

PTS-500
Photometric Testing System for Navigation Aid Lamps
Operation Manual

-V3.0



Airsafe Airport Equipment Co., Ltd.

Airsafe Airport Equipment Co., Ltd.

Add: No.688, Cao Sheng Road, Jiading District, Shanghai, China

August 2018

Version	Date	Modification
V1.0	2011/6/5	Original Version
V2.0	2015/9/6	Update Files according to the New Version of Photometric Testing System
V2.1	2016/6/15	Modify Some Wrong Illustrations
V3.0	2018/8/2	Update Operation Manual according to the New Version of Photometric Testing System

Catalog

1 Photometric Testing System Introduction	4
1.1 Photometric Testing System Outline	4
1.2 Company Disclaimer	4
1.3 Technical Parameters and Limitations	4
2 External Settings of Intelligent Turntable System	6
2.1 Photometric Chamber Requirements	6
2.2 Communication Cables	7
2.3 Installation Methods	8
3 Application Program Introduction of Photometric Testing System	10
3.1 User Account Management	11
3.2 Testing Distance Modification	12
3.3 Qualified Parameters Criterion	13
3.4 Photometric Box Calibration	13
3.5 Re-login	14
3.6 Language	14
3.7 Section of the Tested Lamps	14
3.8 About	17
4 Lamps Testing	19
4.1 Sensor Calibration	19
4.2 Testing Method 1 : Overall Testing	22
4.3 Testing Method 2 : Chromaticity Testing	33
5 Naming the Data File of the Lamp	38
6 Database Queries and Reports	40
6.1 Testing Data Queries of the Lamps	40
6.2 Testing Data Analysis of the Lamps	42
6.3 Data Report of the Lamps	45
6.4 Data Statistics of the Lamps	48
7 Exit	51
8 Additional Functions	52
9 Daily Maintenance of System	56
Annex 1	57
Annex 2	58

1 Photometric Testing System Introduction

PTS-500 Photometric Testing System is a lighting intensity and chromaticity testing system for Navigation Aid Lamps, which is independently developed by Airsafe Airport Equipment Co., Ltd. With this testing system, airport lighting station can easily control the status of various inventory lamps, test their actual status after maintenance, and attach testing records to them.

The system is compact and easy to operate. Data and results criterion of lighting intensity and chromaticity can be simultaneously completed by one test. And most types of the embedded and vertical lamps from home and abroad are included.

1.1 Photometric Testing System Outline

The contents described in this manual are critical, operators must read them carefully. Please follow the specified methods strictly to operate the equipment after properly understanding, any wrong operations may cause malfunction.

1.2 Company Disclaimer

Any defect in design, material or workmanship, which may occur during proper and normal use over a period of one year from date of installation but less than 15 months from date of shipment, or within the warranty period of the tender, will be repaired or replaced by manufacturer free of charge. Manufacturer compensation is limited to the equipment itself, the loss of other aspects is not involved. However, manufacturer shall not undertake the compensation of damage caused by improper operations or incorrect maintenance methods, etc.

The system can provide accurate testing data of lamps, but the testing results are only for reference. Manufacturer refuses to provide any assurance or testify in any form.

Due to the continuous improvement of the equipment and other reasons, manufacturer reserves the right to modify this specification without any explanation.

1.3 Technical Parameters and Limitations

Testing Standard : ICAO Convention ANNEX 14 and FAA

Testing Error : < 5%

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Testing Distance : within 10 meters (testing distance of side lamp is 1 meter)

Measurement Error of Lighting Detector : $< \pm 2\%$

Repetitive Error of Lighting Detector : $< 1\%$

4-speed Automatic Range Conversion of Lighting Detector

Installation Deviation of Lighting Center : $< 0.1^\circ$, Calibrate to $< 0.05^\circ$

Loadable Weight of Lamps : 18KG

Standard Working Noise Intensity : < 38 Decibels

Ambient Temperature : $-10 \sim 45^\circ\text{C}$

Rotation Repetition Accuracy : $< 0.1^\circ$

Cumulative Error of Rotation : $< 0.2^\circ$

Horizontal Rotation Range : $-180 \sim +180^\circ$

Vertical Rotation Range : $-90 \sim +90^\circ$

Horizontal Turntable Speed Threshold : $0.5^\circ/\text{sec}$ $1^\circ/\text{sec}$ $2^\circ/\text{sec}$

Vertical Turntable Speed Threshold : $0.5^\circ/\text{sec}$ $1^\circ/\text{sec}$ $2^\circ/\text{sec}$

MINI CCR Maximum Output Power : 400W

Current Accuracy $< \pm 0.5\text{A}$

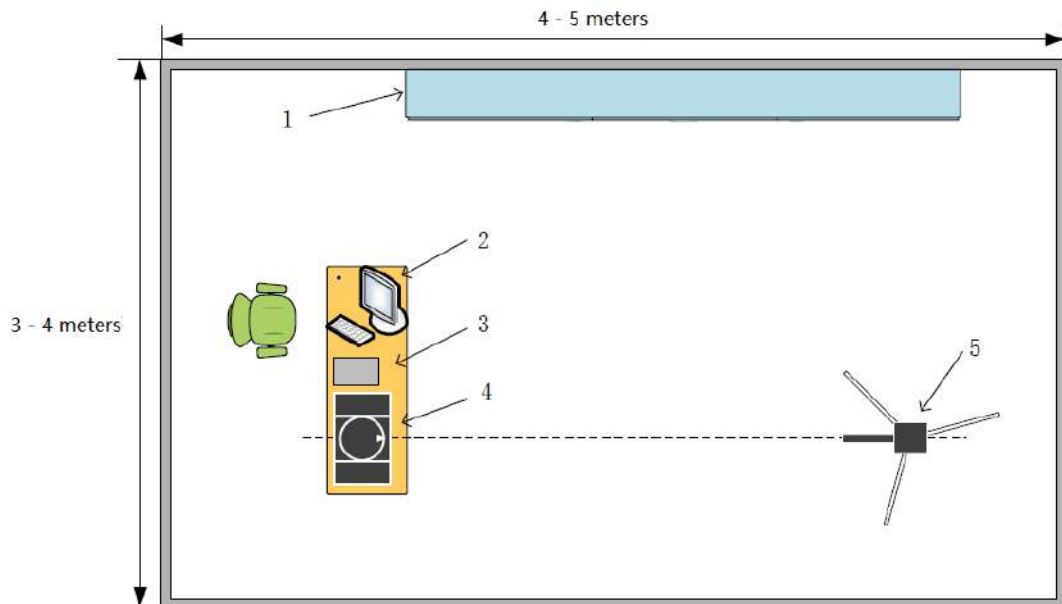
Current Stability $< 3\%$

Input voltage Range : 110-230VAC

2 External Settings of Intelligent Turntable System

2.1 Photometric Chamber Requirements

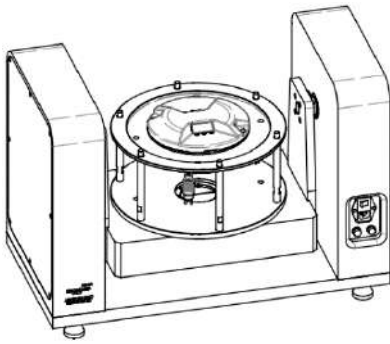
- 1) A Darkroom About 15 Square Meters



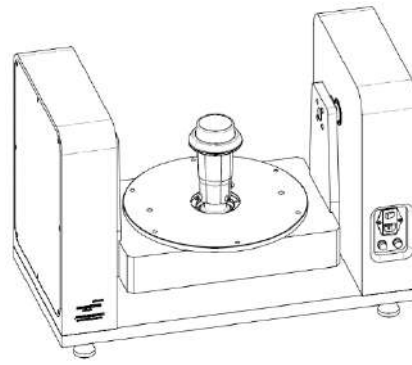
- | | | | |
|---|-------------------------------|---|------------------------|
| 1 | storage rack for tested lamps | 4 | photometric table |
| 2 | photometric computer | | |
| 3 | constant-current dimmer | 5 | photometric instrument |

- 2) A Set of Testing Rotary Platform
- 3) An Imported Sensor (The Domestic Metrology Bureau can test and calibrate)
- 4) A Computer Equipped with Associated Software of Intelligent Test-Bed
- 5) Laser Calibrator
- 6) Lamp Installation Device

The installation methods fall into embedded lighting installation and vertical lighting installation, shown as the following figures:



Embedded Lighting Installation



Vertical Lighting Installation

2.2 Communication Cables

Figure 1 shows a USB TYPE-B dedicated communication cable with a standard of 10 meters, which is used to connect sensors and optical computers. The interface adopts standard USB port. then users can customize the length according to the environment where it's used.



