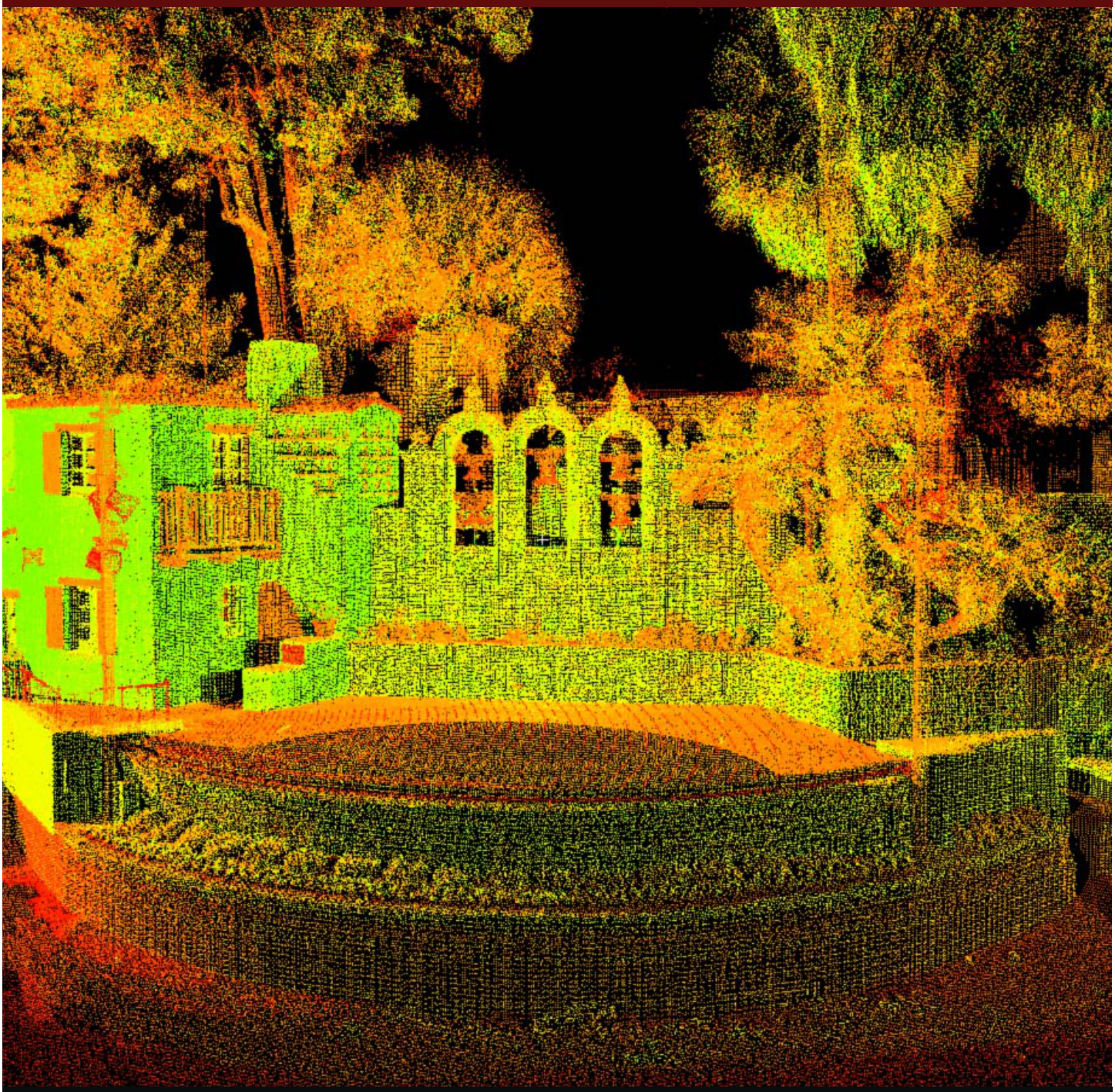
TTU Field and Computer Lab Work Procedure for High Definition Documentation of the Arneson Theatre, San Antonio Riverwalk, Texas | 2007-17

