

Quality Analysis

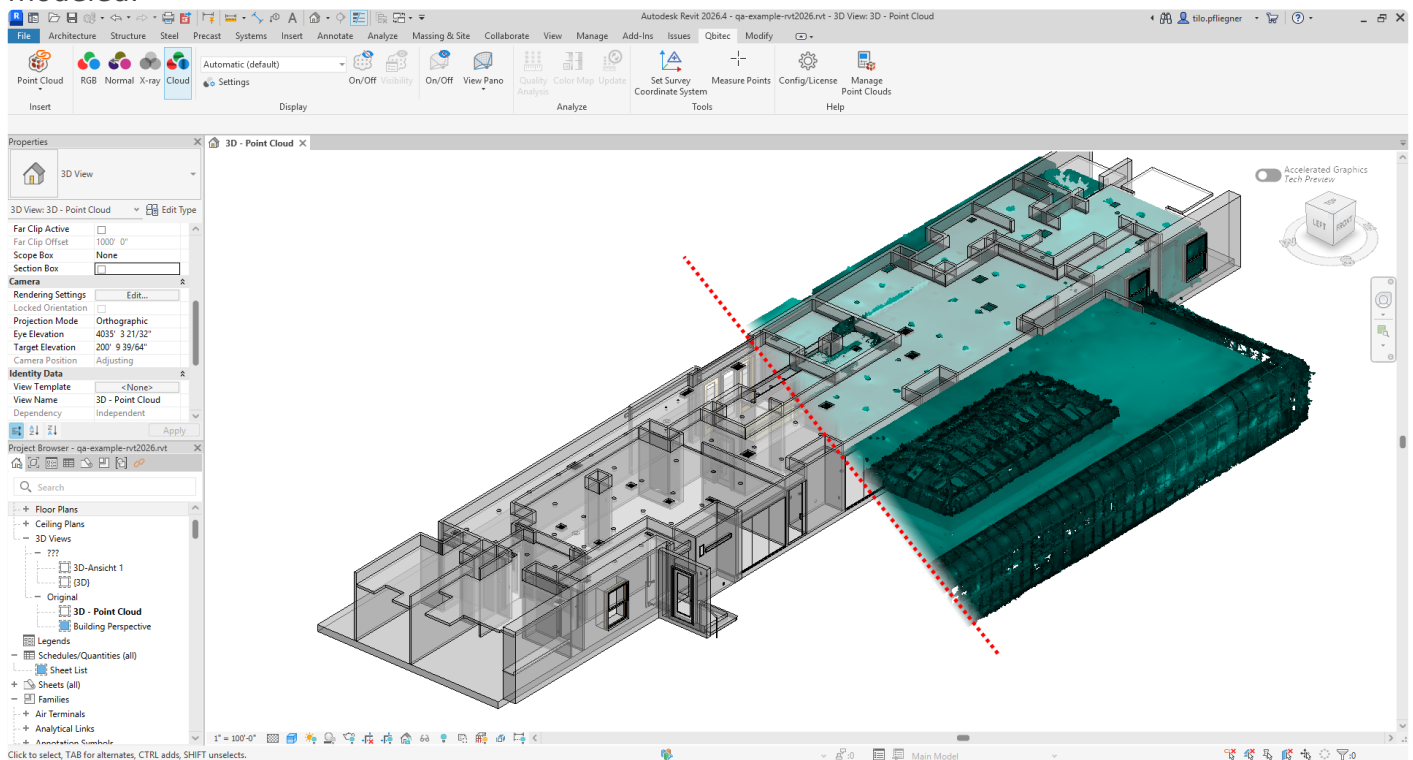
The **Quality Analysis** feature visualizes the distance between point cloud data and selected Revit geometry. It helps you check how closely your model matches the as-built condition by highlighting deviations with color-coded overlays.