USB TYPE B Cable



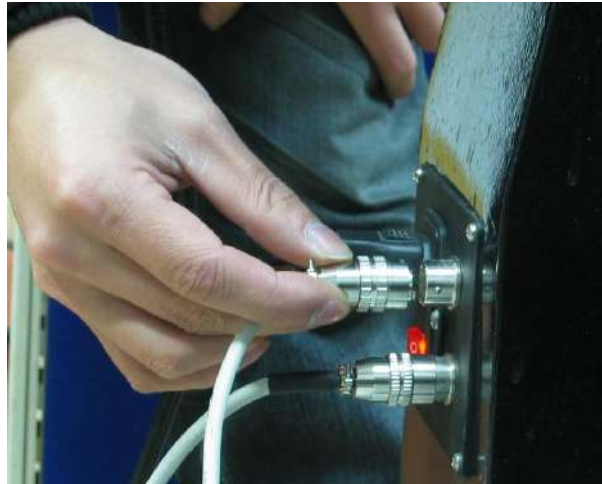
USB TYPE B Cable Interface Diagram

Figure 2 shows a dedicated communication cable with a standard of 5 meters, which is used to connect the photometer platform and computer. One end of the interface uses a 3-bit aviation plug, the other end uses a standard DB9 plug, which can not be hot-plugged. Users can customize the length according to the environment where it's used.



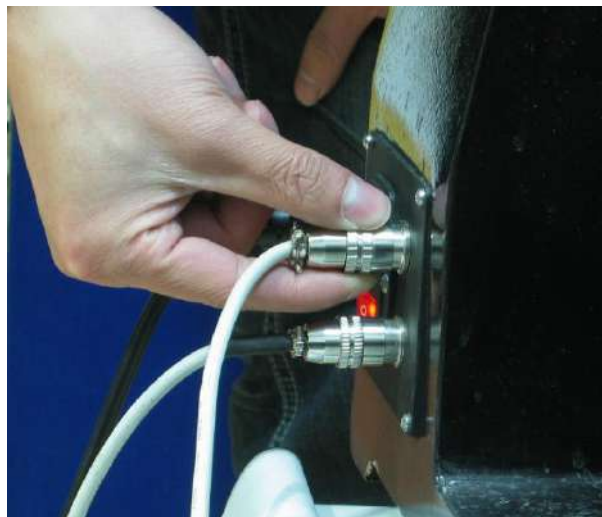
2.3 Installation Methods

How to Insert Aviation Plug



As shown in the figure, when inserting a communication cable, hold the end of the aviation plug and insert it directly after alignment. Hearing the clamped sound means insertion.

How to Dismantle



As shown in the figure, when removing the communication cable, it is necessary to hold the ring of the joint by hand and pull the ring out directly.



- 不可旋转航空接头
- ※ 不可握住接头的尾端硬拉
- ※ 所有接头的插拔均不可带电操作

3 Application Program Introduction of Photometric Testing System

Due to the non-equal conditions like user's testing environment, testing lamps etc., before the system is used, user must set the initial testing conditions of the system according to the airport conditions and the requirements of the factory. The operators are divided into two categories: administrators and general operators. Setting authority is only owned by the administrators, who must hold the identity and enter passwords to set up testing conditions.

Settings methods are as below:



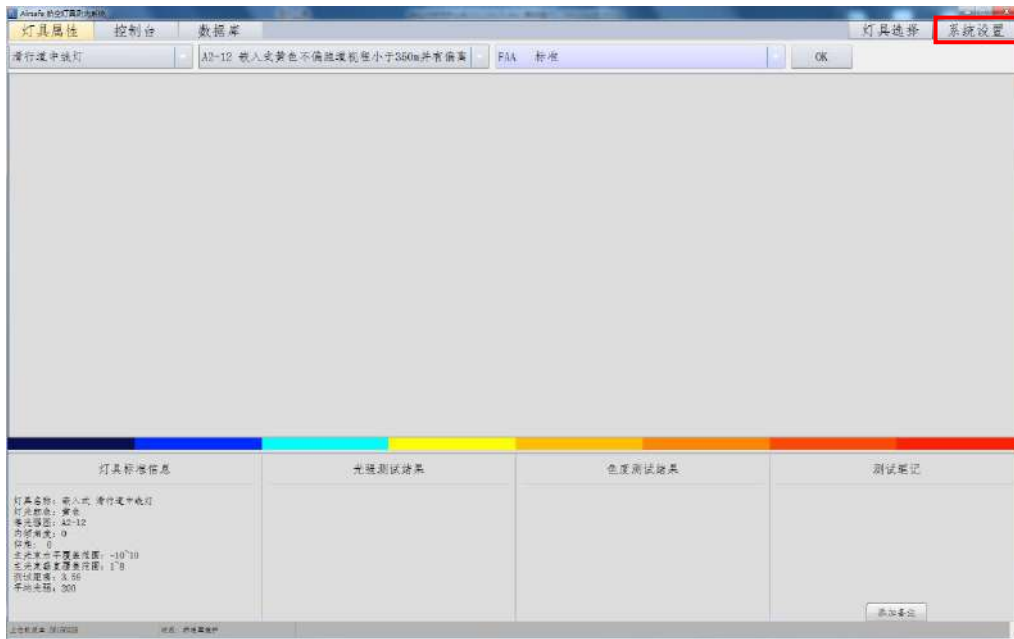
When the user double-clicks on the start-up system after booting, a progress bar will appear, which means waiting for the software to start up.



After system start-up is completed, it will switch to the login interface.



Input the account and password, press the "login" button, login to the system, and enter the operating interface:



Click on the system settings button in the upper right corner of the opening interface,



and a menu appears, the contents of which are respectively about user account management, testing distance modification, qualified parameters criterion, photometric box calibration, re-login, language and related from top to bottom.

Users can add new operators and modify passwords through "user account management"; "testing distance modification" is used to modify the distance between sensor and turntable; "qualified parameter criterion " is used to modify the range of qualified lighting intensity; "photometric box calibration" is used to fitting calibrate according to the actual data of several testing points provided by the measurement center. "Re-login" is used for switching users; "Testing Lamps Selection" is used for users to select the type of tested lamps according to the actual situation of the airport. Besides, the system can "restore factory status" and "input testing standard" again. Other specific functions will be introduced specially as blow.

3.1 User Account Management

In the system, users are administrators and general operators respectively. Administrators should be at least one person, who have the right to set up and delete system users, while operators could be several. Administrators can not only test lamps, but also modify testing distance, display statistical results, select lamps and input testing standards. General testers can change their login password.

Click on User Account Management, a pop-up dialog box showing as below, in which "User Management" is divided into "User Account Password Control" and "User Account Control". After administrator enters the system, all the names and passwords of the users will be displayed in "User Account Password Control" and the "Delete Account" button is available. Administrator can delete any user without limitation (except the administrator himself/herself). "User Account Control" is only open to administrator, who could manage it by adding one or more users and assigning them different identity attributes. After a general user logs in, only User Name will be displayed in the "User Account Password Control". They can change their own password, but the "Delete Account" is not available.



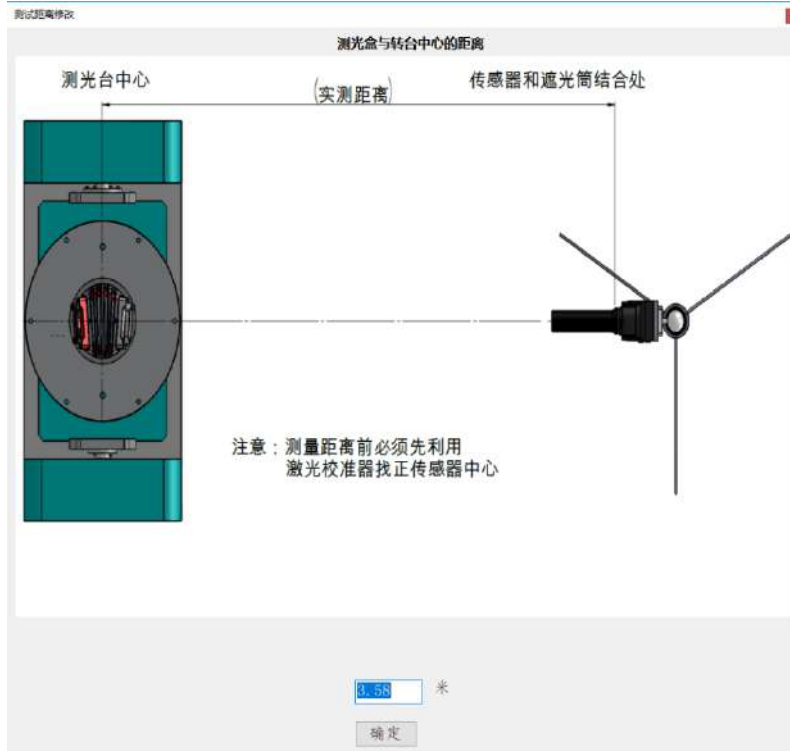
3.2 Testing Distance Modification

A measurement method for displaying and modifying testing distance, units are in "meters". After the modification is completed, click on "OK" button.