Texas Tech University



National Park Service
U.S. Department of the Interior

National Center for Preservation Technology and Training

TTU FIELD AND COMPUTER LAB WORK PROCEDURE

FOR

HIGH DEFINITION DOCUMENTATION

OF THE ARNESON THEATRE,

SAN ANTONIO RIVERWALK,

TEXAS

COLLEGE OF ARCHITECTURE
TEXAS TECH UNIVERSITY
LUBBOCK, TEXAS

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1) LONG RANGE SCANNING PROCESS

(a) Purpose

(b) Equipment

(c) Setting up the Equipment

(d) Data Collection

a) Purpose

i) The main purpose of the 3D scanning is to analyze a real world object or environment to collect data on its shape (in true scale)[1]. This collected data is used to create two-dimensional drawings from three-dimensional digital models.

b) Equipments – List & Describe:

i) Leica HDS 3000: This equipment is used to collect the point cloud data of the project site at 6mm positional accuracy @ 50m.

ii) Tripod: Used to keep the Scanner at a leveled and high position.

iii) Targets: Used to register the different point cloud data after scanning.

iv) Target Mounts: Used to place targets wherever required for the scanner.

v) Power Supplies: The scanner can be connected to an AC power supply or HDS3000 rechargeable batteries.

vi) Laptop/Notebook: A laptop with Cyclone 5.6 is required for scanning and to collect the scan data at site. A mouse is helpful to navigate during scanning process.

vii) Miscellaneous: measuring tape, spikes, hammer, foldable table and chair, markers.

NOTE: Survey Control was established on site using GPS (Global Positioning System) survey equipment. All of the 3D laser scanning targets were also surveyed into this control grid using a total station optical survey device. The data gathered

[1] . http://en.wikipedia.org/wiki/3d_scanning

with the Leica HDS 3000 was then registered together with this control data so that all data points logged by the scanner are surveyed to within +/- 7mm of accuracy.

c) Setting-up the Equipment:

i) Before setting-up the scanner and targets, it is best to have an overlook/observation of the site and a scanning plan, and use the following steps to set up all the equipment.

ii) Decide the position of the scanner according to the object to be scanned.

iii) Adjust and secure the scanner tripod with the bracket and level it by adjusting the scanner's bubble level. Make sure that it does not slip after mounting the scanner.

iv) Mount the scanner on the tripod and lock it with the bracket. If required, relevel the scanner by using the bubble level.

v) Unlock the scanner head from the base.

vi) Supply power to the scanner. One must unlock the scanner head prior to supplying power so that the head can rotate and orient itself to the origin. When the scanner is ready it will show a constant green light, before that it shows a flashing yellow light.

vii) Connect the Ethernet/Networking cable from the laptop to the scanner and switch on the laptop. Remember the power supply to both the scanner and the laptop must not be interrupted during the scanning process.

viii) During the above process another person can position the targets around the site, which must be seen from the scanner as well as from the surveying point.

d) Data Collection/Scanning Process:

Scanning can be done in variety of ways, but all scanning operations generally are divided into the following basic groups: Cyclone 5.6, Help, Scanning with HDS 3000, and The Scanning Process].

i. Creating a Scanner.
ii. Connecting to a Scanner.
iii. Organizing scan data.

iv. Preparing to scan.

v. Executing the scan.

vi. Acquiring the targets.

i) Creating a Scanner:

The first time that you use a scanner, it is necessary to create an entry for it in the Cyclone **Navigator** window on the laptop. Afterwards, the scanner is available each time you start *Cyclone*.

To add a Scan Station or HDS3000 scanner:

(a) From the **Configure** menu, select Scanners. The **Configure Scanners** dialog appears.

(b) Click **Add**. The **Add Scanner** dialog appears.

(c) From the **Scanner Model** list, select the model name of the scanner that you are adding. For example, select **HDS3000** if the scanner is a HDS3000, or **Leica ScanStation** if the scanner is a ScanStation.

(d) In the **Scanner Name** field, type a logical name for the scanner you are adding (e.g., "Scanner", "My Scanner", "Scanner 123", etc.).

(e) In the **IP Address** field, enter the IP Address for the scanner you are adding. The IP address of the scanner is printed on the scanner's housing.

(f) Click **OK**. The scanner is now added.

(g) To close the **Configure Scanners** dialog and return to the **Navigator** window, click **Close**.

ii) Connecting to a Scanner.

Connecting to a known scanner (one that has been entered in the database) is done from a **Scan Control** window.