- [Quick Start Guide](#)
- [Flatness and Deviation Checks](#)
- [Tolerance Checks](#)
- [Completeness Check](#)
- [Clash Detection](#)

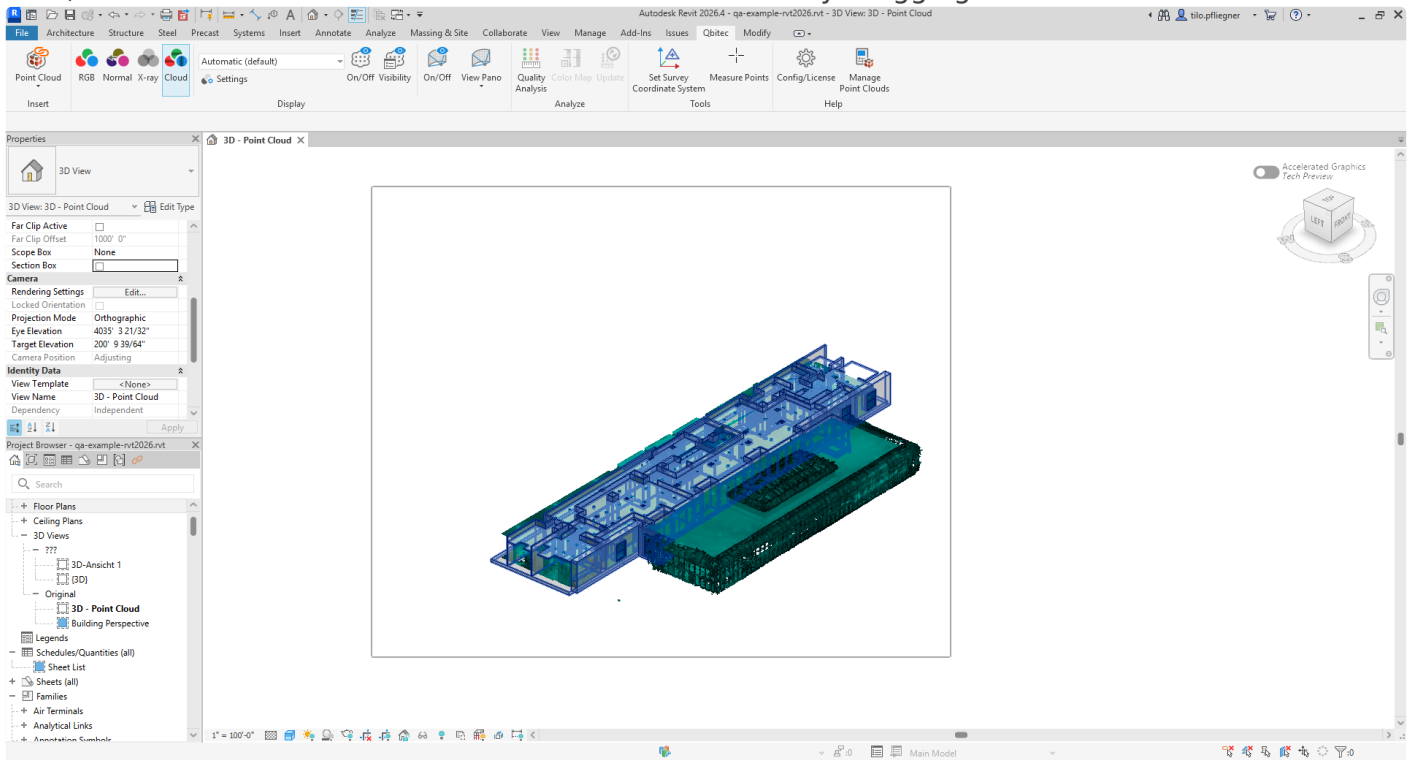
Quick Start Guide

This quick start guide walks you step by step through the quality analysis process, allowing you to quickly check your model against the point cloud using *flatness* and *deviation analysis*, *tolerance checks*, *clash detection*, and completeness checks - so you can identify issues early and ensure your data meets the required standards.

