

Minolta VIVID Scanner Plugin

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For a list of Minolta devices and Geomagic software products with which this plugin is compatible, see *Release Notes for Geomagic Minolta VIVID Plugin*.

The Minolta devices that are compatible with this plugin are non-contact 3D digitizers that scan an object on or without a turntable. [See Konica Minolta Photo Imaging U.S.A., Inc. at www.minoltausa.com.]

The purpose of this (or any) scanner plugin is to eliminate the need to import scan data into Geomagic products. With the plugin, scanned data exists in the Geomagic Model Manager immediately after the data capture process.

Hardware > Scan > Minolta VIVID integrates data capture and processing into the Geomagic user interface. (This menu item in Geomagic products is an optional, separately licensed feature. If **Minolta VIVID** does not already appear on the Plugins menu, download the software from support.geomagic.com, install it according to simple instructions on the web site, and re-start this procedure.)

Table of Contents	
Controls and Indicators	page 2
Scan function	
Photogrammetry function	
Step-by-Step Procedures	page 8
Simple Scan with Turntable	page 8
Photogrammetry With .CSV File	page 8
Photogrammetry With Target Registration	page 9

Controls and Indicators

The **Sample Scan** dialog has the following controls and indicators.

-  **Scan** group - controls the scanner.
 - **Display Units** group -
 - **Units** dropdown (such as Inches, Millimeters, Centimeters ...) specifies the units of measure on the object that will be scanned, such as inches or millimeters.
 - **Turn Table** group - controls the behavior of the turntable
 - **Turntable** dropdown - specifies the model number of the turntable in use.
 - **Com Port** dropdown - specifies the COM port to which the turntable is connected.
 - **Scan Mode** (Single, Multishot, Continuous):
 - **Single** - This mode can be used to take individual shots, and is the only mode available when the turntable is disabled.
 - **MultiShot** - causes the turntable to rotate by **Step** degrees and a new scan to take place every time the user presses **Next**. During a MultiShot process, click **Next** to move on to the next scan, or adjust the parameters and click **Scan** to re-scan the object at its current position.
 - **Continuous** - is similar to MultiShot mode except that scanning and rotation are non-stop (without pressing **Next**) until the **Current Position** reaches 360 degrees or less (until **Step** would cause **Current Position** to exceed 360 degrees).
 - **Current Position** decimal field - controls rotation of the turntable.
 - **Step** decimal field - specifies the increment of change of the turntable upon each new scan.
 - **Reset Axis** button - declares the current position of the turntable to be the "home" position. Subsequent movements are relative to this "home" position.
 - **Calibrate** button - calibrates the turntable (finds the axis of rotation). When prompted, install the calibration plate onto the turntable.
 - **Camera Control** group (when Advanced Options > Configure > Vivid Model is **9i**) -
 - **Image Focus** button - automatically focuses the camera on the subject.
 - **Auto Focus** checkbox - Specifies whether the camera uses automatic focusing. When **Auto Focus** is turned off, use the **Distance** control to focus manually.

- **Distance** integer field (600 to 3000 millimeters; applicable when **Auto Focus** is Off) - specifies the distance between the lens and the focal point.
- **Auto Intensity** checkbox (default On) - specifies that the beam intensity be selected by software based on reflectivity of the object. When deactivated, set **Laser Power** and **Gain** by hand.
 - **Laser Power** integer field (0 to 100; applicable when Auto Intensity is off) - controls the intensity of the laser beam. Higher intensity is suitable for darker colors, lower intensity for lighter colors.
 - **Gain** integer field (0 to 100; applicable when **Auto Intensity** is off and **Laser Power** is at 100) - controls the intensity of the CCD gain. Use CCD gain only when Laser Power of 100 is insufficient because the object reflects light, transmits light, or has low reflectance for red and similar colors.
- **Auto Brightness** radio button and thumbwheel - specifies that image brightness be set automatically, or allows manual setting.
 - **Brightness** integer field (0 to 14; when Auto Brightness is not checked) - specifies the brightness.
- **Advanced Options** checkbox - activates the following advanced settings.
 - **Advanced Camera Control** group - describes the hardware setup:
 - **Calibrate New Lens** button - Press this after installing a new lens on the camera. Be sure to install the calibration fixture before pressing this button.
 - **Multi Power Setting** checkbox and **Scans** integer field - specifies that n varying-intensity passes of the laser beam be made at every angle to improve color detection. Otherwise, one scan is performed at each angle.
 - **Filter** dropdown - specifies the type of hardware filter to use: None, Noise Filter, High Quality Filter, or both.
 - **Remove** dropdown - activates a hardware-based scan angle filter. A scan angle filter removes data points whose normal exceeds a given angle away from the camera's direction of view.
- **Scanning Options** group -
 - **Name** (text field) - is the name assigned to the next scan. By default, the **Name** is "Scan" with a suffix assigned by the movement device (such as a turntable). For example, a turntable device might append a suffix of "-180".
 - **Scan** button - initiates a laser scan named in the **Name** field. To re-scan an object from a given angle, press **Scan** instead of **Next**.
 - **Next** button - saves the previous scan in the Geomagic Model Manager. The function of **Next** depends on the **Scan Mode** in the **Turntable** group:

- when **Scan Mode** is Single, saves the previous scan in the Geomagic Model Manager.
- when **Scan Mode** is MultiShot, saves the previous scan in the Geomagic Model Manager, increments the *degree* part of **Name** by the amount configured at **Rotation Step**, and rotates the turntable by that amount. When you are ready for the next scan, click **Scan**.
- when **Scan Mode** is Continuous, saves the first scan in the Geomagic Model Manager, increments the *degree* part of **Name** by the amount configured at **Rotation Step**, rotates the turntable by that amount, initiates another laser scan, and continues according to the description of continuous scan mode below.
- **Abort** button - aborts any scan that was started when the **Scan Mode** in the **Turntable** group of controls is Continuous.
- **Show Current Scan Only** checkbox - specifies whether to show only the most recent scan in the Viewing Area, or a composite of all scans. This is useful in determining the quality of the most recent scan.
- **Scan Angle Filter** decimal field (0 to 90 degrees; default 75.0) - specifies the “maximum divergence from perpendicular” of surfaces whose points are to be captured. A point whose surface normal is more than **Angle** degrees away from parallel to the beam direction will be ignored. Example: If you are scanning a ball at an **Angle** of 75 degrees, scan data would be collected from points whose normal is up to 75 degrees away from the closest point to the camera (for a total of 150 degrees across the face of the ball).
- **Live Image Display** group -
 - **Show/Hide Live Image Window** button - specifies whether to display a separate Image Viewer window containing a color image of the object and a color-encoded range map of the object.
 - **Stream** checkbox - specifies whether to update the color image in real time, useful while the operator positions an object in the scanner’s field of view.
 - **Update** button - updates the color image and the color-encoded range map immediately.
- **OK** button - saves a scanned object to the Model Manager and closes the dialog.
- **Cancel** button - terminates the dialog without saving data to the Model Manager.
-  **Photogrammetry** group (only for 9i hardware) - controls the scanner in photogrammetry mode. Photogrammetry is a feature that assembles multiple scans of a large physical object into a single data object, based on the registration of target points that are affixed to the physical object.
 - **Display Units** group -

- **Units** dropdown (such as Inches, Millimeters, Centimeters ...) specifies the units of measure on the object that will be scanned, such as inches or millimeters.
- **Turn Table** group - controls the behavior of the turntable
 - **Turntable** dropdown - specifies the model number of the turntable in use.
 - **Com Port** dropdown - specifies the COM port to which the turntable is connected.
 - **Scan Mode** (Single, Multishot, Continuous):
 - **Single** - This mode can be used to take individual shots, and is the only mode available when the turntable is disabled.
 - **MultiShot** - causes the turntable to rotate by **Step** degrees and a new scan to take place every time the user presses **Next**. During a MultiShot process, click **Next** to move on to the next scan, or adjust the parameters and click **Scan** to re-scan the object at its current position.
 - **Continuous** - is similar to MultiShot mode except that scanning and rotation are non-stop (without pressing **Next**) until the **Current Position** reaches 360 degrees or less (until **Step** would cause **Current Position** to exceed 360 degrees).
 - **Current Position** decimal field - controls rotation of the turntable.
 - **Step** decimal field - specifies the increment of change of the turntable upon each new scan.
 - **Reset Axis** button - declares the current position of the turntable to be the "home" position. Subsequent movements are relative to this "home" position.
 - **Calibrate** button - calibrates the turntable (finds the axis of rotation). When prompted, install the calibration plate onto the turntable.
- **Camera Control** group (when Advanced Options > Configure > Vivid Model is **9i**) -
 - **Image Focus** button - automatically focuses the camera on the subject.
 - **Auto Focus** checkbox - Specifies whether the camera uses automatic focusing. When **Auto Focus** is turned off, use the **Distance** control to focus manually.
 - **Distance** integer field (600 to 3000 millimeters; applicable when **Auto Focus** is Off) - specifies the distance between the lens and the focal point.
 - **Auto Intensity** checkbox (default On) - specifies that the beam intensity be selected by software based on reflectivity of the object. When deactivated, set **Laser Power** and **Gain** by hand.
 - **Laser Power** integer field (0 to 100; applicable when Auto Intensity is off) - controls the intensity of the laser beam. Higher intensity is suitable for darker colors, lower intensity for lighter colors.