■ 应该在开始测试前完成修改

※ 测试开始前，再次确认测试距离



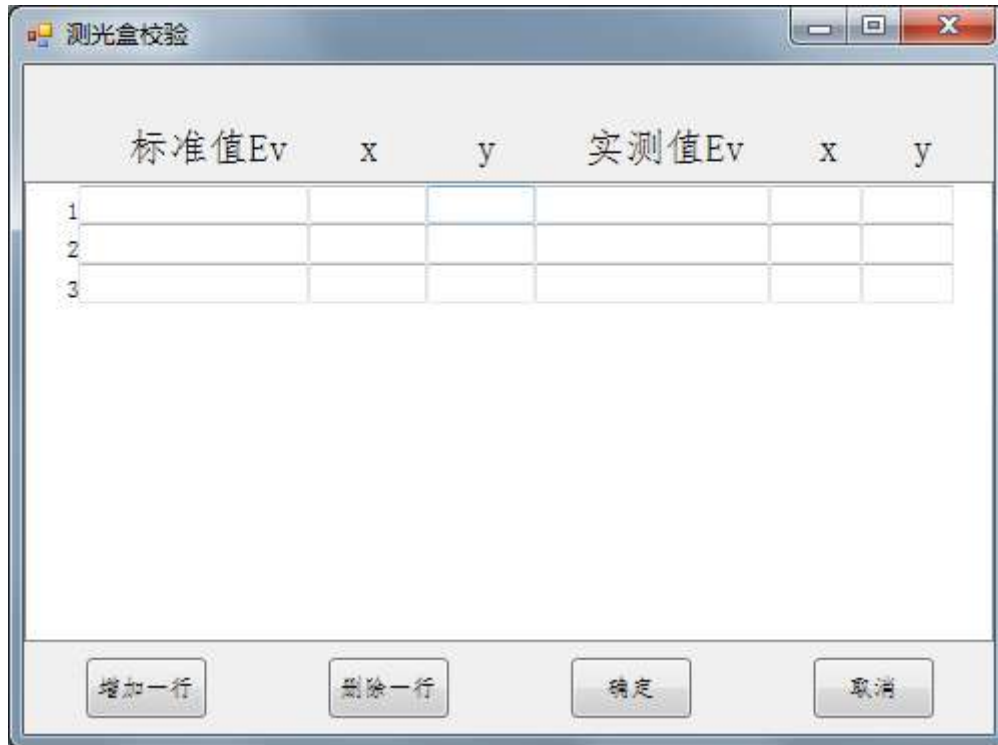
3.3 Qualified Parameters Criterion

Qualified Parameters Criterion is used to modify the qualified range of lighting intensity of lamps. ICAO/FAA relevant standards stipulate that the qualified range of navigation aid lamps is 50%-300%.



3.4 Photometric Box Calibration

Sensor can be fitting calibrated according to the data issued by the Metrology Bureau, who have standard light sources and x, y values, which can be modified according to the data read from our actual tables. No data is filled in by default.



	标准值Ev	x	y	实测值Ev	x	y
1						
2						
3						

3.5 Re-login

Re-login is used for switching users, it has directly user-switching privileges without exiting the software.

3.6 Language

Language is used to select language of the system, currently including Chinese and English, which can be switched.

3.7 Section of the Tested Lamps

According to CAAC requirements, lamps are generally classified into vertical and embedded ones. About 100 kinds in total, and each lamp is divided into approaching lamps, taxiway lamps, runway lamps, etc. based on the different location where it is used. Therefore, in order to facilitate the cumbersome work of tested lamps selection, the system has set up a function of "selecting lamps" for customers. Users can clear the list of unneeded

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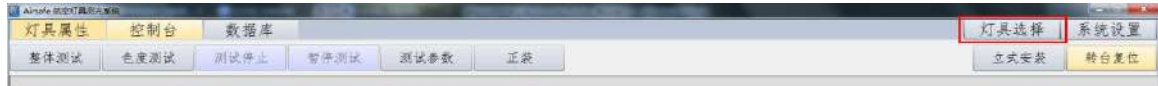
Page 14 of 59

Tel: +86-21- 5354 0453 Fax: +86-21-6364-3114 E-mail:

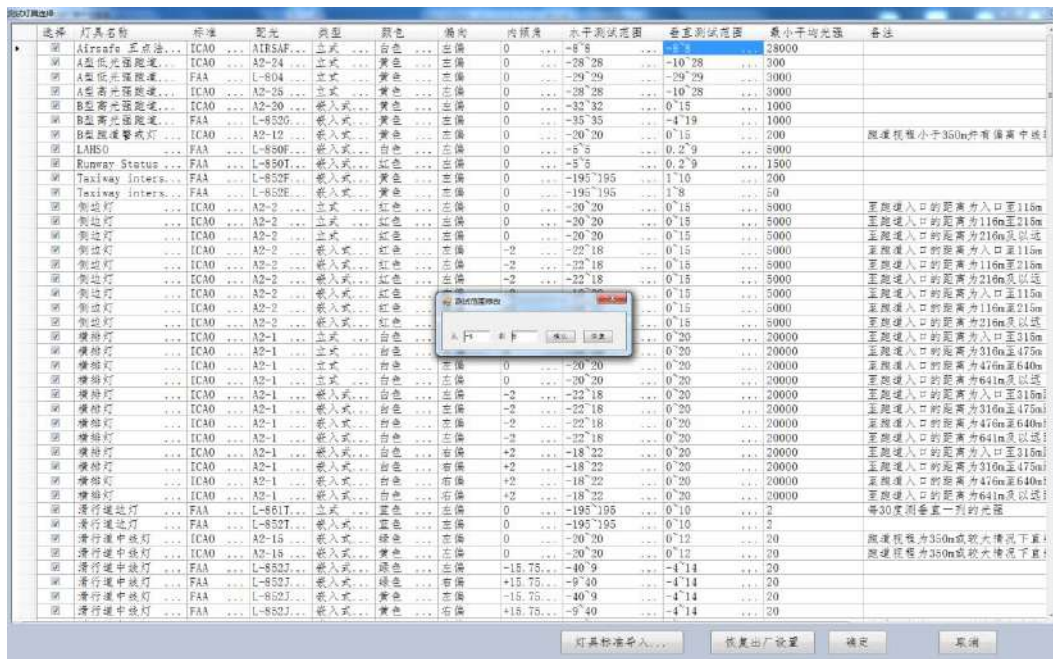
sales@airsafe.com.cn

tested lamps temporarily and keep the needed one according to the real situation of the airport. After this process, the selected types of actual tested lamps will be narrowed down much.

Click on the "Testing Lighting Selection" button and the following dialog box appears:



In the system, all the original lighting settings are in "selected" status. If users need to select lamps in the list, they can click on the selected symbols in the box, behind which is the lamp name. The selected symbols will appear after being clicked on, and the lamp will be presented in the testing list later. In this box, the testing range of lamps can be modified as "horizontal testing range" and "vertical testing range". Users can randomly modify it by double-clicking on the modification location, and save the revised content after clicking on "confirmation", as shown below:



Select the horizontal or vertical testing range of a lamp, double-click on it, click on "confirm" after modification, then the testing range in the system is modified to the required one by users. If you need to restore to the recommended factory testing range, just click on "Restore".