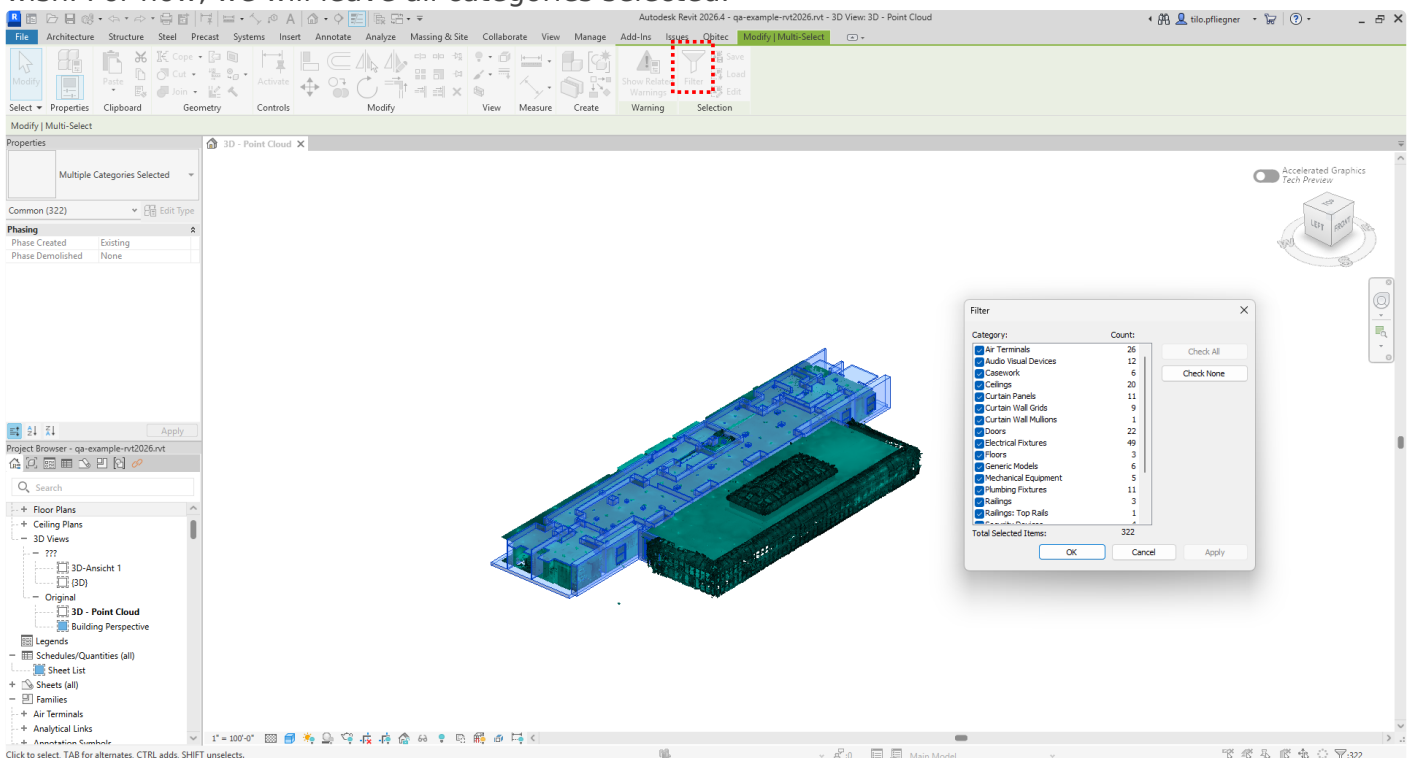
The following picture shows a small sample model taken from a larger hospitality project. The point cloud is colored in "Cloud" mode for better visibility, and the veranda at the front has not yet been modeled:



First, select all the visible Revit elements in the 3D view by dragging a selection window over them:



