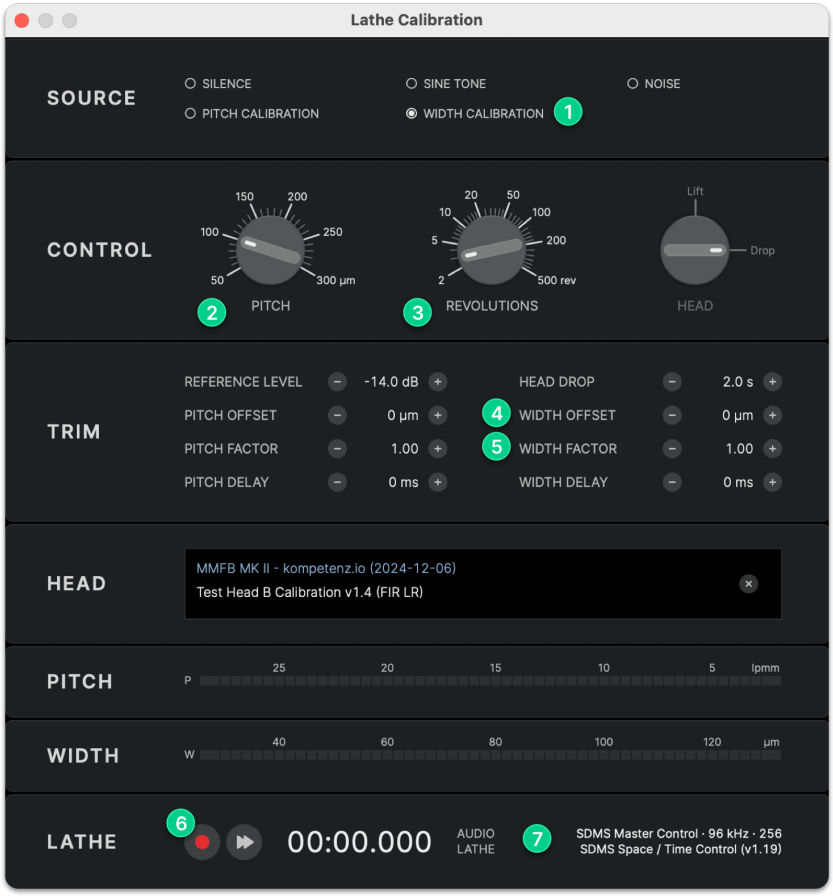
1.1 Prerequisites

- Complete the Pitch Calibration procedure before starting width calibration
- Complete the SDMS "Silent Groove Instructions" to establish a manual w calibration for a baseline groove width of approximately `50 µm`
- Setup you system for lacquer cutting; plastic blanks are not suited well for width calibration.
- Ideally, cut the calibration signals at a diameter `Ø < 260 mm`.

1.2 Abbreviations

SDMS — Sillitoe Disk Mastering System hardware
STC — Space / Time Control software

1.3 References



STC Lathe Calibration Dialog

SDMS **Master Control** and **Space / Time Control** Hardware Modules

> ℹ️ All alphabetical and numerical references in this manual refer to the images above.

2. Calibration Procedure

2.1 Manual Baseline Cut

1. Disable **CARRIAGE** L and **HEAD** P automation (LED buttons OFF)
2. Enable **DEPTH** H automation (LED button ON)
3. Perform a manual test cut of a silent groove for `3…5` revolutions
4. Measure the average groove width using the groove inspection scope and record it as your **GROOVE WIDTH BASELINE**

> ℹ️ In the default configuration of the groove inspection scope with a 10x objective, one division in the ocular scale equals `5 µm`.

2.2 Groove Width Calibration

Prepare STC and SDMS for the calibration cut:

1. Launch **STC** and open the **Lathe Calibration** dialog
2. Confirm your **SDMS Master Control** and **Space / Time Control** hardware modules are connected (7)
3. Enter your **GROOVE WIDTH BASELINE** value as a negative **WIDTH OFFSET** (4)
   (**Example:** If you manually cut a `50 µm` wide groove, enter `−50 µm` as **WIDTH OFFSET** (4))
4. Set the **WIDTH FACTOR** (5) to `2.00`
5. Select **WIDTH CALIBRATION** (1) as the source and set:
   - **PITCH** (2) to `100 µm`
   - **REVOLUTIONS** (3) to `3 rev`
6. Enable automation for **DEPTH** (H), **CARRIAGE** (L) and **HEAD** (P) (LED buttons ON)
7. Ensure the carriage direction (M) is set to `F(orward)`
8. Set the **TURNTABLE SPEED** to **33** (J)
9. Switch on the **TURNTABLE** (K) and **VACUUM & STYLUS HEAT** (Q)

When ready to cut:

1. Press **REC** (6) to start the calibration cut
2. The software will cut a groove with increasing width from `50 µm` to `90 µm` Each width will be held constant for the number of revolutions you set above (default: `3 rev`)
3. The test will stop automatically when complete

Evaluation of the results

1. Inspect the groove using the groove inspection scope
2. Measure the average width of each groove section and note the values in the table below

EXPECTED WIDTH	MEASURED WIDTH
50 µm	
60 µm	
70 µm	
80 µm	
90 µm	

Groove Width Calibration Results

ℹ️ It's easiest to start from the end of the cut and count the revolutions backwards, to find the next section. The five sections of three revolutions at constant width will be separated by a slightly larger land area.

Send your measured results to calibration@spacetimecontrol.com for review and evaluation of your **WIDTH FACTOR** and **WIDTH OFFSET** parameters.

ℹ️ If you are already familiar with the width calibration procedure, you can also enter your results into the Width Calibration Utility and find the optimized values for **WIDTH FACTOR** and **WIDTH OFFSET** yourself.

3. Troubleshooting

Slight variations in lacquer thickness will create slightly wider or narrower grooves. The same is true after switching to a new stylus.

If you see a width offset in a test groove with a fresh lacquer or new stylus, you can correct the **WIDTH OFFSET** to recalibrate the system using the following formula:

> **EXAMPLE:**
> `Expected Groove Width = 50 µm`
> `Measured Groove Width = 55 µm`
> `Width Offset Delta = 50 µm − 55 µm =` **`−5 µm`**