

AI Profile Filter User Manual

A step-by-step guide to turning a raw wheel scan into a clean, production-ready profile. The normal workflow is short: **open the scan** → **let the filter auto-select per-segment filters** → **clean up any stray outliers** → **Confirm Profile**. Everything else is optional fine-tuning.

1. The workspace at a glance

When the app opens it loads the current scan and immediately runs the filter pipeline. You land on the main workspace.



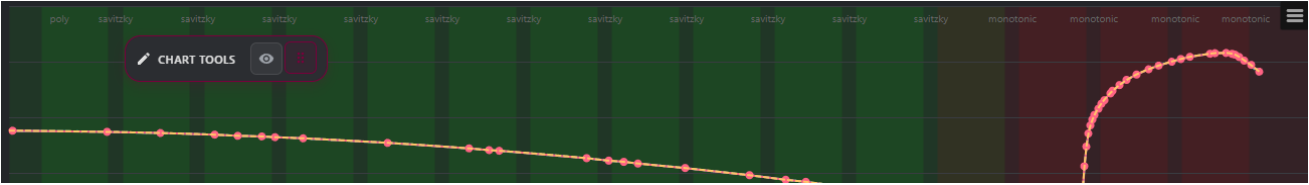
Area	What it is
Confirm Profile (top, pink)	Sends the finished profile to the machine/HMI. This is the final step.
Auto Tune	Lets the app search for better filter settings automatically.
386.0 mm / 78 pts	Live read-outs: total profile length and number of output points.
Advanced	Shows/hides the editing and pipeline tools.

Reload / Wi-Fi / Theme	Icon buttons at the top right — reload the profile, open the updates panel, switch light/dark theme.
Chart	The profile itself. Three curves are drawn (see legend): Raw path , Editing path (the points you edit), and Final path (the densified output that gets exported).
Chart Tools	A small floating panel for zoom/pan, grid, and legend. Drag it by its handle or collapse it with the eye icon so it doesn't cover the curve.

The pink "Test Mode" banner means the app is working from the bundled `getscan.json` test file instead of a live machine scan. In production this banner is absent and the scan comes from the HMI.

2. The filter auto-selects a filter per region

You don't pick one filter for the whole curve. The pipeline splits the profile into segments, analyses each one, and chooses the best filter for that region — straight slopes are preserved, curved areas are smoothed, and noisy/steep areas get detail-preserving filters. The chosen filter is printed above each segment.



In the example above the flat rim is handled by `poly` and `savitzky` filters, while the steep damaged edge on the right switches to `monotonic`. This happens automatically every time the scan is loaded or reprocessed — no action needed.

- `monotonic` — straight slopes, preserved with minimal smoothing
- `poly / savitzky` — smooth curves of moderate complexity
- `median+sg` — steep/noisy sections

Coloured vertical bands behind the curve mark the segment boundaries.

3. Reveal the editing tools (Advanced)

Click **Advanced** in the top bar to open the editing toolset.



This exposes two groups:

Edit Modes

Toggle	Use
Edit	Drag individual points to reshape the curve.
Delete	Click a point to remove it (used for outlier cleanup — see next section).
Add	Click on the curve to insert a new point.
Add Between	Insert a point midway between two existing points.

Next to the toggles are the action buttons: **Undo** (Ctrl+Z), **Redo** (Ctrl+Y), **Measure** (maximum deviation between curves), and **Auto-Trim** (the scissors — auto-removes outlier spikes). The **Deviation** read-out shows how far the edited curve sits from the raw scan, in mm².

Edge Damage Removal — enable this to ramp down a damaged lead-in/lead-out edge by a set distance and depth (handy for chipped rim edges).

4. Clean up small outliers

After auto-filtering, the curve is usually production-ready, but a scan can still leave a few stray points — small spikes that sit off the true profile. There are two ways to remove them.

Option A — Delete them by hand

1. Click **Advanced**, then turn on the **Delete** toggle (it highlights pink).
2. Click directly on each stray point on the curve to remove it.
3. The Final path re-densifies automatically after each deletion.
4. Made a mistake? Press **Undo** (Ctrl+Z).