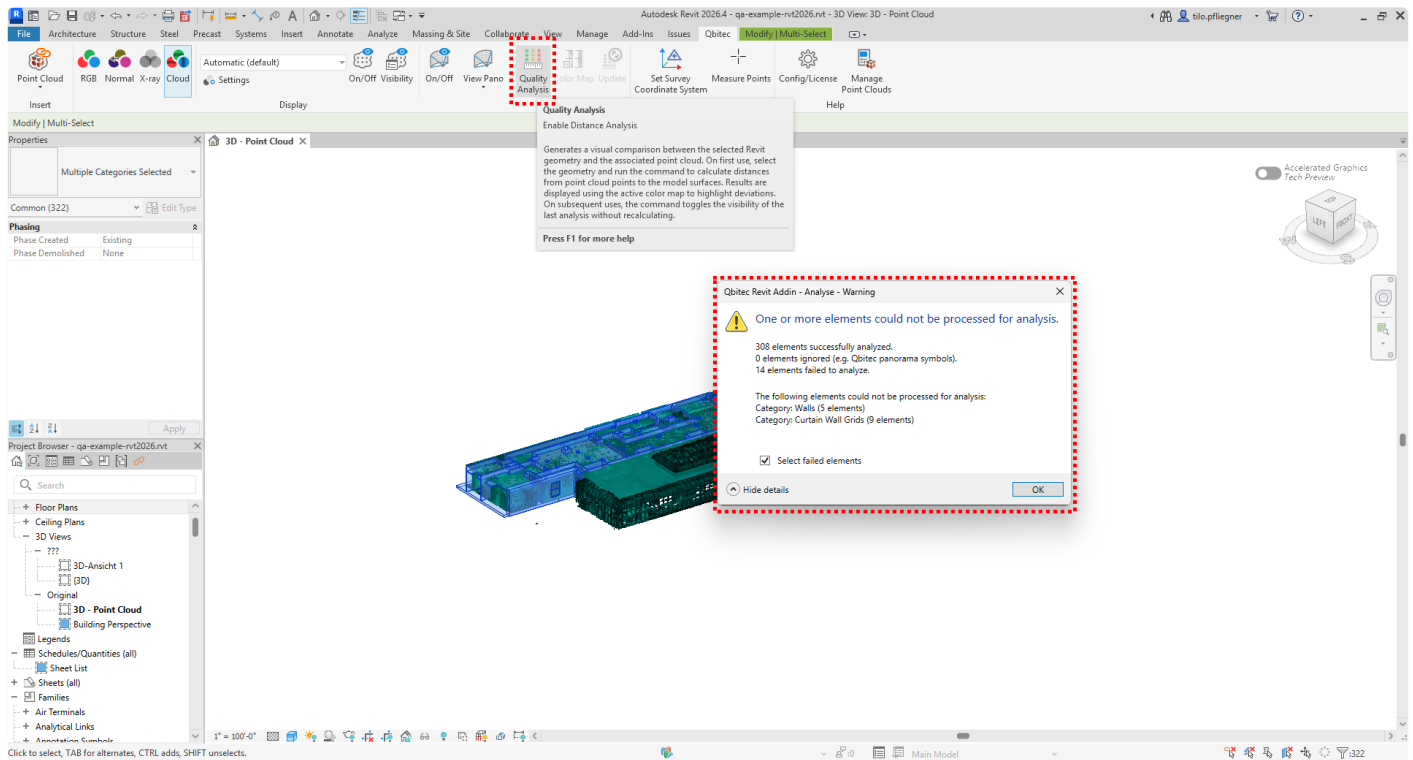
You can now optionally use Revit's Selection Filter to search for specific element categories, if you wish. For now, we will leave all categories selected:



In the Qbitech Ribbon click the **Quality Analysis** button. The geometry of the selected elements will be extracted. That might take up to a couple of seconds, depending on the amount of elements selected.

