GRASP 3D Scanner ALPHA
Quick Start Guide

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GRASP 3D Scanner ALPHA PUBLICATION
GRASP 3D Scanner ALPHA DESIGN

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Grasp 3D Scanner Alpha

DO NOT LOOK INTO LASER BEAM

Important Notice:

This is an ALPHA version release of GRASP 3D Scanner. It is by no means an official release. While the core scanning functionality does work certain functions may not fully work or not work at all. This ALPHA release has been provided in order to allow you to take part in the development cycle. **Please check for updates regularly.**

1. Introduction

This document describes the basic functionality of the GRASP 3D scanner system. GRASP is still under development and this manual only serves to give a very quick insight into its basic workings. The incentive of the example is to provide a simple overview of the process without taking advantage of more advanced ways to perform the scan.

3D scanning is not a trivial task and involves the adjustment of many parameters. Its good to practice and evaluate. GRASP has many features to make the scan job less difficult and more accurate. These will become apparent as you progress. Practice makes perfect.

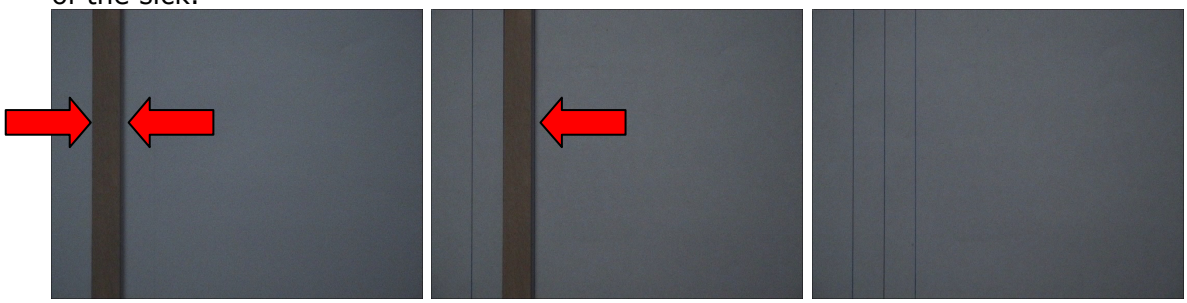
2. Required Materials

1. PC, 2GHz CPU or better, OpenGL support graphics card with 64mb dedicated memory or more, 2Gb system memory
2. Video camera connected to PC or web camera
3. Line laser (part of the TriAngels scanner system or to be purchased separately)
4. Flat stick with square or rectangle cross section (ratio 1:1 to 3:1)
5. White piece of paper
6. Pen or pencil

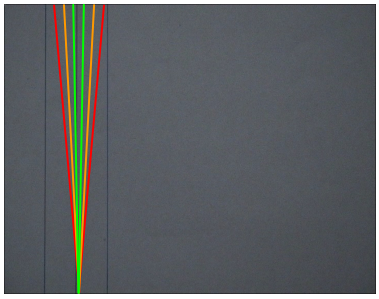
3. Scanner Layout

Set up object and markers
These are important steps. Please read carefully. The better the markers are set up the better the scans will be.

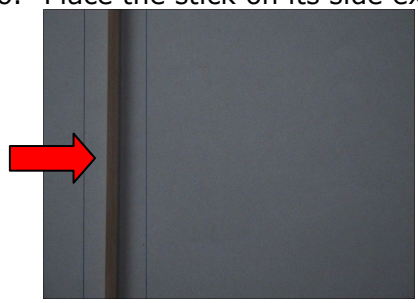
1. Place the paper on a flat horizontal surface
2. Place the wooden stick one side of the paper.
3. using the stick as a ruler, draw 3 lines on the paper. Make sure that they are parallel to each other and that the space between the lines exactly is the same as the width of the sick.



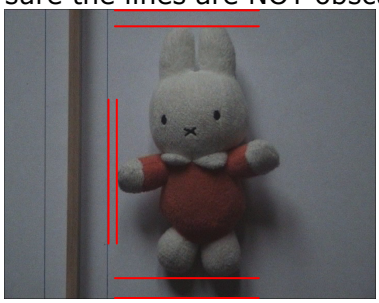
4. Place the camera above the paper looking straight down onto the paper.
5. Also ensure that in the view of the camera the lines are vertical as possible, the maximum allowed deviation is ±5º, preferred within ±1º



6. Place the stick on its side exactly in the middle of the center line.



7. Place the object on the paper. Place it as close to the lines as possible while making sure the lines are NOT obscured by the object.