(a) *To launch a Scan Control Window*:

1. From the **Navigator** window, expand the **Scanners** folder.

2. Double-click the scanner to which you want to connect. The **Scan Control** window appears.

(b) To connect to a scanner:

1. From the **Scanner** menu in the **Scan Control** window, select **Connect** or click the **Connect** icon. Connection progress is displayed at the bottom of the **Scan Control** window.
2. A successful connection is made and the scanner is ready for commands from *Cyclone* when the **Scanner Status** box at the bottom of the **Scan Control** window reads "**Connected and Ready**".

iii) Organizing Scan Data.

Before scanning one must create a **Project** folder in which to store scan data. Then one must create a **ScanWorld** within that project folder. Individual scans and images are saved in this destination ScanWorld. For example, all of the scans and images that are taken from one scanner position would go into one ScanWorld.

During a scanning project it may be necessary to create more than one **ScanWorld**, which can be done under one **Project**. If the site of scanning is changing, it is suggested to create a new **Project** in the **Databases**.

(a) To Select a project for the Scan data.

1. When you open a Scan Control window, the Select a Project dialog appears. To select a different project when the Scan Control window is already open, from the Project Setup tab in the Scan Control window, select Select a Project.
   - You can create a new project for your scan data by clicking Create, and then selecting the created project that appears.
2. Navigate to an existing project, and then click OK. Your destination project is selected.

Note: If you choose a new project, a new ScanWorld is created and your previous ScanWorld is no longer the destination for subsequent scan data.

iv) Preparing to Scan.

Once the destination Project and ScanWorld folders are chosen, the next steps in a typical scanning process is described below [Cyclone 5.6, Help, Scanning with HDS 3000, The Scanning Process]:

(a) Capturing an Image of your scanner field of view.
(b) Targeting within the scene to select areas of interest.
(c) Adjusting Scan Settings to specify the resolution, probe the range of your scan.

(a) ***Capturing an Image:*** You can capture an image of the scene from the point of view of the scanner and display it in the **Scan Control** window. This image is useful for determining the field of view of the scanner, as well as for targeting areas of the scene to be scanned. Note that the colors in the acquired image are mapped to the point cloud upon creation, so it is necessary to acquire an image prior to scanning in order have this visualization option.

To capture an image of the scanner's point of view:

1. In the Scan Control Window, go to the Field of View Tab. Click the arrow button in the Preset and select the Target All option, which will shoot a 360 view of the scan site.
2. Go to Image in the Menu bar and set the Image resolution to High.
3. From the Image menu, select Get Image (or click the Get Image icon). The image appears in the Scan Control window and is saved in the Images folder under the parent ScanWorld.

(b) ***Targeting:*** With a valid image in the **Scan Control** window, you can decide which areas of the scene are of interest and how densely they should be sampled.

1. To target the entire scene in the **Scan Control** window, select **Target All** from the **Scanner Control** menu. The scan target appears in the **Scan Control** window.
2. To target only a portion of the scene, create a target region by dragging one of the **Target** cursors over the area in which you are interested.
3. A number of preset target modes can be selected from the Presets dropdown. The horizontal and vertical settings for the selected mode are displayed in the fields below. When you enter targeting settings manually, the setting automatically changes to **Custom**.

(c) ***Resolution:*** After determining the area of the scene that you want to scan, adjust the **Range**, **Sample spacing**, and/or **Number of points** under the **Resolution** tab. You can enter the Range manually or you can hit the **Probe** button to find the Range.
Note: For detail scanning it is required to set-up the Sample Spacing very low i.e. 3mm.

(d) ***Probe:*** To measure the range and horizontal and vertical direction from the scanner to a point, position the target crosshairs on the point and click the **Probe** button.

(e) ***Station Data (HDS 3000):*** The default scanner coordinate system is based on an origin point within the scanner. The **Station Data** control allows you to enter known or assumed real-world coordinates to establish a relationship between the scanner and that coordinate system, which is generally done with the help of Surveying.

v) Executing the scan.

After defining the target region and adjusting the scan settings, the next step is to begin the scan. In the **Scan Control** window, click the **Scan** button. When a scan is complete, it is saved in the **Scans** folder under the current ScanWorld.

vi) Acquiring the Targets.

When the scanning is done, it is required to acquire all the targets which are fixed at the scanning site. Following are the steps to acquire targets.

(a) Go to **Scanner Control** Menu and Click **Acquire Targets**.