- **Gain** integer field (0 to 100; applicable when **Auto Intensity** is off and **Laser Power** is at 100) - controls the intensity of the CCD gain. Use CCD gain only when Laser Power of 100 is insufficient because the object reflects light, transmits light, or has low reflectance for red and similar colors.
- **Auto Brightness** radio button and thumbwheel - specifies that image brightness be set automatically, or allows manual setting.
 - **Brightness** integer field (0 to 14; when Auto Brightness is not checked) - specifies the brightness.
- **Advanced Options** checkbox - activates the following advanced settings.
 - **Advanced Camera Control** group - describes the hardware setup:
 - **Calibrate New Lens** button - Press this after installing a new lens on the camera. Be sure to install the calibration fixture before pressing this button.
 - **Multi Power Setting** checkbox and **Scans** integer field - specifies that n varying-intensity passes of the laser beam be made at every angle to improve color detection. Otherwise, one scan is performed at each angle.
 - **Filter** dropdown - specifies the type of hardware filter to use: None, Noise Filter, High Quality Filter, or both.
 - **Remove** dropdown - activates a hardware-based scan angle filter. A scan angle filter removes data points whose normal exceeds a given angle away from the camera's direction of view.
 - **Scanning Options** group -
 - **Name** (text field) - is the name assigned to the next scan. By default, the **Name** is "Scan" with a suffix assigned by the movement device (such as a turntable). For example, a turntable device might append a suffix of "-180".
 - **Scan** button - initiates a laser scan named in the **Name** field. To re-scan an object from a given angle, press **Scan** instead of **Next**.
 - **Next** button - saves the previous scan in the Geomagic Model Manager. The function of **Next** depends on the **Scan Mode** in the **Turntable** group:
 - when **Scan Mode** is Single, saves the previous scan in the Geomagic Model Manager.
 - when **Scan Mode** is MultiShot, saves the previous scan in the Geomagic Model Manager, increments the *degree* part of **Name** by the amount configured at **Rotation Step**, and rotates the turntable by that amount. When you are ready for the next scan, click **Scan**.
 - when **Scan Mode** is Continuous, saves the first scan in the Geomagic Model Manager, increments the *degree* part of **Name** by the amount configured at **Rotation Step**, rotates the turntable by that

amount, initiates another laser scan, and continues according to the description of continuous scan mode below.

- **Abort** button - aborts any scan that was started when the **Scan Mode** in the **Turntable** group of controls is Continuous.
- **Show Current Scan Only** checkbox - specifies whether to show only the most recent scan in the Viewing Area, or a composite of all scans. This is useful in determining the quality of the most recent scan.
- **Scan Angle Filter** decimal field (0 to 90 degrees; default 75.0) - specifies the “maximum divergence from perpendicular” of surfaces whose points are to be captured. A point whose surface normal is more than **Angle** degrees away from parallel to the beam direction will be ignored. Example: If you are scanning a ball at an **Angle** of 75 degrees, scan data would be collected from points whose normal is up to 75 degrees away from the closest point to the camera (for a total of 150 degrees across the face of the ball).
- **Photogrammetry Options** group -
 - **Use Target Registration** checkbox and **Matching Sensitivity** slider - causes every new scan to be registered with the one or more existing scans. Each new scan must have three or more stickers in common with an existing scan. The slider controls the perfectness of the match that must exist between the three (or more) stickers in common. Typically, leave the slider in the middle. When **Use Target Registration** is not checked, the scans do not register automatically.
- **Live Image Display** group -
 - **Show/Hide Live Image Window** button - specifies whether to display a separate Image Viewer window containing a color image of the object and a color-encoded range map of the object.
 - **Stream** checkbox - specifies whether to update the color image in real time, useful while the operator positions an object in the scanner’s field of view.
 - **Update** button - updates the color image and the color-encoded range map immediately.
- **OK** button - saves a scanned object to the Model Manager and closes the dialog.
- **Cancel** button - terminates the dialog without saving data to the Model Manager.