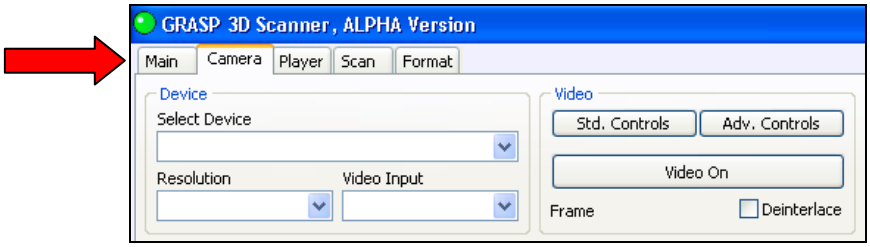
8. If not done already, adjust the zoom of the camera such that the objects and lines are maximized while remaining visible. Leave a small space above and below the object roughly equal as the space between the lines.

Set up scan

Start the GRASP 3D scanner program

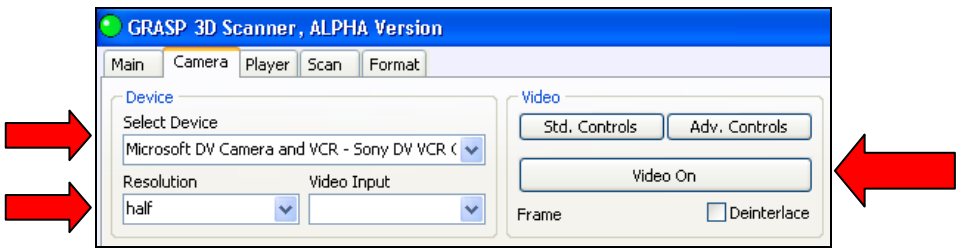
Start Camera

Browse to the **Camera** tab



Select the camera (Device).

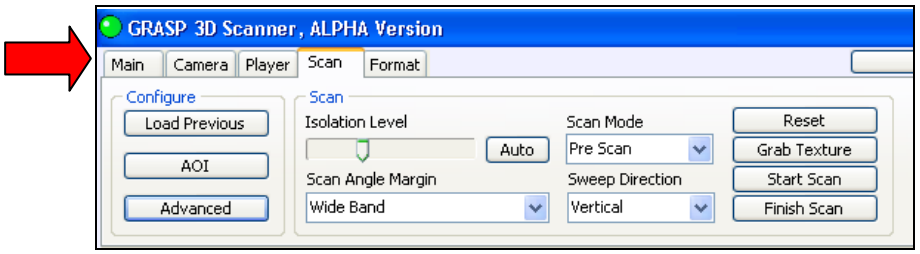
Select the resolution. Start with a low resolution setting (preferably no less than 640x480). For subsequent scans you can set to a higher resolution.



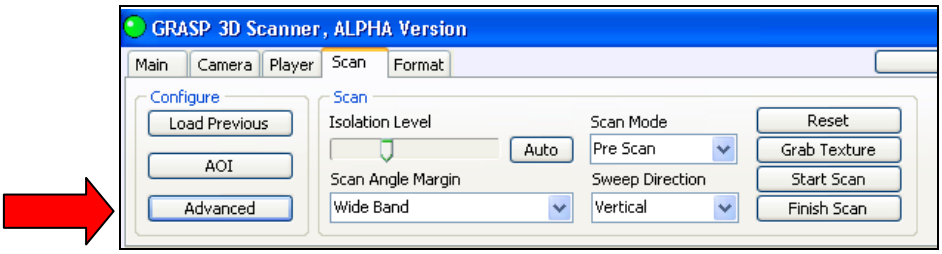
After selecting the camera and resolution click **Video On** Button. The screen will now show the streaming video.