(b) From the **Acquire Targets** menu in the dialog, select **HDS Targets from Pick Points** to mark potential HDS Targets in the Model-Space viewer, and list them in the **Acquire Targets** dialog.

(c) Name the targets uniquely so that each of them can identify and keep the naming the same for a single scanning project.

(d) After selecting all the targets to be acquired, click the **Acquire** button to get the final result.

After acquiring the targets, scanning is done for the present ScanWorld. You can move to a new position to establish a new ScanWorld in the same Project or you can create a new project to continuing scanning.

2) POINT CLOUD REGISTRATION PROCESS

a) **Definition of Registration:** Registration is the process of integrating a project's ScanWorlds into a single coordinate system as a Registered ScanWorld. This integration is derived using a system of constraints, which are pairs of equivalent objects or overlapping point data that exist in two ScanWorlds.

b) **The Registration Process:**

Registering a set of ScanWorlds can be accomplished mainly in two different ways. These processes are:

- Target to Target registration.
- Cloud to Cloud registration.

(i) ***Target to Target registration:***

The following series of steps represents the Target to Target registration.

(a) *Creating a Registration:* Select the desired project in the **Navigator** window, and then selecting the **Registration** command from the **Create** menu. The Registration object does not need to be created in the same project as the participating ScanWorlds, but must be in the same database.

(b) *Adding the Scan Worlds:* To open the **Registration**, double click the newly created **Registration**. After opening the **Registration** object, select participating (component) **ScanWorlds** via the **Add ScanWorld** command.

(c) *Establishing a Home Scan World:* By default, the first **ScanWorld** added to the **Registration** is set as the **Home ScanWorld**. However, the **Home ScanWorld** can be re-selected using the **Set Home ScanWorld** command.

(d) *Adding Constraints:* To add the **Constraints** click the **Auto-Add Constraints** icon, this will generate a list of all the **Constraints/ Targets** present in the **ScanWorlds**.

(e) *Register:* The next step is to register the ScanWorlds using the **Register** command in the **Registration** menu.

(f) Creating a Registration ScanWorld and Freezing the Registration: After a successful registration, the **Create ScanWorld/Freeze Registration** command can be used to create a single ScanWorld that includes the registered (component) ScanWorlds in a unified (common) coordinate system.

(g) Creating a Model Space from the Registration:

There are two ways to create a Model-Space from a Registration, depending on the desired content of the resulting Model-Space.

(1) The Model-Space is created using the **Create | Model-Space** command in the **Navigator** window. The same result is obtained by using the **Create Model-Space** (or **Create and Open Model-Space**) command under the **Registration** menu in the **Registration** window.

(2) The Model-Space is created from the Model-Spaces tab of the Registration window by selecting all Model-Spaces containing objects you want to include in the resulting Model-Space, and then using the Create Model-Space command. The Model-Space created in this manner includes Model-Space data from each of the selected Model-Spaces.

(ii) Cloud to Cloud registration:

Cloud Registration supports the creation and management of *cloud constraints* between overlapping point clouds and meshes without the need for targets.

To get the best result in a scanning project and registration it is always advisable to use targets, but in a few circumstances the use of targets is not possible. For example, if the scanning site is too small. In this case one would have to use cloud registration.

The Registration Process:

The cloud to cloud registration process is done using the following steps:

a) Create a Registration in the **Project** Folder of the **Navigation Window**.

b) Double click the **Registration** icon to open the registration window.

c) Go to **Scan-world** > **Add Scan-world** and add the scan-worlds you want to register in the select scan-world for registration dialogue box. Click **Ok** to finish this step.

d) After adding the scan-world, Cyclone automatically set the **Home Scan-world**. If you need to change this one **Right Click** the desired scan-world and select the Set Home Scan-world.

e) Go to the Model-Space Window tab and expand the first scan-world and double click the model space to open the clouds in the window. Do the same to the other scan-world to open it in the other window.

f) The next step is to **Add Constraints**. This can be done in two different methods: (a) **Manual Creation** via the **Add Cloud Constraints** command and (b) Assisted creation via the **Cloud Constraints Wizard** [Cyclone 5.6, Help, Registration> Cloud Registration].

(1) Manual Creation method:

(a) Pick three or more matching points on the two clouds open in the **Registration Window**.

(b) Select the **Add Cloud Constraint** command.
Note: If the picked points match closely enough, the cloud constraint is created and the selected clouds are copied as needed into their respective **Control-Spaces**.