选择	灯具名称	标准	配光	类型	颜色	偏角	内倾角	水平测试范围	垂直测试范围	最小平均光强	备注
☑	Airsafe 基准灯...	ICAO	AIRSAF	立式	白色	左偏	0	-8'5	-8'5	28000	
☑	A型高光强跑道...	ICAO	A2-24	立式	黄色	左偏	0	-8'8	-28'28	300	
☑	A型低光强跑道...	FAA	L-804	立式	黄色	左偏	0	-29'29	-29'29	3000	
☑	A型高光强跑道...	ICAO	A2-28	立式	黄色	左偏	0	-28'28	-10'28	3000	
☑	B型高光强跑道...	ICAO	A2-20	嵌入式	黄色	左偏	0	-32'32	0'15	1000	
☑	B型跑道中线灯...	FAA	L-8526	嵌入式	黄色	左偏	0	-35'35	-4'19	1000	
☑	B型跑道中线灯...	ICAO	A2-12	嵌入式	黄色	左偏	0	-20'20	0'15	200	跑道视程小于350m时有偏角中轴灯
☑	LALHSI	FAA	L-850F	嵌入式	红色	左偏	0	-5'5	0'2'9	5000	
☑	Runway Status	FAA	L-850T	嵌入式	红色	左偏	0	-5'5	0'2'9	1500	
☑	Taxiway Interse...	FAA	L-852E	嵌入式	黄色	左偏	0	-195'195	1'10	200	
☑	Taxiway Interse...	FAA	L-852E	嵌入式	黄色	左偏	0	-195'195	1'8	50	
☑	侧边灯	ICAO	A2-2	立式	红色	左偏	0	-20'20	0'15	5000	至跑道入口的距离为入口至115m
☑	侧边灯	ICAO	A2-2	立式	红色	左偏	0	-20'20	0'15	5000	至跑道入口的距离为110m至215m
☑	侧边灯	ICAO	A2-2	立式	红色	左偏	0	-20'20	0'15	5000	至跑道入口的距离为216m及以上
☑	侧边灯	ICAO	A2-2	嵌入式	红色	左偏	-2	-22'18	0'15	5000	至跑道入口的距离为入口至115m
☑	侧边灯	ICAO	A2-2	嵌入式	红色	左偏	-2	-22'18	0'15	5000	至跑道入口的距离为110m至215m
☑	侧边灯	ICAO	A2-2	嵌入式	红色	左偏	-2	-22'18	0'15	5000	至跑道入口的距离为216m及以上
☑	侧边灯	ICAO	A2-2	嵌入式	红色	左偏	-2	-22'18	0'15	5000	至跑道入口的距离为入口至115m
☑	侧边灯	ICAO	A2-2	嵌入式	红色	左偏	-2	-22'18	0'15	5000	至跑道入口的距离为110m至215m
☑	侧边灯	ICAO	A2-2	嵌入式	红色	左偏	-2	-22'18	0'15	5000	至跑道入口的距离为216m及以上
☑	横排灯	ICAO	A2-1	立式	白色	左偏	0	0'20	0'20	30000	至跑道入口的距离为入口至315m
☑	横排灯	ICAO	A2-1	立式	白色	左偏	0	0'20	0'20	20000	至跑道入口的距离为316m至475m
☑	横排灯	ICAO	A2-1	立式	白色	左偏	0	0'20	0'20	20000	至跑道入口的距离为476m至640m
☑	横排灯	ICAO	A2-1	立式	白色	左偏	0	0'20	0'20	20000	至跑道入口的距离为641m及以上
☑	横排灯	ICAO	A2-1	嵌入式	白色	左偏	-2	-22'18	0'20	20000	至跑道入口的距离为入口至315m
☑	横排灯	ICAO	A2-1	嵌入式	白色	左偏	-2	-22'18	0'20	20000	至跑道入口的距离为316m至475m
☑	横排灯	ICAO	A2-1	嵌入式	白色	左偏	-2	-22'18	0'20	20000	至跑道入口的距离为476m至640m
☑	横排灯	ICAO	A2-1	嵌入式	白色	左偏	-2	-22'18	0'20	20000	至跑道入口的距离为641m及以上
☑	横排灯	ICAO	A2-1	嵌入式	白色	左偏	-2	-22'18	0'20	20000	至跑道入口的距离为入口至315m
☑	横排灯	ICAO	A2-1	嵌入式	白色	左偏	-2	-22'18	0'20	20000	至跑道入口的距离为316m至475m
☑	横排灯	ICAO	A2-1	嵌入式	白色	左偏	-2	-22'18	0'20	20000	至跑道入口的距离为476m至640m
☑	横排灯	ICAO	A2-1	嵌入式	白色	左偏	-2	-22'18	0'20	20000	至跑道入口的距离为641m及以上
☑	滑行道中线灯	FAA	L-861T	立式	白色	左偏	0	-195'195	0'10	2	每30米设置一盏灯的光强
☑	滑行道中线灯	FAA	L-852T	嵌入式	蓝色	左偏	0	-195'195	0'10	2	
☑	滑行道中线灯	ICAO	A2-15	嵌入式	蓝色	左偏	0	-20'20	0'12	20	跑道视程为350m或更大情况下直下!
☑	滑行道中线灯	ICAO	A2-15	嵌入式	黄色	左偏	0	-20'20	0'12	20	跑道视程为350m或更大情况下直下!
☑	滑行道中线灯	FAA	L-852J	嵌入式	绿色	左偏	-15.75	-40'9	-4'14	20	
☑	滑行道中线灯	FAA	L-852J	嵌入式	绿色	左偏	-15.75	-40'9	-4'14	20	
☑	滑行道中线灯	FAA	L-852J	嵌入式	黄色	左偏	-15.75	-40'9	-4'14	20	
☑	滑行道中线灯	FAA	L-852J	嵌入式	黄色	左偏	-15.75	-40'9	-4'14	20	

After the modification, click on the "confirm" button at the bottom right. And the modification appears after the system restarts.

Terminology in table (from left to right)

Selection: Lighting standard selected by users for suitable airport

Lamp Name: the Chinese expression of each lamp in ICAO

Standard: ICAO Convention ANNEX 14

Lighting distribution: According to ICAO requirements, each lamp has corresponding lighting distribution requirements

Type: Vertical/Embedded Lamps

Installation: Formal/Reverse installation, refer to the installation methods of lamps

Color: Different colors emitted by each lamp, white/red/yellow/green/blue

Deviation: Left/Straight/Right

Inclination Angle: Deviated Angle

Horizontal Testing Range: Translational distance of turntable in horizontal direction

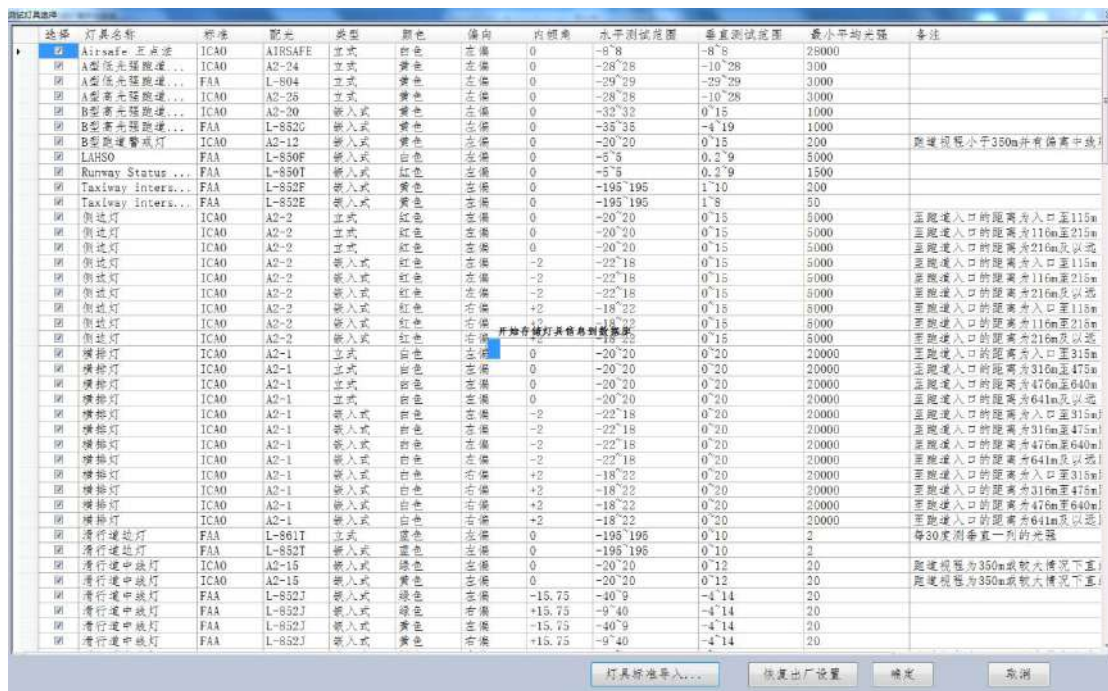
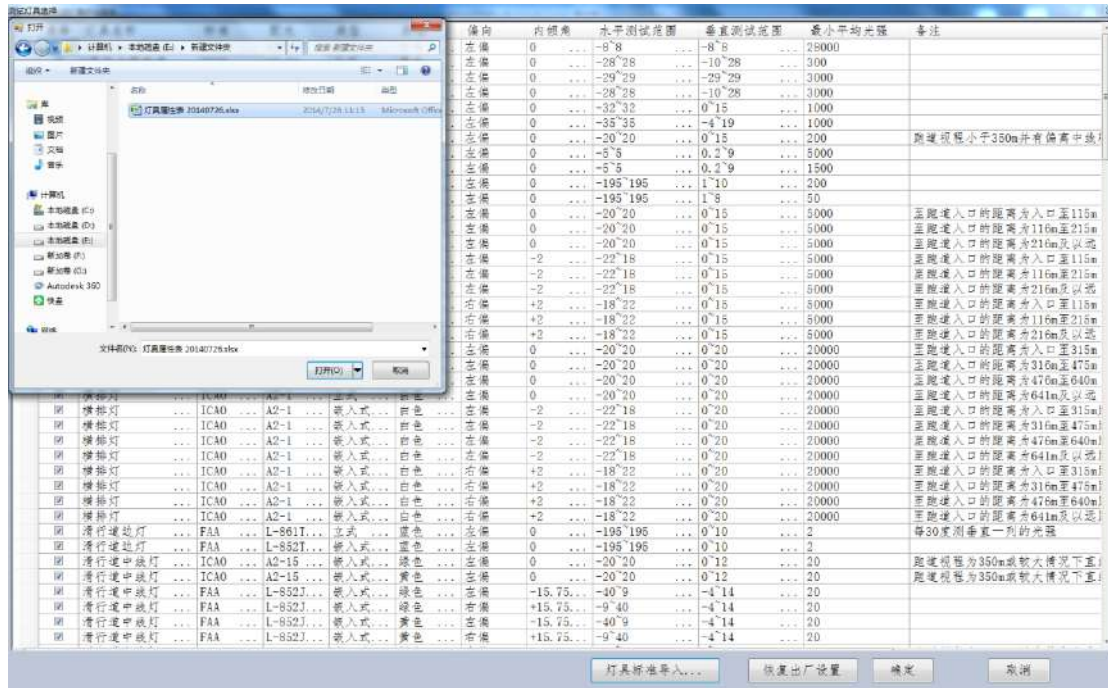
Vertical Testing Range: Translational distance of turntable in vertical direction