Set Up Marker Positions

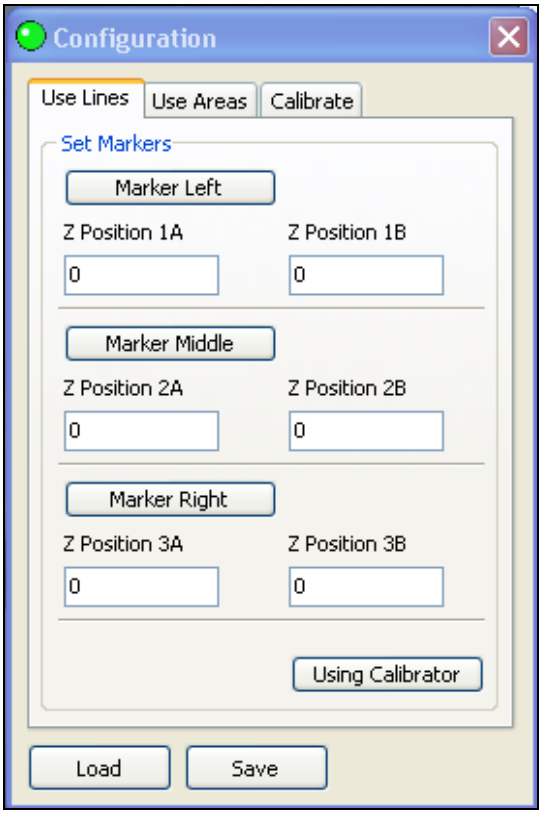
Browse to **Scan** tab.



Click **Advanced** button (or Set Markers)

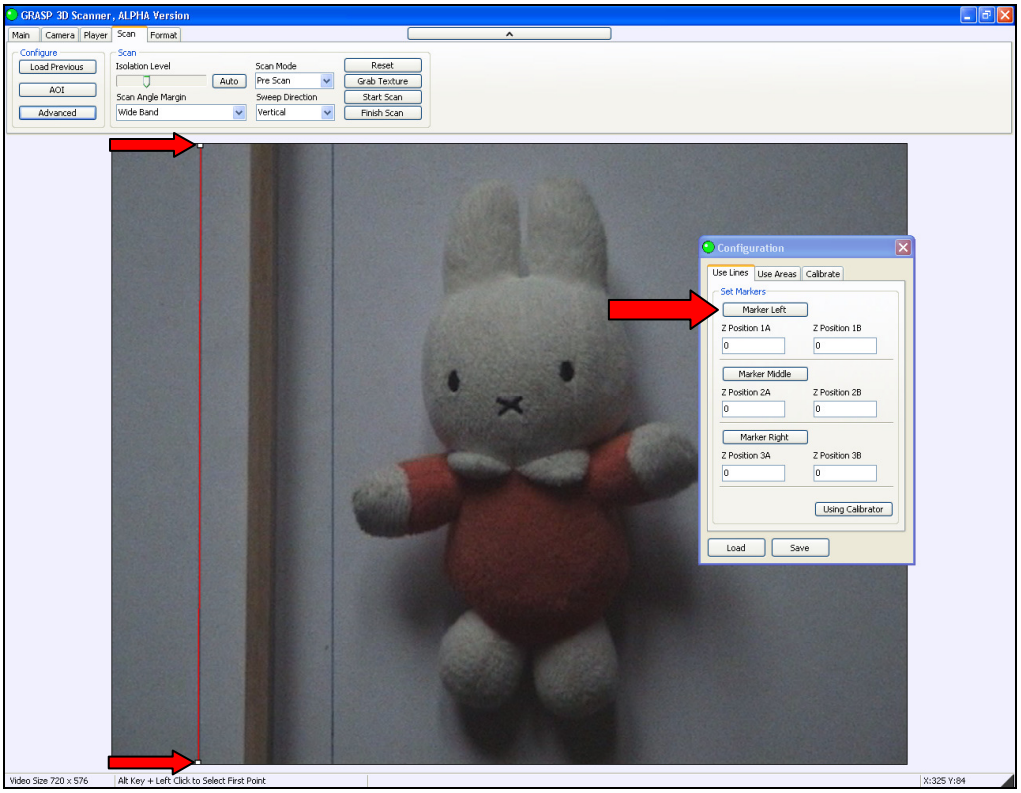


The Marker Configuration dialog will appear.