(2) Assisted creation via the **Cloud Constraints Wizard**: **Cloud Constraints Wizard** guides you through the entire process of creating cloud constraints and can save considerable time compared

to the other methods. First, specify which ScanWorld pairs are overlapping, and then the Wizard takes you through the process of creating a cloud constraint for each specified pair of ScanWorlds.

g) After creating the Constraints we need to register both the clouds. To do so, go to **Registration > Register**. This may take few seconds/minutes as per the cloud size.

h) In the **Constraints List Tab** the **Error** of the registration will be seen. To get the best result in registration it is advisable to keep the Error less than or equal to 0.006.

i) Go to **Registration > Create Scan-world / Freeze Registration**. This will create a scanworld, which will be displayed in the **Navigation window**.

j) Create the Model Space for the registration by **Registration > Create Model Space**. This can be created in a different method as explained before. **Create a Model Space View** to see the result of the registration.

3) CLOUDWORX IN AUTOCAD

Cloudworx is a Plug-in to AutoCAD to import the Point Cloud data into AutoCAD. After importing the data Plan, Elevation and Section of a structure can be drawn using the AutoCAD drawing commands/tools.

a) **Drawing the Plan:**

1) It is better to clear the point cloud above the cutting plane level for drawing a Plan. Just select the points above the decided cutting plane for the Plan and delete those.

2) Import the Point Cloud to **AutoCAD**.

3) Go to Cloudworx and **Open Model Space View**.

4) In the **Open Model Space View** window browse the Model Space View of the Structure and Open it. Click **Ok** to import the point cloud to AutoCAD. Remember to specify the Unit.

5) Click the **Top** Icon on the **View Bar** to see the point cloud (if not displayed after importing). Hit the **Refresh Icon** on the **Cloudworx Command** bar to get a good view of the point cloud.

6) Click the **Poly-line** command and start drawing on the top view of point cloud to get the Plan of the structure.

b) **Drawing the Elevation & Section:**

1) Import the Point Cloud to AutoCAD. Go to **Cloudworx > Open Model Space View**.

2) In the **Open Model Space View** window browse the **Model Space View** of the Structure and Open it. Click **Ok** to import the point cloud to AutoCAD. Remember to specify the **Unit**.

3) Click the **Top Icon** on the **View Bar** to see the point cloud (if not displayed after importing). Hit the **Refresh Icon** on the **Cloudworx Command** bar to get a good view of the point cloud.

4) Then select a specific **Wall** (which elevation we want to draw) and take a section of that wall in the top view. To do this it is required to align the **UCS** along the wall.

5) Aligning the **UCS** and cutting the section includes some steps which are explained as follows:

   i) Draw a line along the wall and draw another line perpendicular to it.

   ii) Click the **3 Point** Icon in the **UCS** command bar to align the **UCS**.

   iii) Click the **Clip Point to Slice** icon on the **Cloudworx Command** bar and select the **Y-axis** from the icon list.

   iv) On the Top View specify two clipping plan along **Y-axis** to get the section of the point cloud.

   v) Click **Cutplane Manager** icon on the Cloudworx command bar and in the **Cutplane Manager** window select the **Cloudworx Cutplane** and hit the **Align View** button. This will align the **Cutplane View** to the user's viewport.

   vi) Select the **View** icon on the **UCS** command bar to align the **Cutplane View** in the **X-Y** direction.

   vii) For future reference click the **Named UCS** icon and give a name to the current **UCS**.

   viii) Same as the previous step select the **Named Views** icon and give the same name to the view and make it current view.

6) After aligning the Cutplane section we can start drawing on the top of the point cloud.

7) Create or select the required Layers and start drawing with the Poly-line command.

8) Using the same process we can draw the section of the structure.

4) PHOTO MAPPING TO POINTCLOUD & MESH

Definition: 3D photo mapping is the process of applying the high resolution photographs to a three dimensional model. The model could be a point cloud or mesh model.

a) **The Meshing Process:**

We can create the mesh model from the point cloud data in two different computer programs, those are:

(1) Meshing using Leica Cyclone 5.6.

(2) Meshing using Raindrop Geomagic Studio 9.

1) ***Meshing using Leica Cyclone 5.6:***

(a) Open the Model Space View of the Point Cloud.