Minimum Average Intensity: The Arithmetic meaning of lighting intensity at mesh points within the iso-intensity curve of the main beam

Note: Special description of some lamps

Standard import of lamps

The system can be imported into new lighting standards. The specific steps are as follows:



3.8 About

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Page 17 of 59

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Click on "About" and there will be Airsafe manufacture attributes. Any questions, feel free to send emails to sales@airsafe.com.cn. For software updates, please visit the Airsafe website, www.airsafe.cn. There is a machine code at the bottom of the window for users, as shown in the figure below.



4 Lamps Testing

Lamp testing is the most important part of this manual. Understanding and mastering the correct testing methods is the guarantee of accurate lamp testing results. Otherwise, incorrect test results may occur.

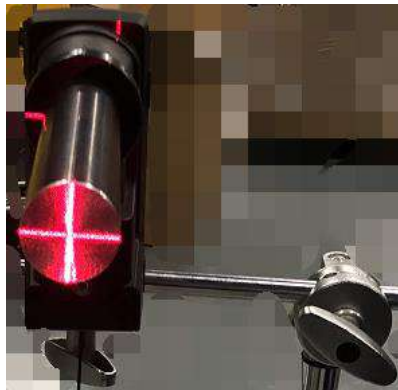
4.1 Sensor Calibration

Sensor calibration is the foundation of all test. Therefore, before testing, it is a must to calibrate and ensure no movement of the sensor after calibration.

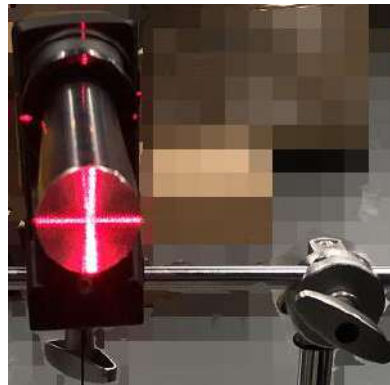
- 1) Install a laser calibrator on the photometric platform, as shown in the following figure:



Calibration Image of Laser Calibrator



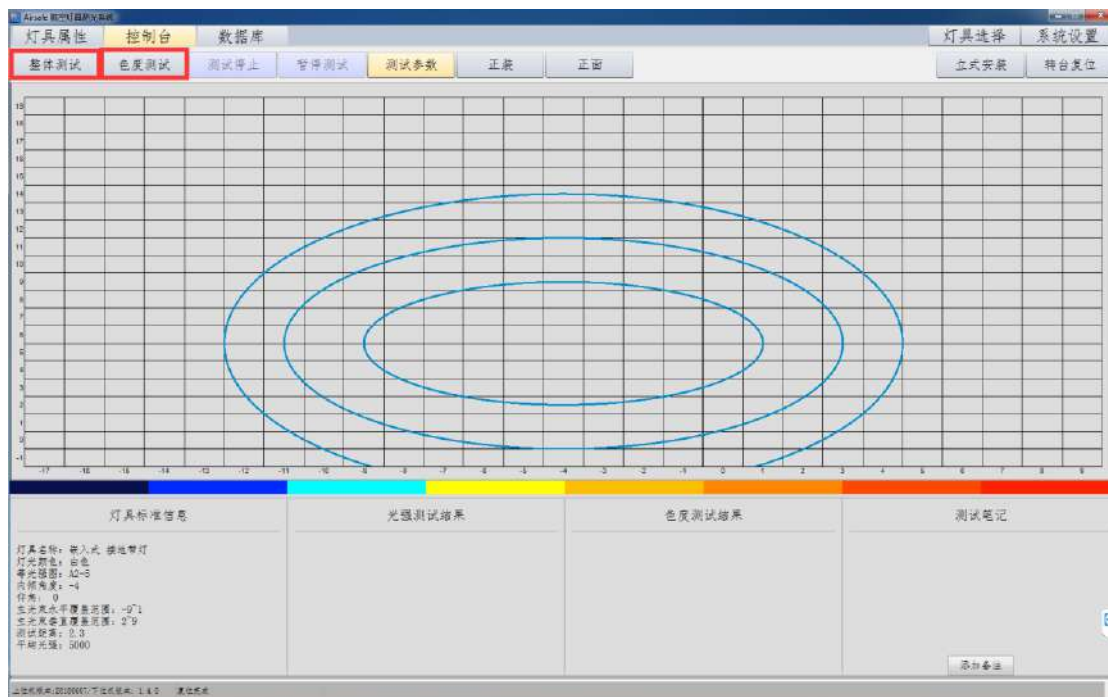
Before Calibration



After Calibration

2) System after calibration

The system provides two lamps testing methods, namely "Overall Testing" and "Chromaticity Testing", as shown in the following figure:



"Overall Testing" is the most commonly used testing method, which fully complies with the requirements of ICAO to formulate the testing scope, calculation method and criterion of the lamps. The testing results that include lighting intensity and chromaticity values, and other

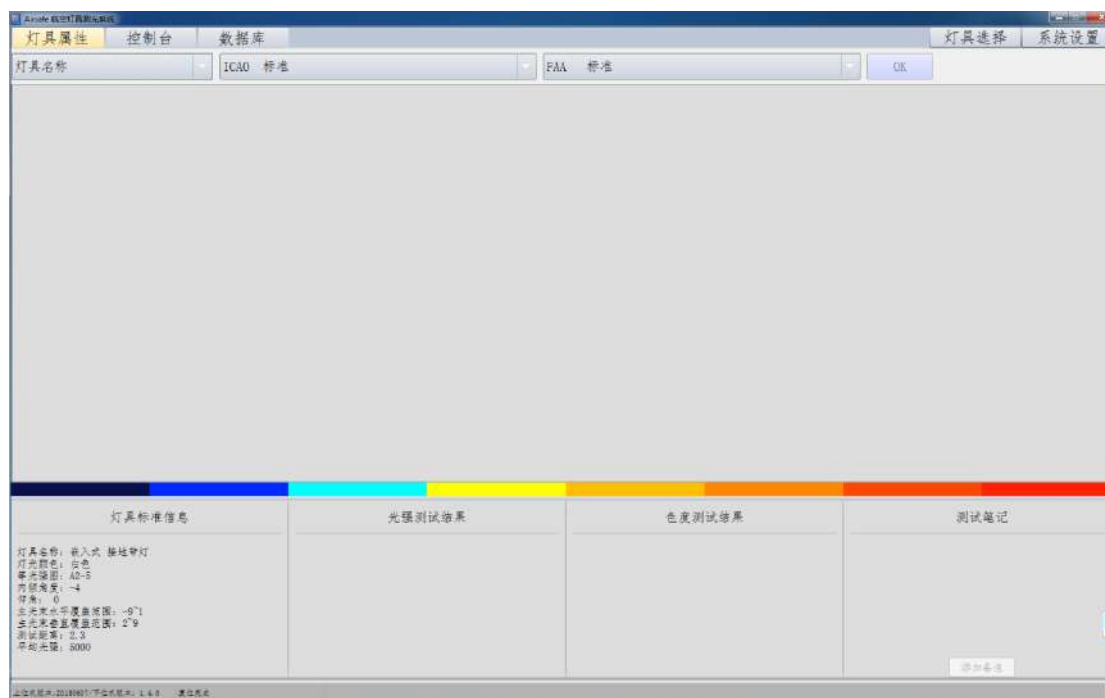
various statistical analysis are stored in the "database" of the system. In order to facilitate the criterion of the tested lamps, three kinds of analytical charts are designed, which could be read or printed by users in the "database".