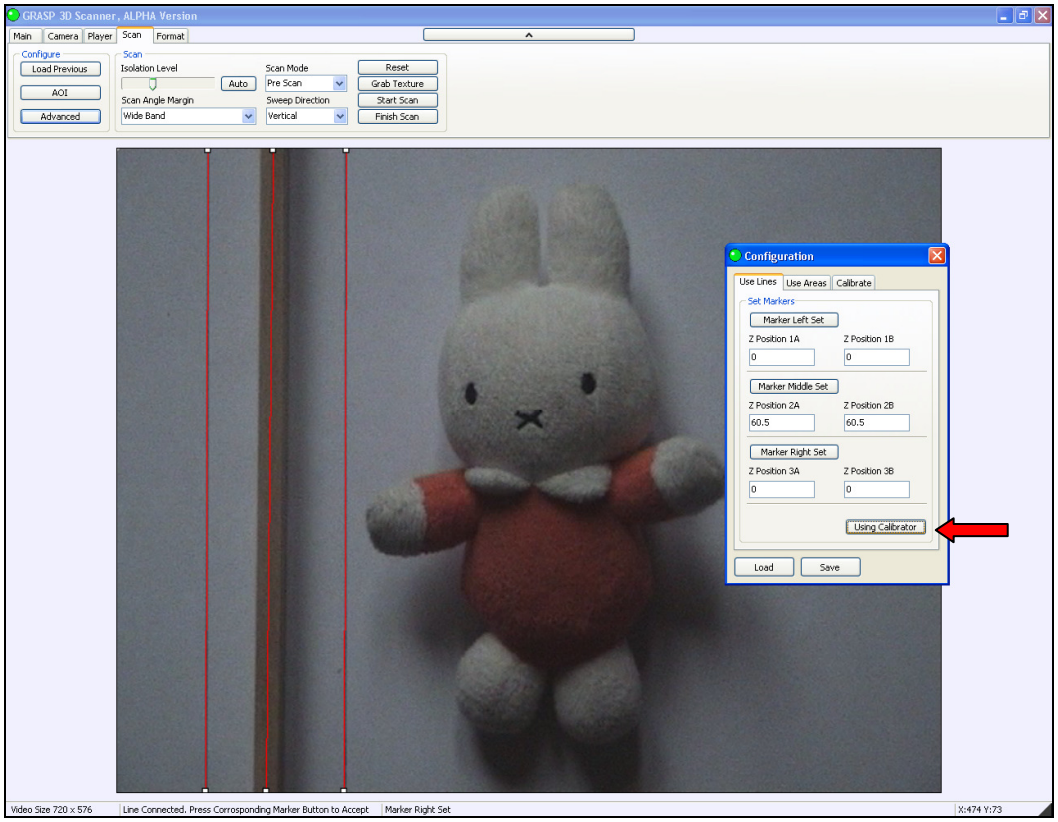


Set up the markers in Grasp

Press the "ALT" button on your keyboard and left mouse click on the top of the line/marker.
Press the "ALT" button on your keyboard and left mouse click on the bottom of the left line/marker (ALT + Right mouse click will erase marker position).
In the popup window click the **Marker Left** Button. If you make a mistake then click the Right mouse button while holding the Alt key down.



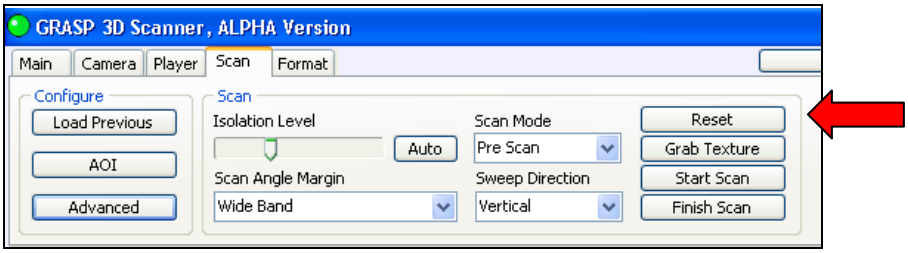
Repeat these steps for the Middle and Right Markers, for the middle marker, select exactly the middle of the stick on the top and the bottom.
Click **Using Calibrator** button to calculate the z Values of the middle marker.



Close the Configuration dialog.