(b) If the Point Cloud is a Registration of multiple ScanWorlds it is better to create individual Mesh instead of collapsing the Point Clouds to one and meshing them.

(c) To create the Mesh select the point Cloud and go to **Tools > Mesh > Create Mesh**.

(d) Select the **Complex Mesh** option from the **Meshing Type** window.

(e) After a few moments the Point Cloud will be converted to Mesh.

(f) If the Model Space View contains more than one ScanWorld, select them individually and repeat step III and IV.

2) Meshing using Raindrop Geomagic Studio 9:

(a) Import the Point Cloud Data to Geomagic Studio 9.

(b) Specify the **Ratio and Unit** while importing the file to Geomagic.

(c) Save the File with a suitable name.

(d) If required, orient the Point Cloud as preferred.

(e) In the Drop-down Menu go to **View > Shading > Smooth** to get a clear view of the Point Cloud.

(f) To convert the point clouds to mesh click the **Wrap** Icon in the icon menu.

(g) Click **Ok** in the **Compute Wrap Panel**, which will convert the point cloud to mesh after few minutes.

(h) If the new mesh model still looks like a point cloud, click the **Display** Icon in **Manager Panel**.

(i) In the **Display Panel** change the setting under **Poly to 100 / 100** from the default setting 50 / 33. After changing the setting you will have a solid mesh appearance.

(j) Clear the Mesh Model by clearing the unwanted mesh. Just select the mesh and hit the delete button to remove the unwanted meshes.

(k) Fill the holes in the mesh by using the **Fill Holes** command. For this click the **Fill Holes** icon or go to **Polygon > Fill Holes** in the drop down menu.

(l) Continue the above process to get a clean mesh model.

b) **The Mapping Process:**

We can map the mesh model in both the above mentioned computer programs. The procedure is explained as follows.

(i) ***Mapping using Leica Cyclone 5.6:***

The texture mapping process involves the following steps:

(a) Adding the image / cube map from the database.

(b) Matching points in 3D with Pixels in the image.

(c) Computing the optimal mapping.

(d) Displaying the texture mapping.

(a) Adding the Image / cube map from the database.

1. Select one point cloud or mesh. Most of the commands in **Texture Map Browser** support only one selected object at a time.
2. In the **Texture Map Browser**, click the **Add** toolbar button.
3. Browse to and select an Image using the **Select Image** dialog.
4. In the **Texture Map Type** dialog, indicate the images type as **Perspective**.
5. A texture map is added to the object with that Image. The **Texture Editor** dialogs appear.

(b) Matching Points in 3D with Pixels in the image.

1. Texture maps are defined by correspondences (or constraints) between points in 3D with pixels on the image. Perspective images need at least six constraints, plus one for confidence, for a minimum of seven constraints.
2. Select one **Point cloud** or **Mesh**.
3. In the **Texture Map Browser**, select a texture map and click the **Edit** toolbar button, or double click on the texture map. The **Texture Editor** dialogs and **Texture Editor Image** dialogs appear.
4. Identify and pick **Points** in the 3D scene that correspond to the **Pixels** in the image, and then click the **Add** toolbar button in the texture editor. Hints: Pick features that are easy to identify.
5. To replace one or both the picks in an existing constraint, re-pick one or both 3D point and/or image pixel, then click the **Replace** toolbar button.

(c) Computing the optimal mapping.

1. With enough enabled constraints, the **Compute Toolbar** button becomes activated. Push the **Compute toolbar** button to compute the texture mapping parameters.
2. If the **Suggested Improvements** option in the **Texture Map Editor Options** dialog is set to **"Yes"**, after the computation is finished (Success or failure), Cyclone searches for a subset of constraints that results in a lower overall error, if available. The process may be cancelled at any time. If any improvements were found, Cyclone displays the list of up to ten improvements.
3. To visually verify the texture mapping results, select the texture map in the **Texture Map Browser** and click the **Align** toolbar button. The 3D viewport should change to closely match the image.

(d) Displaying the texture mapping.