"Chromaticity Testing" is specially used for chromatic test, though already included in the "standard testing". However, in some cases, if only chromatic testing is needed, users could select it to save much time. It fully complies with the requirements of FAA or ICAO about chromaticity test, and tests five basic points on the standard lighting intensity map. The testing results are about the lighting intensity and chromaticity values of these points, while system provides the specific color coordinate values and analysis diagram for all the points as well.

After each test, the system will save the latest testing attributes of the lamps. Users could enter the testing interface directly without any confirmation if the tested lamps are completely the same as previous. After directly selecting the testing method, and clicking on the corresponding "start test" functional control, system will perform the test. But if a different lamp to be tested, it must be reset.

4.2 Testing Method 1 : Overall Testing

Enter the main interface of "the Lamp Attribute", and users need to make choices on the relevant functional controls to ensure the system to meet the testing conditions of the lamp attribute.

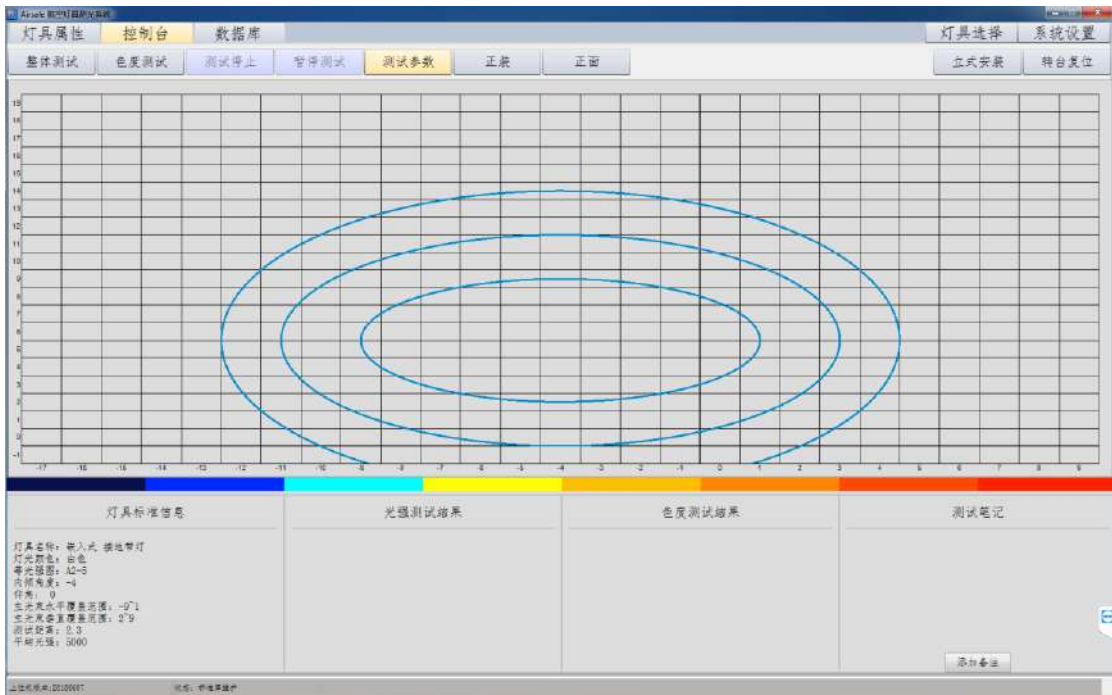


In the "Lamp Attribute" interface, you can choose the name and attribute of the lamp. Because the suitable lamps for the airport have been selected when the system is internally set up, the space chosen here is relatively smaller, which belongs to several commonly used lights in the airport.

As shown in the following figure:



After clicking on the "OK" button, the system switches to the "console" interface, as shown in the following figure:



On the "console" interface, there are "overall testing", "chromaticity testing", "stop test", "pause test", "testing parameters", "formal/reverse", "front/back" and some other functional buttons.



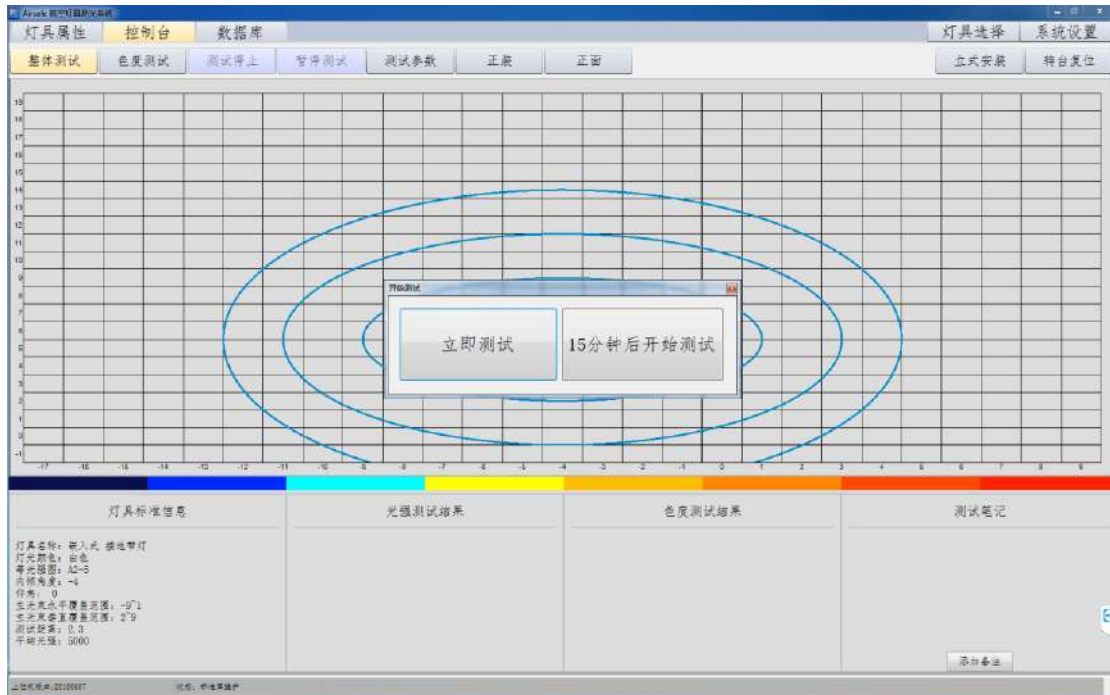
At the lower left of this interface, the standard information of the selected lamps by users will be displayed, including "lamp name", "lamp color", "lighting distribution", "inclination angle", "horizontal (testing) range", "vertical (testing) range" and "testing distance", etc. At the same time, the corresponding standard iso-intensity curve of the tested lamps will be displayed in the center of the interface according to the attributes of the selected lamps.

Before the test starts, you can set up the testing parameters of the system by clicking on the "Testing Parameters" button. Testing parameters include testing scope and testing speed, click on the "confirmation" button after selection.