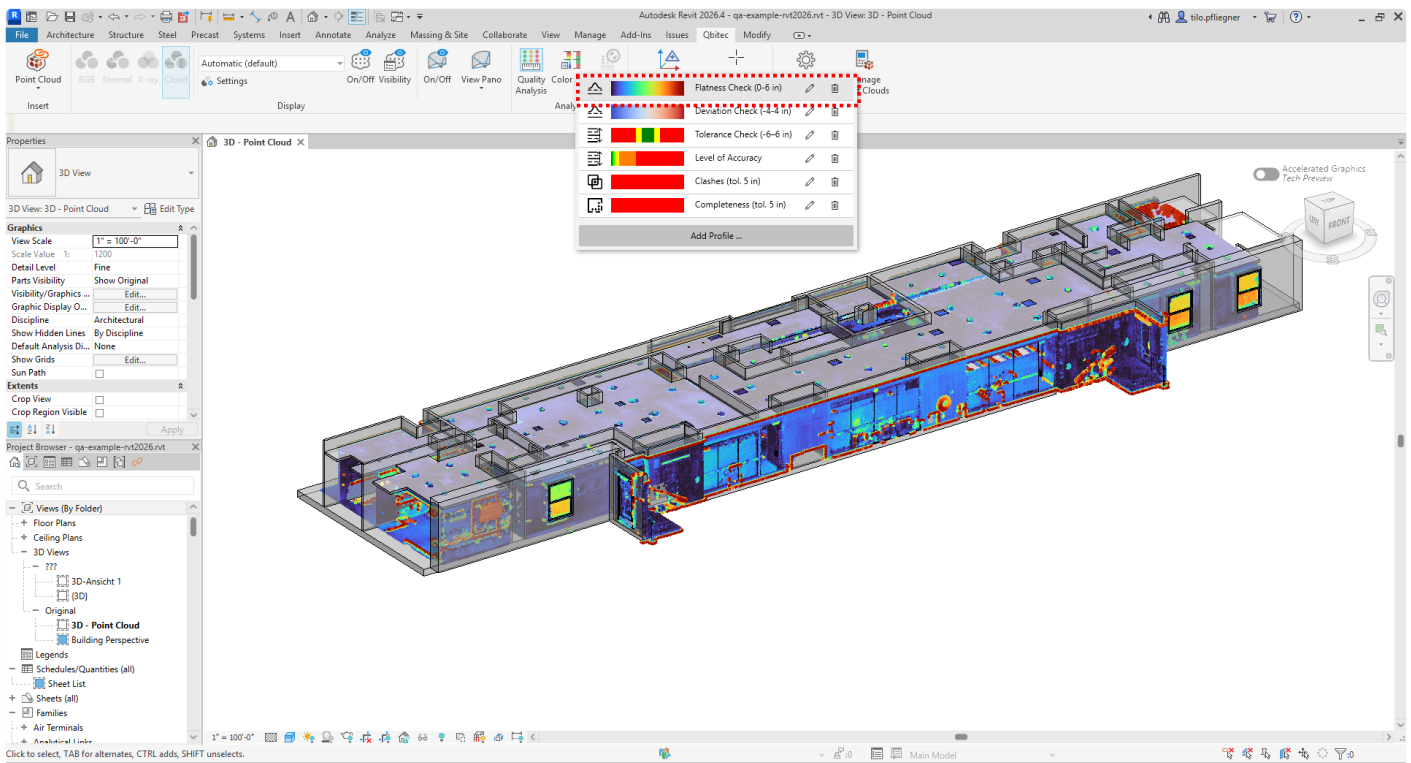
In some cases, certain elements may not provide usable geometry and therefore cannot be analyzed. In this case, a message will appear listing the successful, ignored, and failed elements.

Additionally, the failed elements can be selected for further review. Qbitec family symbols, such as panoramic images or measurement symbols, are ignored by default:



After confirming, the plugin now starts calculating the shortest distance from every point cloud point to all the selected elements.

Note: Distances are calculated dynamically. The analysis starts at a coarse level so results become visible quickly, and then refines to deeper levels to reveal finer details. For each point in the point cloud, the shortest distance to the selected Revit geometry is visualized based on the selected color map. A set of pre-defined color maps suitable for all use cases will be created, using the first one ("rainbow", Flatness check) as a default:



You can now switch between the different color maps and application scenarios, customize the color maps as you like, or add new ones. The color palettes are saved in the Revit project and are therefore available and ready to use at any time. The individual use cases are described in more detail on the following pages.

Toggle the visualization on or off anytime with the **Quality Analysis** button. When the quality analysis is reactivated, the geometry of the *previously selected elements will be reused*. If geometry changes or you want to analyze a different selection, pick the new elements and press the **Update** button to recalculate.

Note that the calculated distances and geometry used for quality analysis are not saved with the project and will be recalculated when the project is reopened.

Flatness and Deviation Checks

Intro

The **flatness check** is primarily used to verify the flatness of surfaces such as floors, walls, or ceilings. This is done by color-coding the deviations between the **point cloud** and the **model geometry**. This allows for the rapid identification of unevenness and discrepancies between the model (or specific components) and the point cloud to monitor construction quality or provide proof of standard-compliant tolerances.

Examples

- **Checking Floor Coverings and Ceilings:** Monitoring the flatness of screed, raw concrete floors, or ceilings.
- **Inspecting Walls:** Checking for bulges, inclinations, or misalignments.
- **Renovation Preparation:** Identifying depressions (dips) or elevations (humps) in existing buildings.

