PhotoModeler SmartMatch Assist with Coded Target Projects

PhotoModeler SmartMatch, available in PhotoModeler Premium and PhotoModeler Standard (since Dec 2023), is a tool for automating project solutions and for the orientation of photos without targets or manual intervention. SmartMatch relies on identifying natural, random textures in the photos to perform matching.

SmartMatch in Coded Target Projects

Why use SmartMatch and Coded Targets together? Consider their strengths and weaknesses:

	Coded Targets	**SmartMatch**
Requires target placement	Yes	No
Surface compatibility	Any surface that can hold targets	Requires a surface with random texture
Accuracy	High accuracy	Varies
Suitability for creating Planes	The best method	Varies
Photography	Enough photos to capture target overlap	Typically requires more photos with smaller angles
Processing Speed	Faster	Slower / Longer
Resulting 3D Data	Points on the Coded Targets	Generates a denser point cloud depending on surface texture

You might use SmartMatch with a Coded Target project in two scenarios:

1. When photo overlap is insufficient, and not all photos orient using coded targets alone (indicated by a red 'X' after the initial solution).
2. When most of the photos were solved with the coded targets but there is an error in linking the photos due to an incomplete photo set. This can occur with photo sets arranged in a 'U' shape (ideally an 'O' shape) or an 'H' shape (requiring a more complete 'B' shape coverage, as viewed from above). Lower accuracy can result when connection is lacking in the photos.

One note when using SmartMatch in a Coded Target Project – SmartMatch requires random texture (think dirt, wood, concrete, bricks) but coded targets are not random (nice sharp black and white corners). This means the coded targets may cause issues with SmartMatch but if there is enough other texture in the photos it may work. Highly reflective surfaces (e.g., boat gel coat, shiny metal) often lack the texture required for SmartMatch.

Note that in a weak project with small photo overlap and not enough random photographic texture, SmartMatch may produce incorrect results (poor photo orientations). It is good to review the results. SmartMatch is something to try before you retake your photos in a coded target project that is not solving.

How to use SmartMatch in a Coded Target Project

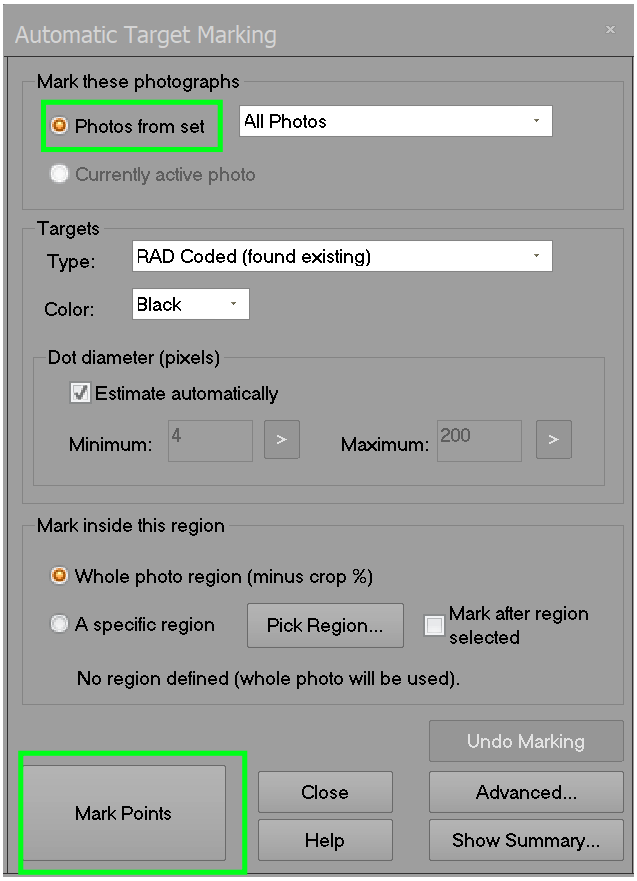
There are two approaches to using SmartMatch based on order. You can run a SmartMatch project first, and then manually run the coded target detection, or run a Coded Target project first, and then manually run the SmartMatch detection and processing. Currently, PhotoModeler does not offer a combined workflow that runs both SmartMatch and Coded Target processing simultaneously; however, this functionality may be added in the future.

Running SmartMatch first

If a standard Coded Target project results in many unsolved photos (indicated by a red 'X'), if this is due to photo overlap issues, and there are enough photos with texture, you can re-start the project running it as a SmartMatch project to see if more photos solve. If more photos solve using SmartMatch, you can then manually process coded targets following the steps below.

Assuming a SmartMatch project has been run, to run coded targets manually in a solved SmartMatch project do this:

1. Find the “Automatic Target Marking” tool. In the “Create [Targets]” toolbar tab, or in the Tool Search.



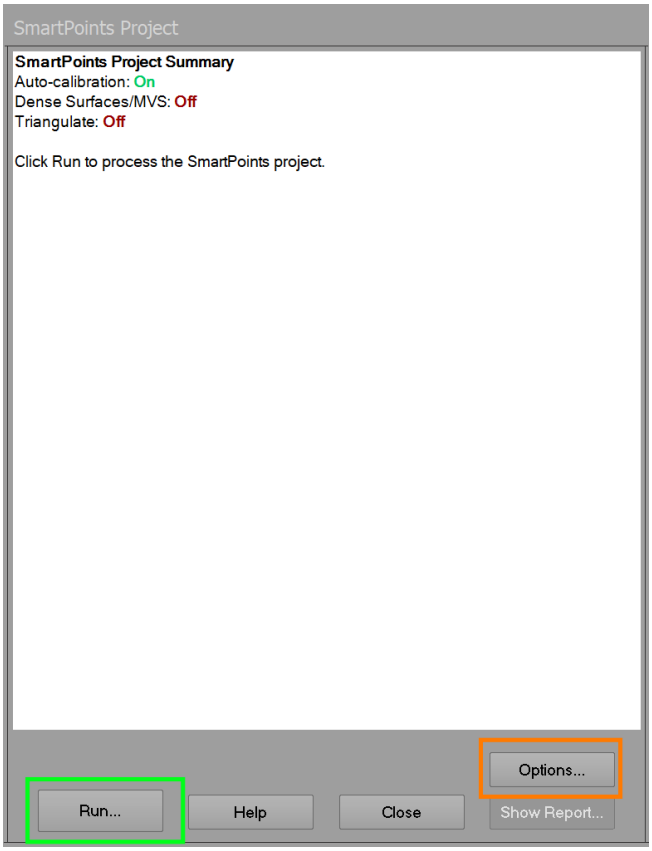
2. The default settings in this dialog are generally suitable. Do pick the “Photos from set: All Photos” option.
3. Press the Mark Points button.
4. A progress dialog will appear as all the photos are searched for coded targets.
5. After it is complete the dialog will tell you how many targets were marked (above the Mark Points button).
6. Press Close.
7. Consider opening the 3D viewer to examine the coded points, apply a preset for scaling, and analyze the maximum residual values.

Running Coded Targets first

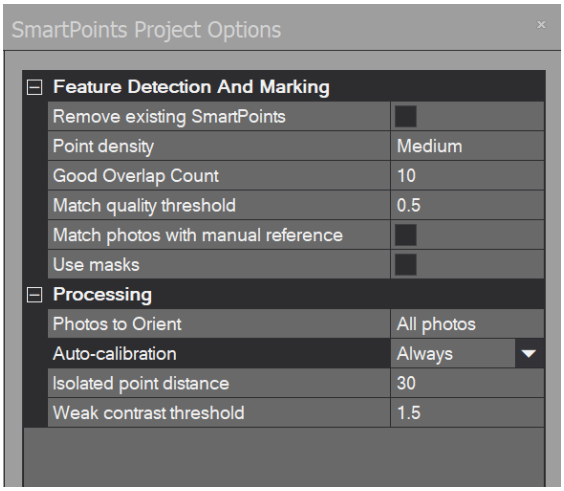
This would be the typical scenario where you have run a Coded Targets project and the results were not as expected (not enough oriented photos, or it has accuracy and scale issues). This approach is also suitable if you have already begun outlining and modeling in a coded target project and wish to preserve that work.

To run SmartMatch manually in a solved Coded Target project do this:

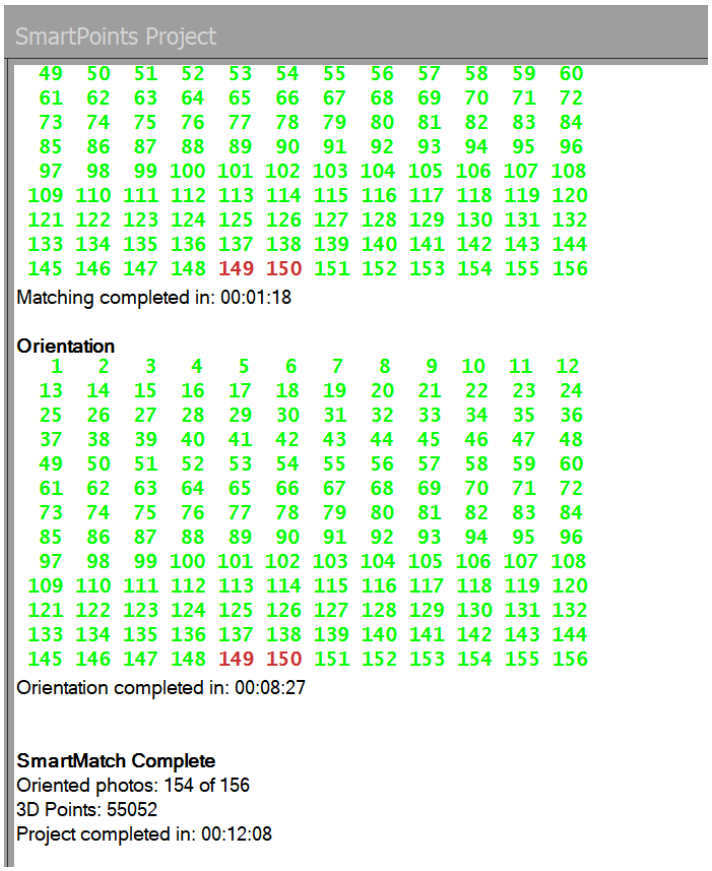
1. Load your solved Coded Target project.
2. Find the SmartMatch tool (Tool Search is a fast way).
3. The SmartMatch dialog, titled 'SmartPoints Project', appears as follows:



4. First click on the Options button. The option dialog opens:



5. Change these options:
    a. Photos to Orient: All photos (this restarts the orientation process from scratch, though it may not always be necessary).
    b. Auto-calibration: Always (depending on the project, re-running auto-calibration with the SmartMatch data can improve results if the original Coded Target project used auto-calibration as well).
6. Close the Options and press Run... on the main dialog. The process will look like this:



7. Green numbers indicate successfully oriented/solved photos. A few red (unsolved) photos are usually acceptable.
8. After closing the dialog and saving the project, review the statistics (e.g., check distance table, residuals, etc) to assess project improvement.