4. Scan

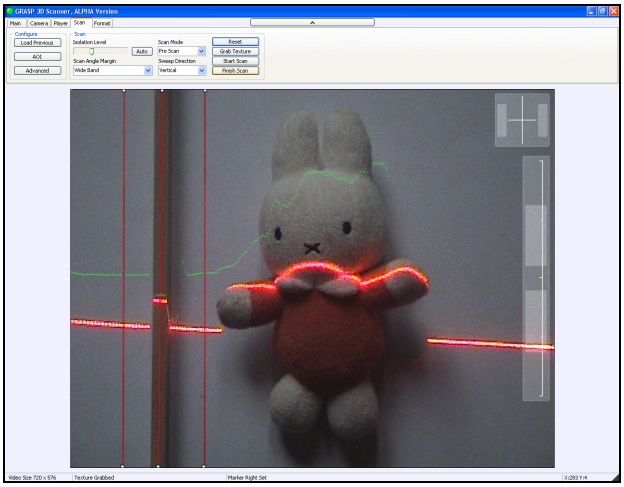
Click the **Reset** button to initialize the scan



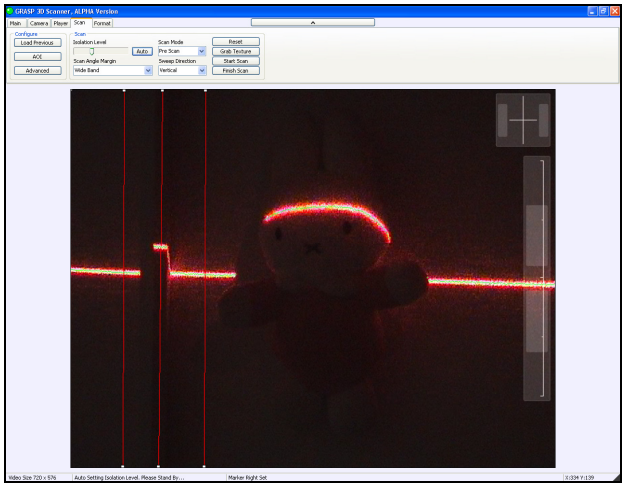
Verify Isolation Level

Turn on the line laser and while making sure the laser line is near horizontal, slowly sweep the laser over the object and the 3 markers.

Verify that the laser line is being recognized by the system. When it is recognized the laser line is overlaid by a thin green line. If the laser line is not recognized or if there are gaps in the green line, adjust the isolation level and / or lighting conditions to compensate until the image looks like the image below right. It is best to turn the room lighting down. Scanning in the dark works better. A Isolation Level of about 85 is a typical setting.



Laser Line Not Recognized

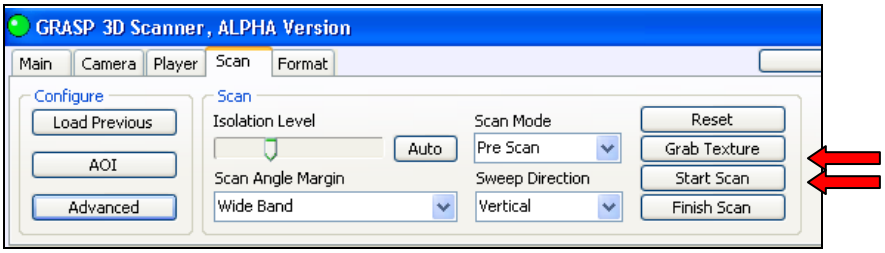


Laser Line Recognized

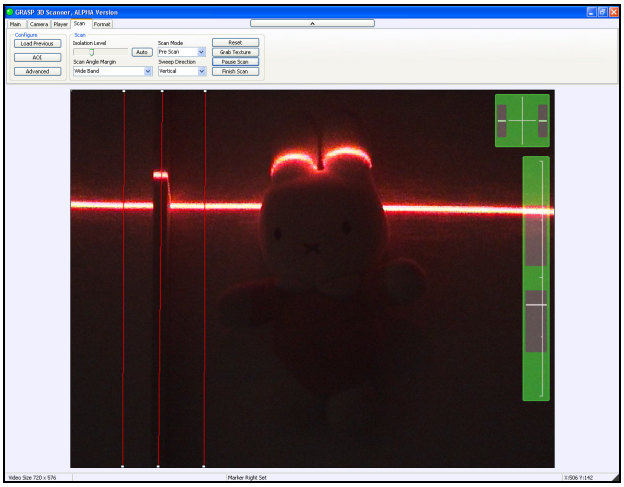
Scan object

Turn on room lighting. Press the **Grab Texture** Button. The color of the object will be captured. Turn down room lighting.