Procedure

1. **Select Revit elements** (e.g., floors, ceilings, or walls). Use Revit selection filter ("Modify --> Filter") to narrow down the selection by Category.
2. Click the **"Quality Analysis"** button.
3. The plugin extracts the geometry of the selected Revit elements and determines the **distance of all points** from these elements. The distances are mapped onto the active **color map** and displayed.
4. Select and edit color maps using the **"Color Map"** command.
5. If the analyzed geometry changes or you wish to analyze different geometry in the same view, select the corresponding elements and click **"Update"** to restart the calculation.
6. Toggle between the distance visualization and the normal view by turning the **"Quality Analysis"** button on or off.

Key features

Quality analysis can be performed in all view types that support point cloud display (3D, Floor or Ceiling Plans, Elevations, Sections). Each Revit view can be configured independently, allowing you to focus on specific elements, element categories, levels or rooms.

For documentation purposes the views can be placed on sheet views and printed or exported.

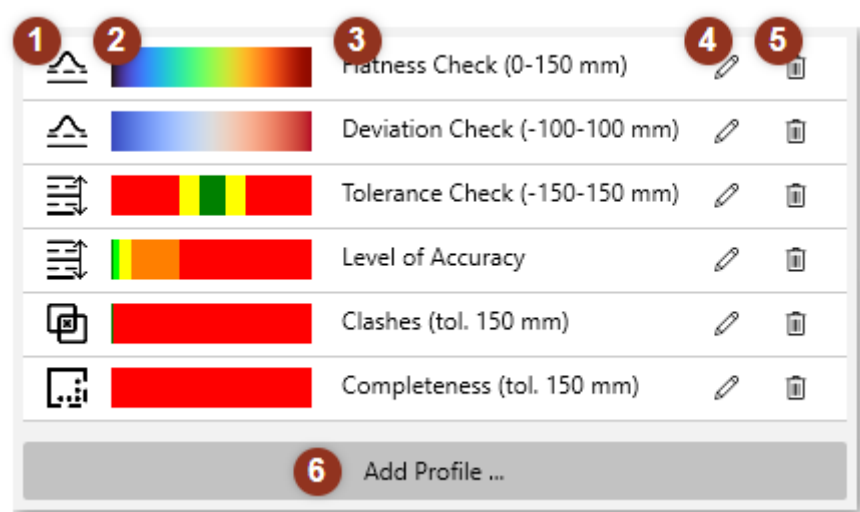
The distance calculations are performed dynamically, meaning only the points visible in the current view (from coarse to fine, following the Level-of-Detail scheme) are processed.

Calculated distances are not saved in the Revit project; they must be recalculated in a new Revit session.

Add and customize color maps

Use the "Color Map" command to add additional color maps or modify existing ones.

The color maps displayed in the list are saved in the Revit project and are therefore retained beyond the end of the session. When a Revit project is saved as a template file, the color palettes also become part of this Revit template.



(1) Color map symbol

	Flatness Check Evaluates the evenness of surfaces such as floors, walls, or ceilings by showing distance variations between the point cloud and model planes.
	Tolerance Check Highlights areas that exceed defined tolerance limits using a traffic-light color scheme, making it easy to identify in- and out-of-tolerance regions.
	Completeness Check Identifies scanned areas not covered by the model geometry, helping detect missing or unmodeled elements in as-built verification workflows.
	Clash Detection Reveals where modeled geometry overlaps with the point cloud beyond acceptable limits, useful for detecting construction conflicts or misalignments.

(2) Color Gradient

Displays the active color scale used for the selected analysis type. It visually represents how distance or deviation values are mapped to colors in the current Quality Analysis view.

(3) Name

Displays the active color scale used for the selected analysis type. It visually represents how distance or deviation values are mapped to colors in the current Quality Analysis view.

(4) Edit Icon

Opens the color map editor, where you can adjust the gradient, distance range, and thresholds or define new color transitions for custom analyses.

(5) Delete Icon

Removes the color map from the list. This action deletes the profile from the local configuration but does not affect active visualizations until refreshed.

