User Manual for Diamond Cutting System

Introduction

The Diamond Cutting System is a comprehensive system specifically designed for the evaluation and analysis of diamond cutting quality. It integrates advanced image analysis, measurement technology, data processing, and a user - friendly interface, providing accurate and efficient cutting inspection solutions for professionals and enthusiasts in the diamond industry.

System Overview

- **Hardware Components**: It includes a diamond cutting instrument, a stage, a computer host, a monitor, a printer, etc.

- **Software Functions**: The software has functions such as image acquisition, algorithm processing, display of test result data, 3D model display, export and storage of data files, report printing, multi - language settings, grading standard settings, and model settings. It can measure multiple cutting parameters, including total depth ratio, table width ratio, crown angle, crown height ratio, pavilion angle, pavilion depth ratio, and girdle thickness ratio. It can also grade the cutting

quality according to international standards, IGI standards, and custom - defined standards.

Installation and Initialization

- **Installation Steps**:

  - Connect the diamond cutting instrument to the specified interface of the computer host and ensure a stable connection.

  - Connect the printer and install the corresponding driver.

  - Turn on the computer, insert the installation CD of the diamond cutting system or run the installation program, and complete the software installation according to the prompts.

- **Initialization Settings**:
  - When running the system for the first time, system initialization is required, including setting the IP address, algorithm parameters, cutting instrument parameters, system language, user permissions, etc.

  - Enter the system administrator account and password. After logging in to the system, enter the settings interface to perform relevant system configuration settings.

Operation Process

- **Sample Preparation**:

  - Use tweezers to carefully pick up the diamond to be tested, avoiding direct contact with the diamond surface by hand.

  - Gently place the diamond on the stage with the table of the diamond facing down and centered on the stage.

- **Measurement Operation**:

  - Open the diamond cutting system software and select the "Start Detection" option on the main interface.

  - In the popped - up diamond selection page, select the appropriate diamond shape and format (such as round, P8 - P8 format) according to the diamond's format and shape.

  - Click the "Start Detection" button. The system will automatically pop up a diamond code input box to generate and save corresponding data files after the test. If you only want to simply check and observe the test result data, click "Skip".

  - The system will automatically control the optical measuring instrument to collect optical data of the diamond from multiple angles and in all directions, generate test result data, and grade the cutting quality of the tested diamond.

- **Result Viewing and Analysis**:

  - After the measurement is completed, the system will automatically display various cutting parameters and measurement results of the diamond, including estimated weight, total depth ratio, table width ratio, crown angle, crown height ratio, pavilion angle, pavilion depth ratio, girdle thickness ratio, etc., and present them intuitively in the form of 3D model rendering and data.

  - The system will conduct an overall rating of the diamond cutting according to the cutting grade standard selected in the system configuration, such as "Excellent", "Very Good", "Good", "Fair", "Poor".

  - Users can further analyze and view the measurement data through the 3D model generated on the test result interface, such as viewing the optical reflection and refraction images of each facet.

  - **3D Model Multifunctional Settings**:

    - Left - click of the mouse: Double - click the model face to display the same - type faces changing color and show the data of the clicked object.

- Middle button of the mouse (hold down): Click and drag to change the model's position.

- Mouse wheel: Scroll up to zoom in on the diamond model and scroll down to zoom out.

- Right - click of the mouse (single - click): Pop up the 3D model property check box. You can select the required options according to the property description to assist in daily work, symmetry observation, and data analysis.

- Right - click of the mouse (hold down): Move the mouse to rotate the 3D model up, down, left, and right.

- Rotation button: Click to automatically rotate the model.

- Heart - arrow diagram button: Click to display the heart - arrow diagram image of the diamond.

- Users can evaluate the symmetry of the diamond through the observation of the 3D model, and then manually grade the symmetry through the detailed symmetry data of the test results.

Methods for Recording and Saving Measurement Results

- **Automatic Saving**: If a diamond code was entered at the start of the detection, the system will automatically save the measurement results to the database after the measurement is completed. Users can view the measurement result records in the TXT file under the file save path.

- **Manual Saving**:

  - Users can click the "Save" button on the test result interface to save the current measurement results as files in specific formats, such as TXT, Excel, STL, DAT, for viewing and processing on other devices or software.

  - When saving, users can scan the diamond code with a barcode scanner or customize the file name.

- **Exporting Files**:

  - Users can click the "Export" button on the test result interface to export files. If the diamond code has not been entered after the detection is completed, the system will prompt a diamond code input dialog box. The diamond code is used to specify the file name of the exported file.

  - After entering the diamond code, save the current measurement results as a TXT - format file for viewing and processing on other devices or software.

- **Printing Output**:

  - Users can click the "Print" button on the test result interface, and the system will pop up the print preview interface.

  - After confirming the print, print the measurement report label.

System Maintenance and Calibration

- **Daily Maintenance**:

  - Regularly wipe the lenses of the optical measuring instrument and the stage with a clean soft cloth to remove dust and stains and keep the optical system clean.

  - Check the disk space and memory usage of the computer system, and timely clean up useless files and programs to ensure smooth system operation.

- **Regular Calibration**:

  - To ensure the accuracy and reliability of the measurement, it is recommended to calibrate the system once every 3 months.

  - The calibration operation requires the use of standard diamond samples and calibration tools. Follow the steps of the system

maintenance personnel for the operation. Do not change the system settings randomly during the calibration process.

Troubleshooting

- **Abnormal Measurement Results**:

  - Check whether there are stains, scratches, or other defects on the surface of the diamond sample. If necessary, clean it with a special diamond cleaner or replace the sample.

  - Check the calibration status of the system. If the calibration period has passed, perform the calibration operation in a timely manner.

  - Confirm whether there are vibrations, strong light, or electromagnetic interference in the environment around the system during the measurement. If necessary, adjust the measurement environment.

- **System Failures**:

  - If the system freezes, lags, or shows other abnormal situations, try restarting the system and related devices.

  - Check whether there is an updated version of the system software. If necessary, update the software in a timely manner.

- If the problem still cannot be solved, contact the system manufacturer or professional technicians for repair and handling.

Precautions

- When operating the diamond cutting system, strictly follow the operation steps in this manual. Do not change the system settings randomly or perform illegal operations.

- Non - professional maintenance personnel should not disassemble the hardware equipment of the system without permission to avoid equipment damage or safety accidents.

- During the use process, if abnormal sounds, odors, or other abnormal situations are found in the system, stop using it immediately, cut off the power supply, and resume use only after finding out the cause and troubleshooting the problem.

- Keep the relevant accessories, standard samples, and instruction manuals of the system properly for timely reference and use when needed.