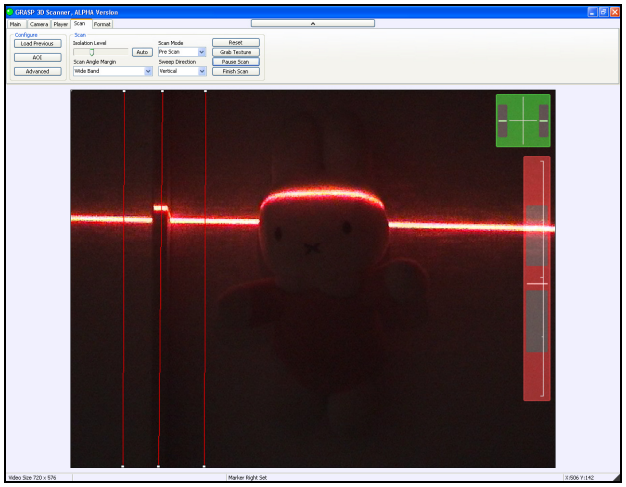
Press the **Start Scan** Button.



While making sure the laser line stays horizontal slowly sweep over the object making sure that the laser line crosses all 3 markers. Hold the laser at a 45 degree angle in relation to the camera or more while sweeping the laser line over the object. The system will respond with the GRASP Ping sound when all conditions are met. The system will also visually aid the sweeping by the use of the GRASP Bar. This is the bar on the right side that will change color to indicate if the conditions have been met. It will also show the present up or downward angle and what the limits are.