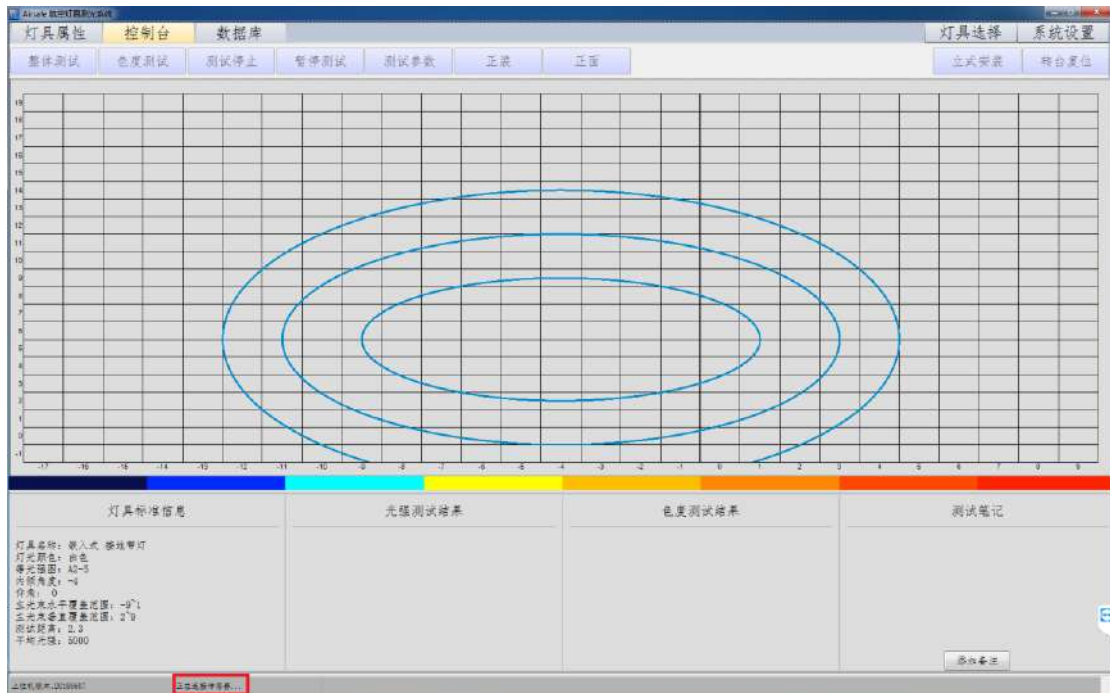
Among them, the selection of testing range allows user to select from the main beam, secondary beam and adjustable, while default is adjustable. The testing speed includes horizontal and vertical testing speed adjustment, which can be adjusted according to the actual needs, default is 1 degree/second;



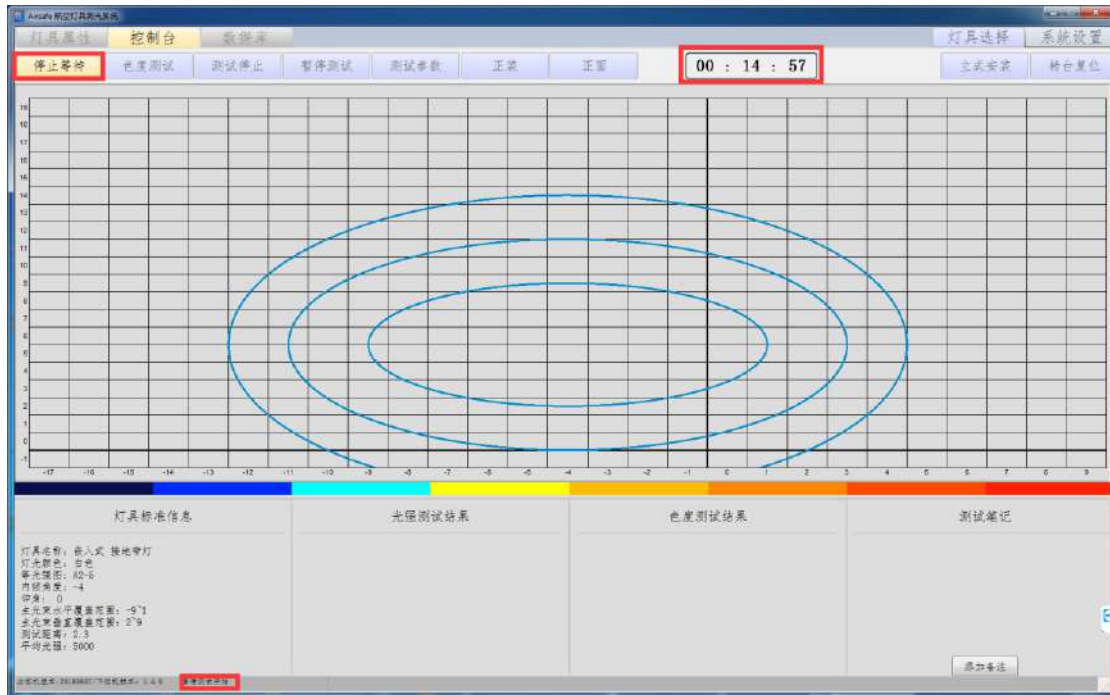
After clicking on "Overall Testing", the system will prompt you to select "Test Now" or "Start Testing in 15 Minutes", as shown in the following figure:



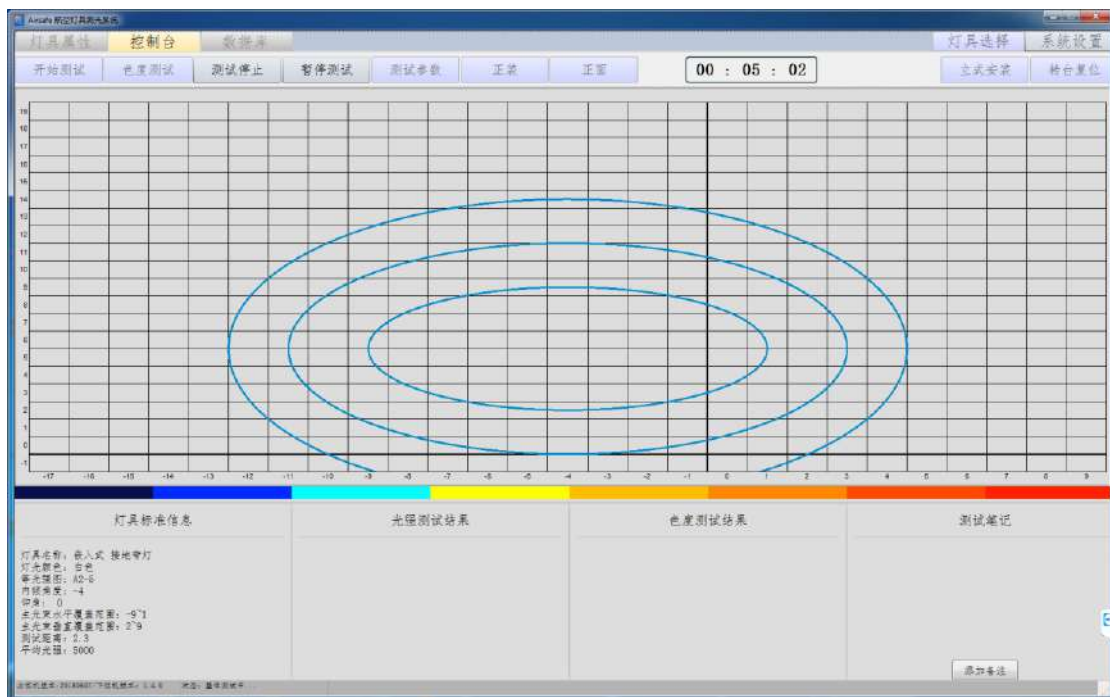
Click on the "Test Now" button. After receiving this command, the link relations between the testing status of system and the sensor is shown as follows:



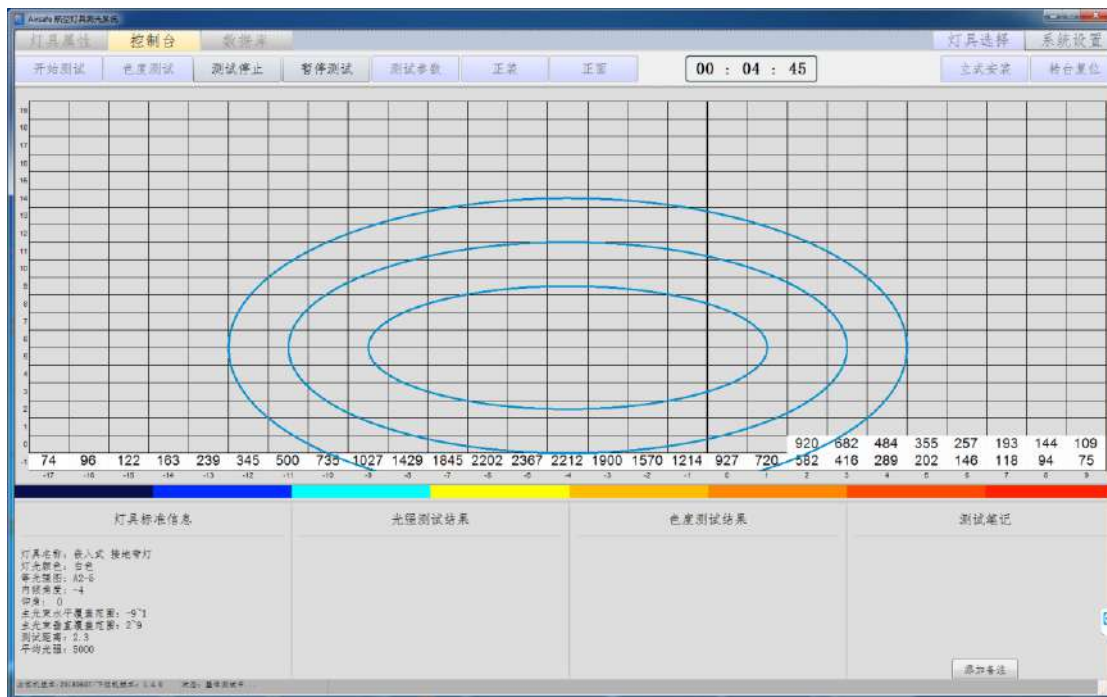
When you click on the "Start Testing in 15 Minutes" button, the system enters the waiting mode automatically before test. During the waiting process, if you need to start testing directly, click on the "Stop Waiting" button to stop waiting.