In the screenshot above, **Delete** mode is active each point on the curve is now clickable for removal.

Option B — Auto-Trim (BETA!)

Click the **scissors** button to let the app find and remove outlier spikes for you. Click it again to trim more aggressively; if nothing is left to remove the sensitivity resets. This is the fastest way to knock out a handful of small outliers without hunting for each one.

5. Optional fine-tuning

- **Edit mode** — drag points to correct any area that needs human judgement.
- **Auto Tune** — let the app search for better pipeline settings if the default result isn't clean enough.
- **Measure** — check the maximum deviation between the edited and raw curves before committing.

6. Reload the profile (discard all changes)

If you've edited the curve and want to start over from the original scan, use the **Reload** button — the circular arrows icon at the top right of the toolbar.

Reloading:

1. **Discards every edit** — deleted points, dragged points, added points, trim, and edge-damage changes are all thrown away.
2. **Re-fetches the scan** and **re-runs the full filter pipeline** from scratch, so the per-segment filters are recalculated.
3. Leaves you back at the freshly filtered profile, exactly as it looked when the app first opened.

Reload does **not** ask for confirmation and there is **no undo** for a reload — it is a clean reset. Use **Undo** (Ctrl+Z) instead if you only want to step back one or two edits.

7. Confirm the profile

When the curve looks right, click **Confirm Profile** (top bar).

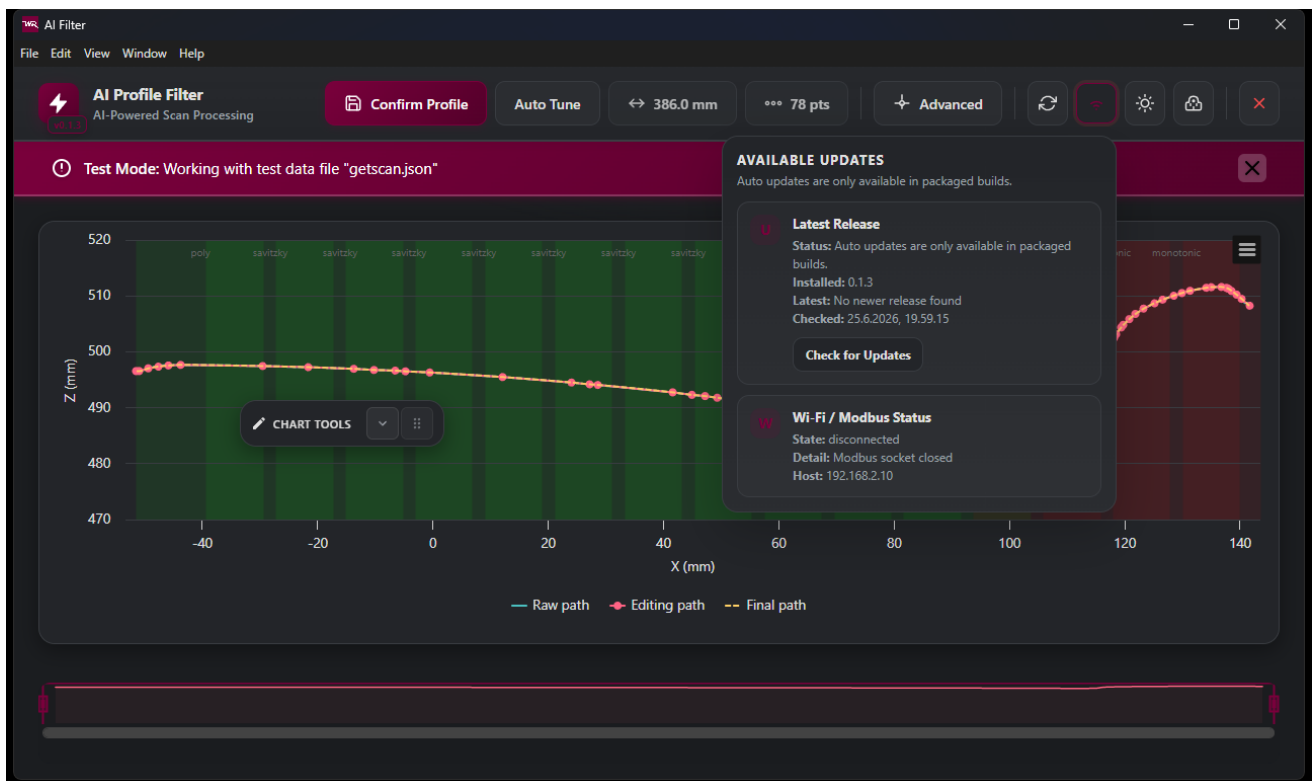
The app will:

1. Run a safety/validation check on the profile.
2. Build the final, densified output curve (the **Final path**).
3. Send it to the machine/HMI and close.

If validation fails, the confirmation is cancelled and nothing is sent. (fix the flagged issue and try again.)

8. Updating the app

The app can update itself. Open the **Available Updates** panel by clicking the **Wi-Fi / connection** icon at the top right of the toolbar.



The panel shows:

- **Installed** — the version you are running.
- **Latest** — the newest release found on GitHub (or "No newer release found").
- **Checked** — when the last check ran.
- **Wi-Fi / Modbus Status** — the machine connection state, detail, and host.

To update:

1. Click **Check for Updates**. The app queries the latest release.
2. If a newer version is available it downloads in the background. When the download is ready an **Install Update** button appears.
3. Click **Install Update** the app closes, installs the new version, and relaunches.

Auto-updates only work in packaged (installed) builds. When running from source / in Test Mode the panel shows *"Auto updates are only available in packaged builds"* and the version is read locally.

Quick reference

Step	Action
1	Open the app scan loads and filters auto-apply
2	Review the per-segment filter labels across the top of the chart
3	Click Advanced to open editing tools
4	Remove stray outliers — Delete mode (click points) or Auto-Trim (scissors)
5	<i>(optional)</i> Edit/drag points, run Auto Tune , or Extend Profile
6	Need a clean slate? Reload discards all edits and re-filters
7	Click Confirm Profile to send the result to the machine
—	Keep the app current via the Wi-Fi icon → Check for Updates

Keyboard shortcuts: `+ / -` zoom · `← / →` pan · `R` reset view · `T` toggle Chart Tools · `Ctrl+Z` undo · `Ctrl+Y` redo

Safety

Click the **Deviation** read-out to show how far the edited curve sits from the raw scan, in mm².



Every time you click Confirm Profile, the app runs an automatic safety check that compares your edited profile against the original raw scan. The check exists to stop an unsafe or unintended profile from reaching the machine. If something looks wrong, a warning dialog appears and nothing is sent until you decide.

The 0.5 mm deviation limit

The most important check is maximum deviation: how far your Editing path strays from the Raw path at its worst point.

- If the maximum deviation is greater than 0.5 mm, confirmation raises an error:
We advise against running a profile that triggers this error. A deviation this large usually means the curve has been over-edited, over-smoothed, or pulled away from the true scanned shape — running it risks removing too much (or too little) material. Go back, reduce the edits in that region, and re-check before confirming.
- As an early heads-up, deviations above 0.35 mm (but still under the limit) show a yellow "High deviation — approaching limit" warning. Treat this as a prompt to double-check that area before you commit.
- The check is a confirmation gate, not a hard lock. The app warns you and explains why; the operator stays in control of the final decision. Only override it if you fully understand why the deviation is high and are confident the profile is correct.