Correct Laser Angle

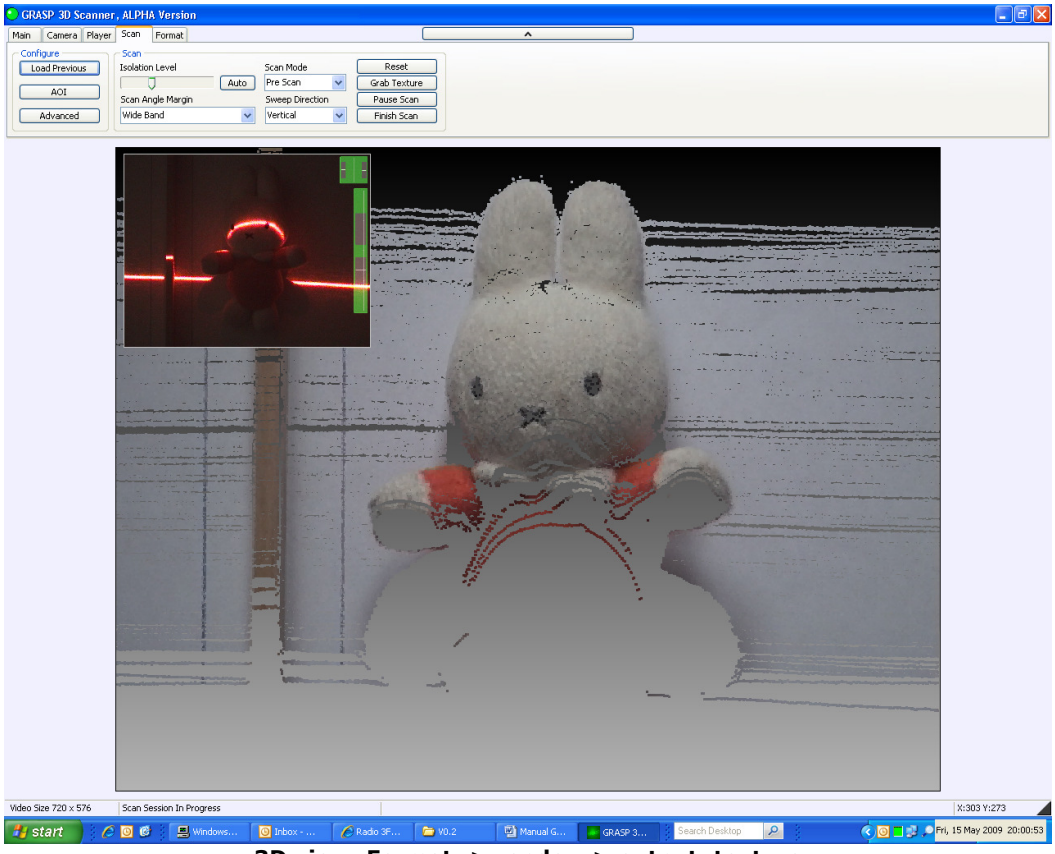


Too Small Laser Angle

5. Viewing Options

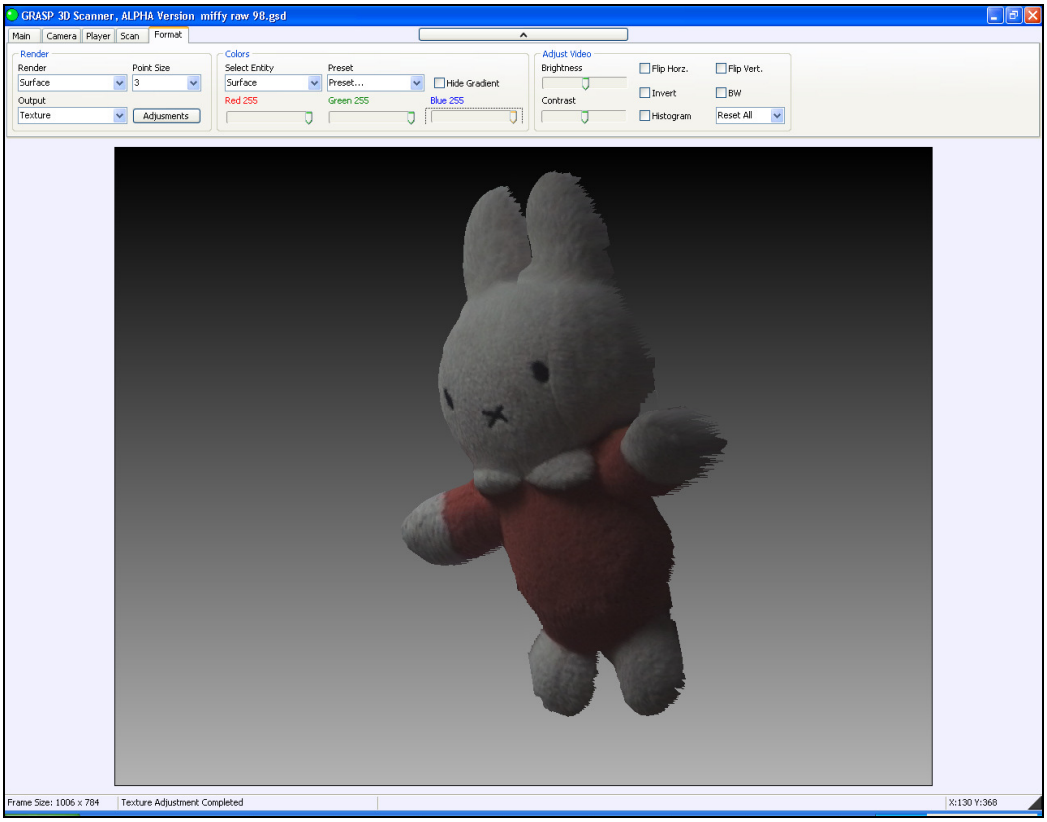
By double clicking on the view window during the scan, it is possible to change from camera view to real-time 3d view. This will help to find and fill in the gaps in the scan.

By right clicking on the view window a menu with the view options will appear. Shown below is the **Picture in Picture** option (note the small video window in the left top corner).



3D view: Format -> render -> output: texture

6. Finished scan



Final scan (Format -> Render -> Adjustments)

7. Important Tips

- To be able to scan the complete object, ensure enough added marker length to be captured by the camera.
- The setting up and selecting the markers is vital towards the accuracy of the scan. The more precisely this is done the better the scans will be.
- Do not set up the camera too close to the object as lens distortion will be more pronounced. Instead, set the camera at a greater distance and use zoom. This will flatten the image.
- Using a narrower band scan angle margin will improve the scan accuracy.
- Viewing the video in actual video size helps to improve the performance on older computer systems.
- Grab the texture under normal lighting conditions but do the actual scanning in a **dark** environment.