Step-by-Step Procedures

- [Simple Scan with Turntable](#) on page 8
- [Photogrammetry With .CSV File](#) on page 8
- [Photogrammetry With Target Registration](#) on page 9

Simple Scan with Turntable

1. Click the Minolta icon  , or select **Hardware > Scan > Minolta VIVID** on the Geomagic ribbon.
2. Perform any necessary calibration of the turntable (if any).
3. Place an object on the turntable.
4. Set the **Show/Hide Live Image Window** checkbox, and check **Stream** in the **Live Image Display** group. Move the object on the turntable until the object is well framed in the Image Window.
5. Hide the live image window by clicking **Show/Hide Live Image Window**.
6. Press the **Scan** button in the **Scanning Options** group. See the first scan in the Viewing Area.
7. Press **Next**. The turntable moves as configured. A scan is performed, and the second set of scan data appears in the Viewing Area.
8. Check **Show Current Scan Only** to see a separation of the first scan and second scan.
9. Un-check **Show Current Scan Only**.
10. Perform additional scans at new angles by pressing **Next** several more times, allowing time for each scan to complete.
11. The several scans appear in the Viewing Area to be a single merged object, but they are not. They are simply a set of scans that occupy the same position in space.
12. Press **OK**.
13. Click the Model Manager tab to see that each individual scan appears as a separate object. To create a single merged object, use **Points > Merge**.

Photogrammetry With .CSV File

This procedure assumes familiarity with photogrammetry, including how to apply target stickers/magnets to the object.

1. Click the Minolta icon  , or select **Hardware > Scan > Minolta VIVID** on the Geomagic ribbon.
2. Place the black and white calibration chart on the turntable, click **Calibrate**, wait for the center axis to appear in the Viewing Area, and remove the chart from the turntable.

3. Using the live image in the Work screen as a guide, place the object on the turntable in the camera's field of view. Ensure that three or more targets are visible to the camera.
4. Verify that the **Use Target Registration** checkbox is *not* checked (because this function would override the registration that will be performed by the Minolta scanner).
5. Press the **Scan** button in the **Scanning Options** group.
6. At the prompt, click **Specify Target Location** and click **OK**. Enter the name of a .csv file to load. This file contains target information from a digital camera.
7. See the first scan in the Viewing Area.
8. Press **Next**. The turntable moves as configured. A scan is performed, and the second set of scan data appears in the Viewing Area.
9. Check **Show Current Scan Only** to see a separation of the first scan and second scan.
10. Un-check **Show Current Scan Only**.
11. Perform additional scans at new angles by pressing **Next** several more times, allowing time for each scan to complete.
12. The several scans appear in the Viewing Area to be a single merged object, but they are not. They are simply a set of scans that occupy the same position in space.
13. On the main Minolta Scan dialog, press **OK** to accept the photogrammetry session and close the plugin. All individual scans are saved to the Model Manager.
14. To create a single merged object, use **Points > Combine > Merge**.

Photogrammetry With Target Registration

This procedure assumes familiarity with photogrammetry, including how to apply target stickers/magnets to the object.

1. Click the Minolta icon  , or select **Hardware > Scan > Minolta VIVID** on the Geomagic ribbon.
2. Place the black and white calibration chart on the turntable, click **Calibrate**, wait for the center axis to appear in the Viewing Area, and remove the chart from the turntable.
3. If you want the upcoming scans to be registered automatically as the data is collected, check the **Use Target Registration** checkbox. If not, you will register them manually at Step 13. In most cases, check the checkbox.
4. Press the **Scan** button in the **Scanning Options** group.
5. At the prompt, click **Detect Targets For Target Registration**, then click **OK**.
6. See the first scan in the Viewing Area.

7. Press **Next**. The turntable moves as configured. A scan is performed, and the second set of scan data appears in the Viewing Area.
8. Check **Show Current Scan Only** to see a separation of the first scan and second scan.
9. Un-check **Show Current Scan Only**.
10. Perform additional scans at new angles by pressing **Next** several more times, allowing time for each scan to complete.
11. The several scans appear in the Viewing Area to be a single merged object, but they are not. They are simply a set of scans that occupy the same position in space.
12. On the main Minolta Scan dialog, press **OK** to accept the photogrammetry session and close the plugin. All individual scans are saved to the Model Manager.
13. Only if the **Use Target Registration** checkbox was not checked, register the Point Datums on the several scans by using **Alignment > Scan Alignment > Target Registration**, then create a composite object by using **Points > Combine > Merge**.