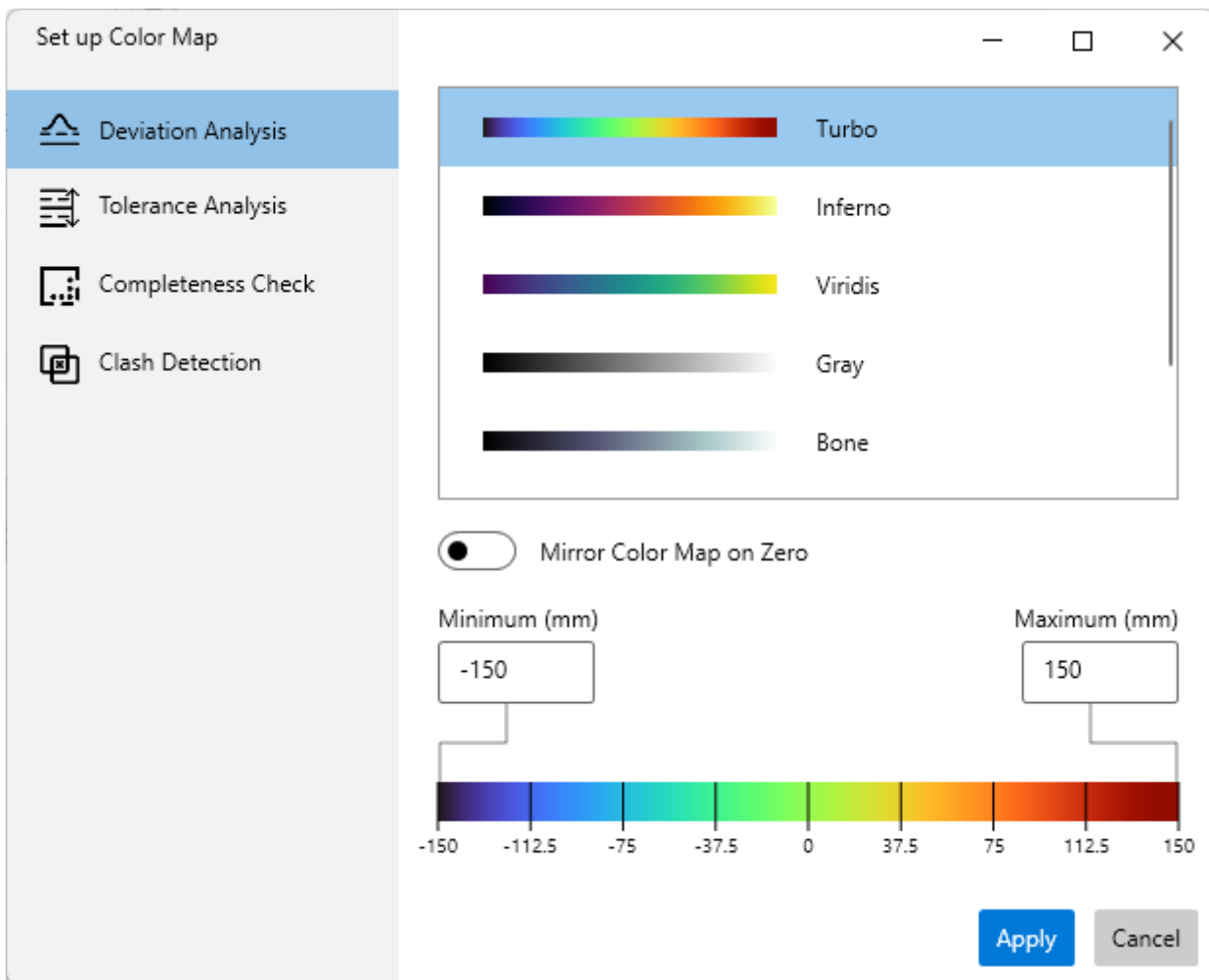
(6) Add Profile Button

Opens the color map editor to create a new color map profile. You can define a name, distance range, and gradient to suit specific analysis types, such as completeness or tolerance checks.