Other reasons confirmation can be blocked

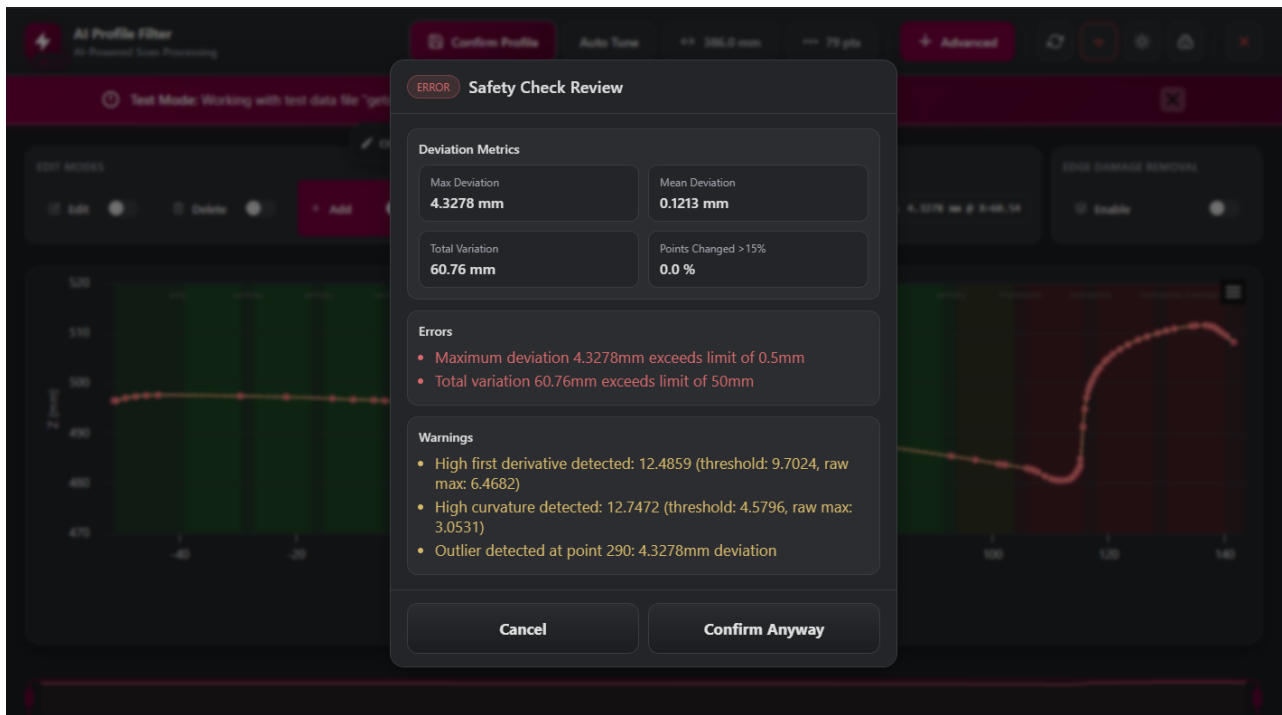
The same safety dialog can also appear for:

- Profile endpoints don't line up — the start or end X position of the edited profile no longer matches the raw scan (within 0.01 mm). This usually means points were added or deleted at the very ends.
- Too much total change — the overall amount of variation, or the percentage of points that were modified, is higher than allowed. Data integrity problems (missing, out-of-order, or invalid points)

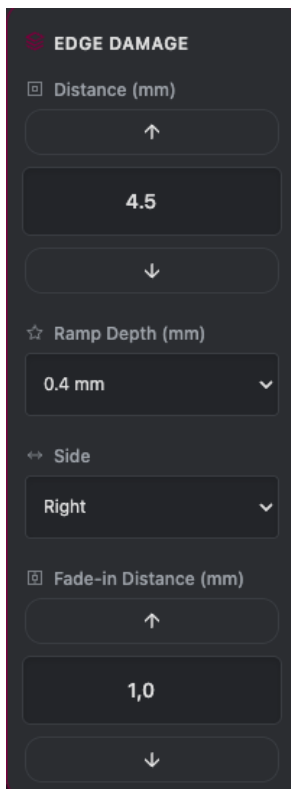
In every case the rule is the same: read the message, fix the flagged issue, and only confirm once the profile is clean. If validation passes with no warnings, the profile is sent to the machine and the app closes.

- Two different "deviation" numbers don't confuse them
- The live Deviation read-out in the Edit Modes bar is a total area figure, shown in mm².
- The safety check measures maximum deviation at a single point, in mm, and that is the value compared against the 0.5 mm limit.