1. Once a texture mapping has been computed, the texture map is considered "**Valid**" and can be used to color the point cloud or mesh.
2. Enable texture mapping in the **Model-space View** by toggling **ON** the **View> Global Texture Map** command.
3. Select one **Point cloud** or **Mesh**.
4. In the **Texture Map Browser**, select the texture map and toggle its **Use** checkbox **ON**.
5. Use **Edit Color Map** or **Edit Global Color Map** to select the **Image texture Map** mode. Alternately, select the **Edit Object> Appearance> Apply Color Map> Image Texture Map** command.
6. When a single cloud or mesh has multiple enable texture maps, the texture maps may overlap. Where two texture maps overlap,

the texture map that appears lower in the **Texture Map Browser's** list will be covered by the other texture map. To change the order of the texture maps, click the **Raise** and **Lower** toolbar buttons in the **Texture Map Browser**.

2) Mapping using Geomagic Studio 9:

(a) After creating a good mesh model we can map the model with high resolution photographs.

(b) To start the Mapping / Texturing go to **Tools > Color > Generate Texture**.

(c) In the **Generate Texture Panel** change the setting under **Resolution**.

(i) Minimum Texel Size: Default

(ii) Maximum Texture Maps: One to Unlimited.

(iii) Maximum Texture Size: 1024 x 1024 to 4096 x 4096

(d) After changing the settings click the **Apply** and **Ok** button to finish the **Generate Texture** command. This will make the model white color.

(e) Now we have to apply the High Resolution photographs on the model as texture.

(f) Go to **Tools > Color > Project image**.

(g) Load the image to be mapped using the **Load** button in the **Project Image Panel**. This will load the desired image in a different window.

(h) Then pick point in the Model and the corresponding point in the Image. Continue this process to select at least 15-20 points.

(i) More overlapping points, the better the accuracy in mapping/texturing.

(ii) Always pick a feature which can be identified easily both in the mesh model and the image.

(i) Click the **Register** button to start the registration process, which will take a moment to complete.

(j) Hit the **Apply** and **Ok** button to complete the **Project Image** command.

(k) If there is more then one image to map, follow the steps 5 to 9.

(l) To Render an Image go to **File > Screen Capture > Advance** and define size of the image and click **Capture**. Save the Image in the desired folder.

5) AUTOCAD TRACING METHOD

CREATING LEVEL – 1 MAP IN AUTO CAD USING MAPPED POINT CLOUD DATA SET (3D MESH MODEL)

Various steps are taken to create a Level – 1 map. These steps are explained as follows:

a) MAPPING AN IMAGE OR CUBIC MAP TO POINT CLOUD

Note: for this step please follow the Process of Texture Mapping process in Cyclone 5.5 and Geomagic Studio 9.

b) TAKING A SCREEN-SHOT

1) **Method – 1:** If the point cloud data has not been converted to a Mesh this method will work.

   (a) Open **Cyclone 5.5** (if not open previously) and align the required view\elevation to be drawn. Take a horizontal or vertical measurement in cyclone, which will be helpful to scale the image in Auto CAD.

   (b) Go to File > Snap Shot. Give a file name to the snap shot and save it in **.JPEG** format (You may need to hit the save button twice).

   (c) A window will appear asking about the image size. Enter the desired image size (maintain the proportion of the image otherwise it will give a distorted image).

   (d) After the previous step an **Anti-aliasing Quality** message window will appear. Hit the **High** button to get the better quality of the image.

   (e) The Rendered image will be created at the specified location.

2) **Method – 2:** If the point cloud data has been converted mesh.

   (a) Align the desired view\elevation of point cloud mesh model to be drawn. Take a horizontal or vertical measurement in cyclone, which will be helpful to scale the image in Auto CAD.

   (b) Hit **Print Screen** key/button on the key board.

(c) Open **Windows Paint 5.1**.

(d) Go to **Edit > Paste** in Paint.

(e) After the previous step go to **File > Save** and save the image in **.JPEG** format at a desired location.

(f) Edit the image if required in **Microsoft Office Picture Manager**.

c) IMPORTING THE SCREEN SHOT IMAGE TO AUTO CAD 2006.

1) Open **Autodesk Architectural Desktop** or **AutoCAD**.

2) Create a new drawing file and set-up the unit in "**Millimeter**".

3) In the Menu bar go to **Insert > Image Manager** and hit the **Attach** button. Browse the Image you want to trace in CAD.

4) A **Image** window appear, click **OK** and place the Image in the drawing.

5) Draw a line of the same length as the dimension shown in the Image.

6) Scale the Image as reference to the newly drawn line.

7) Save the drawing file.

8) Create different layers to arrange the drawings.

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