Color Map Editor

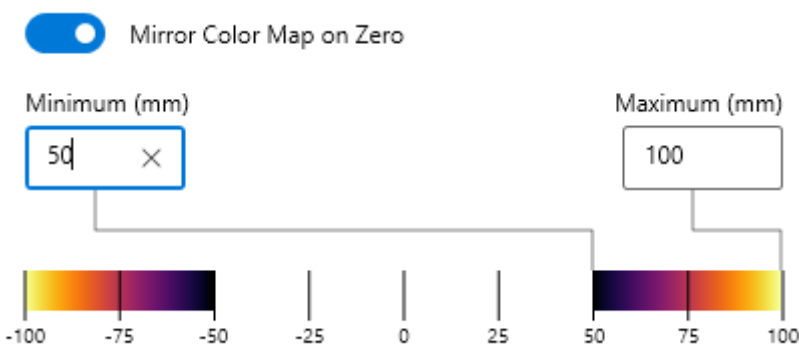
When adding a new color map or by choosing the pencil symbol  behind an existing one, the Color Map Editor window opens, and you can define the properties of the color map, including the color gradient and the range (minimum, maximum).

The Units for the minimum and maximum values are always specified in Millimeters [mm] or Inches [in], depending on the Revit project unit.



Select a color gradient from the list and specify the minimum and maximum distance values.

If **Mirror Color Map on Zero** is enabled, the minimum value must be non-negative (≥ 0). In this mode, positive and negative deviations (points lying above or below the surface) are treated symmetrically, and only the absolute distance values are used for coloring. If you set the minimum value to a number greater than zero, you can hide all points whose absolute distance is less than the minimum value, in this example 50 mm:

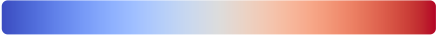


Color Maps - Deep Dive

For flatness analysis, **soft, multi-colored gradients** (e.g., Turbo) or **diverging color maps** (e.g., cool-to-warm) are recommended, as they fluidly represent the topography (peaks and valleys) of the surface. Color gradients suitable for flatness analysis are marked with the symbol 

Recommended Color Maps for Flatness Checks

Color Gradient	Name	
	Turbo	“Rainbow Colors.” Developed by Google as an improved alternative to “Jet.” Turbo retains the vibrant, high-contrast colors of the rainbow to make fine details visible, but without sudden changes in brightness that can cause edges to appear. Note: It is not completely perceptually uniform and is not colorblind-safe.
	Inferno (1) (2)	Smoothly transitions from black through fiery reds and oranges to bright yellow. It is highly effective for highlighting high-intensity data in heatmaps while remaining colorblind-friendly and printing well in grayscale.
	Viridis (1) (2)	Smoothly transitions from dark purple through blue and green to bright yellow. It is specifically designed to be colorblind-friendly and perfectly legible when printed in grayscale, making it a highly reliable standard for scientific data visualization.
	Gray (2)	Visualizes the distances without distracting color associations.
	Bone (2)	Grayscale-based colormap with a subtle blue and warm gray tint that progresses from black to white. It is the standard choice for medical imaging (like X-rays and MRIs) - that's where name comes from - because its slight coloration is easier on the eyes than pure grayscale.
	Red-White-Blue	Red-white-blue is a classic diverging colormap that transitions from deep red through a pure white center to deep blue. It is ideal for flat 2D visualizations where you want a critical midpoint (like zero) to fade into a white background, heavily emphasizing extreme positive and negative anomalies.

Color Gradient	Name	
	Cool to Warm (1) (2)	Cool-to-warm is a diverging colormap that shifts from cool blue to warm red through a desaturated, neutral light gray rather than pure white. This design prevents middle data values from washing out or confusing the eye when compared to white background.

(1) **Perceptually uniform**, meaning that equal numerical changes in distance are perceived by the human eye as equally sized changes in color and brightness.

(2) **Color-blind friendly**, meaning that individuals with color vision deficiencies can accurately distinguish data values by relying primarily on steady changes in brightness rather than problematic color contrasts like red and green.

Diverging color charts (Red-White-Blue, Cool to Warm) are typically created with symmetrical boundaries, e.g., min = -20 mm, max = +20 mm. This means that values around zero are displayed in the respective neutral color, white (red-white-blue) or light gray (cool-to-warm).

Tolerance Checks

Highlight regions outside your defined project tolerances.

Completeness Check

Use the Completeness Check to ensure all scanned elements are covered by the model.

Clash Detection

Reveal unexpected overlaps or gaps between modeled and scanned data.