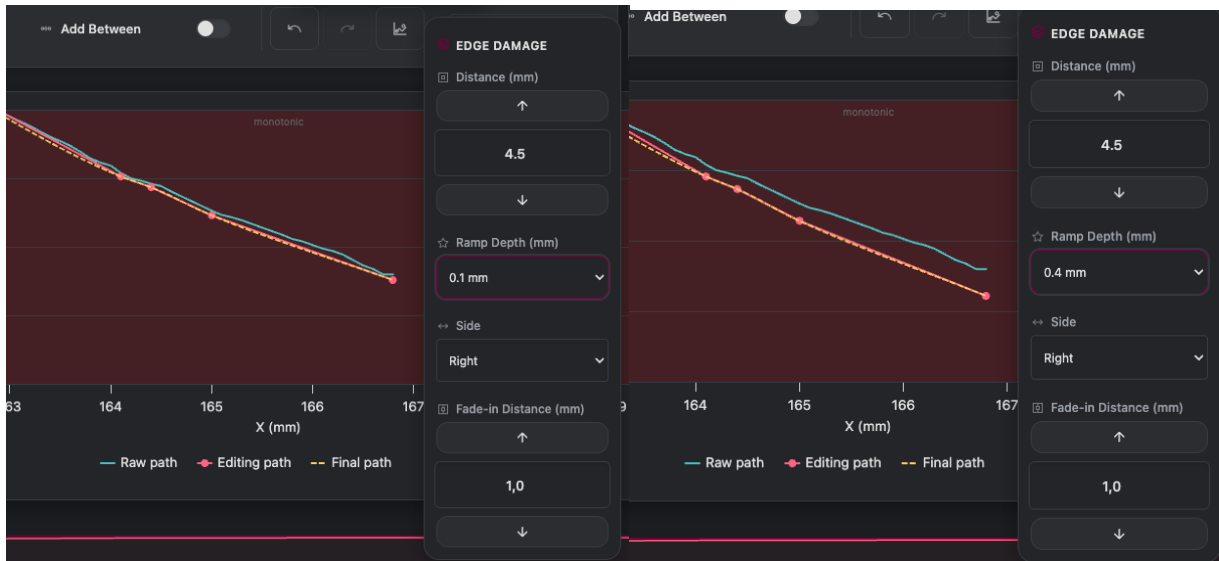
A small mm² read-out does not guarantee you're under the 0.5 mm safety limit a single sharp spike can pass the limit while the area figure still looks low. Always trust the Confirm-time check, not the live area read-out, for safety.



Edge Damage Removal



1. Turn on Edge Damage Removal.
2. Choose the Side that has damage (or Both).
3. Set Distance to cover how far the damage reaches.
4. Set Ramp Depth to how hard you need to pull the edge down.
5. Adjust Fade-in if the start of the ramp looks too sharp.
6. Review the profile and fine-tune.



Distance

How far in from the edge the cleanup reaches. This sets the width of the affected zone. A larger distance pulls down more of the profile near the end; a smaller distance only touches the very tip.

- Start around 4 mm (the default).
- Increase it if damage extends well into the part.
- Decrease it if only the extreme edge is bad and you want to keep as much real data as possible.

Ramp Depth

How much the edge gets lowered. This is the maximum drop, applied right at the edge and easing to zero where the zone meets your good data. It creates a smooth wedge so there's no step.

- Default is 0.2 mm; options are 0.1 / 0.2 / 0.3 / 0.4.
- Use a smaller depth for light edge cleanup.
- Use a larger depth when the edge is badly raised or damaged and needs to be pulled down more firmly.

Side

Which end to treat Left, Right, or Both.

- Pick Left or Right if only one end of your part has damage.
- Pick Both if both ends need cleanup.
- Default is Right.

Fade-in Distance

- How smoothly the cleanup begins at the edge. Without it, the deepest cut starts abruptly and can leave a small sharp corner. The fade eases that drop in gradually for a softer, more natural transition.
- Default is 0.5 mm.
- Higher = gentler, more gradual onset (recommended if you see a kink at the edge).
- 0 = no smoothing; a straight ramp with a sharp tip.