After successful connection, the function control in the upper left control bar of the “console” interface changes to "Start the test", while "Chromaticity Testing" turns grey, then "Stop Test" and "Pause Test" are available, and the remaining time of the test is displayed. As shown in the following figure:

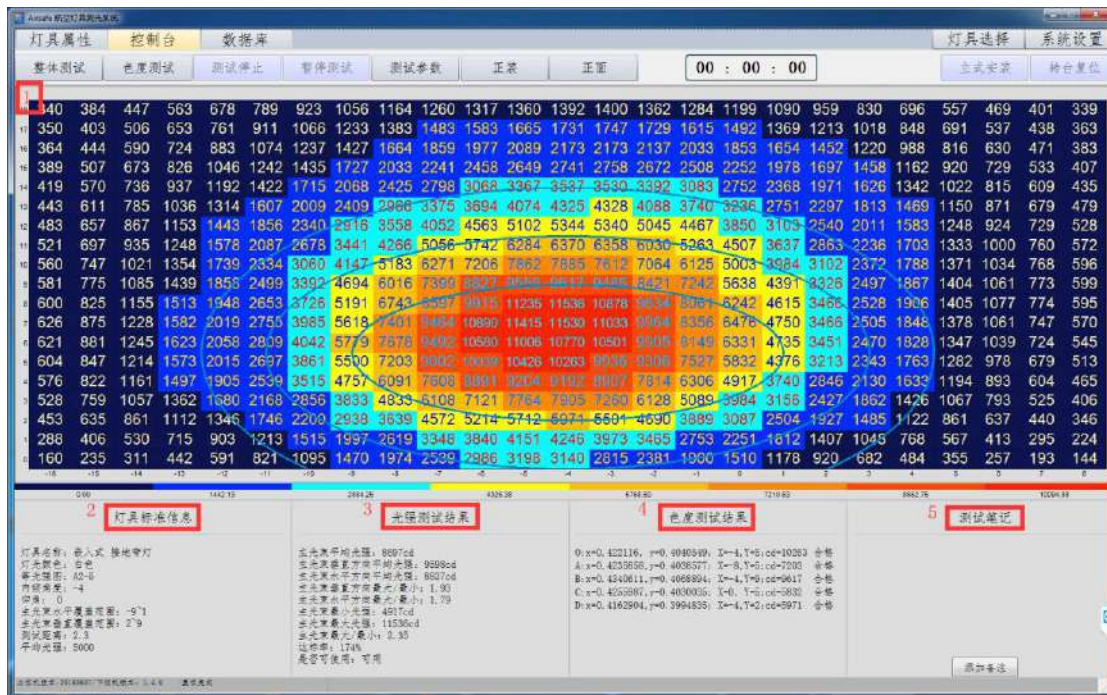


Click on "Start the test" and the system starts to test the lamps. The suspension rack turntable equipped with the tested lamps starts from the initial position, first turns to the lowest left point specified in the testing range, and then rotates from left to right and from bottom to top (except taxiway side lamps). The rotating speed of the turntable is continuous and uninterrupted. The chromatic meter reads the data respectively and consecutively, including the lighting intensity and the chromaticity value. The system continuously fills the data into the corresponding grid of the standard iso-intensity curve on the interface, and the displayed data there is the actual lighting intensity of the point, without showing the chromaticity value of each point. The complete lighting intensity and chromaticity values of each point are stored in the database, users can export these data. As shown in the following figure:



Because the position of some lighting intensity testing points is not uniform with the five special points of chromaticity, the system will judge whether the data of the five special points have been read or not after reading the whole data. If it has been read, the whole test of lamps will complete. If not, the system will automatically select an optimal path to read the data. After reading all the data of lighting intensity and chromaticity, the mechanical

turntable equipped with tested lamps will be reset. At the same time, the system processes the data and forms the following effect interface:



This interface is one of the analysis interfaces in the database, which generally consists of four parts: two-dimensional lighting intensity map (as shown in Figure 1 above), standard information of lamps (as shown in Figure 2 above), the testing results of lighting intensity (as shown in Figure 3 above) and the testing results of chromaticity (as shown in Figure 4 above), etc. Through these four items, users can quickly determine the various characteristics of the lamps.

The color image in the center of the interface is a two-dimensional image of the lighting intensity about lamps, the test of which is just finished. Each grid in the table represents the lighting intensity of the tested lamp at each specific position. The different colors in the table are set up to distinguish the lighting intensity level. During the test, the system lists the lighting intensity scale under the chart according to the values read by each point (as shown in Figure 5 above, the classification is divided according to the lighting intensity; and the color of the ribbon can be customized), the color related to the value of the lighting intensity is embedded in the background block. Different lighting intensity is

reflected in different colors. At the same time, through the standard iso-intensity curve in the background and the angle values of horizontal and vertical axes, users can not only understand the lighting intensity at a specific point, but also clearly see the lighting intensity distribution of the lamps, and intuitively understand the distribution area of the lighting intensity at all levels of the tested lamps.

In the information and testing results of the lamps under the interface, the testing results acquired are after data processing. Users can obtain the specific values of the lighting intensity and chromaticity to know whether the lamp is qualified or not.

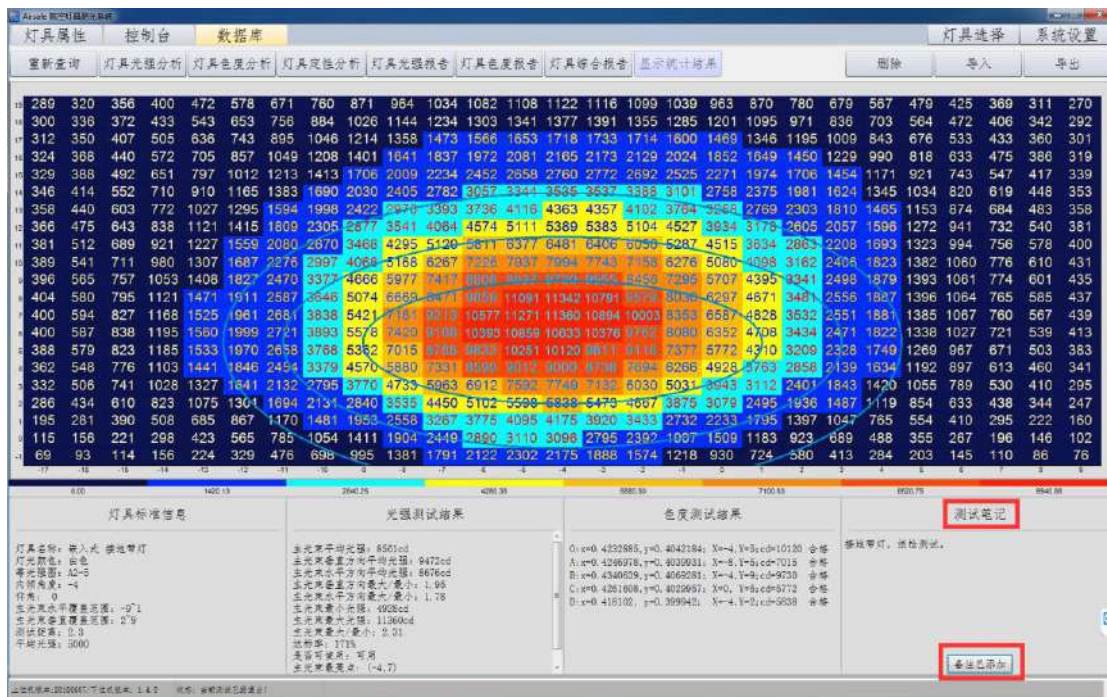
The system judges whether the average lighting intensity of the lamps is qualified or not fully based on FAA criteria, if the ratio of the measured average lighting intensity to the standard average lighting intensity is more than 50% and less than 300% (as shown in the figure below), the lamps is qualified and can be used on the runway or taxiway. However, users must understand that the average lighting intensity up to 100% is always the ultimate goal. Each airport has its own implementation standards, which is unnecessary to fully meet the FAA and ICAO standards. The system allows users to modify the qualified rate of the lighting intensity.



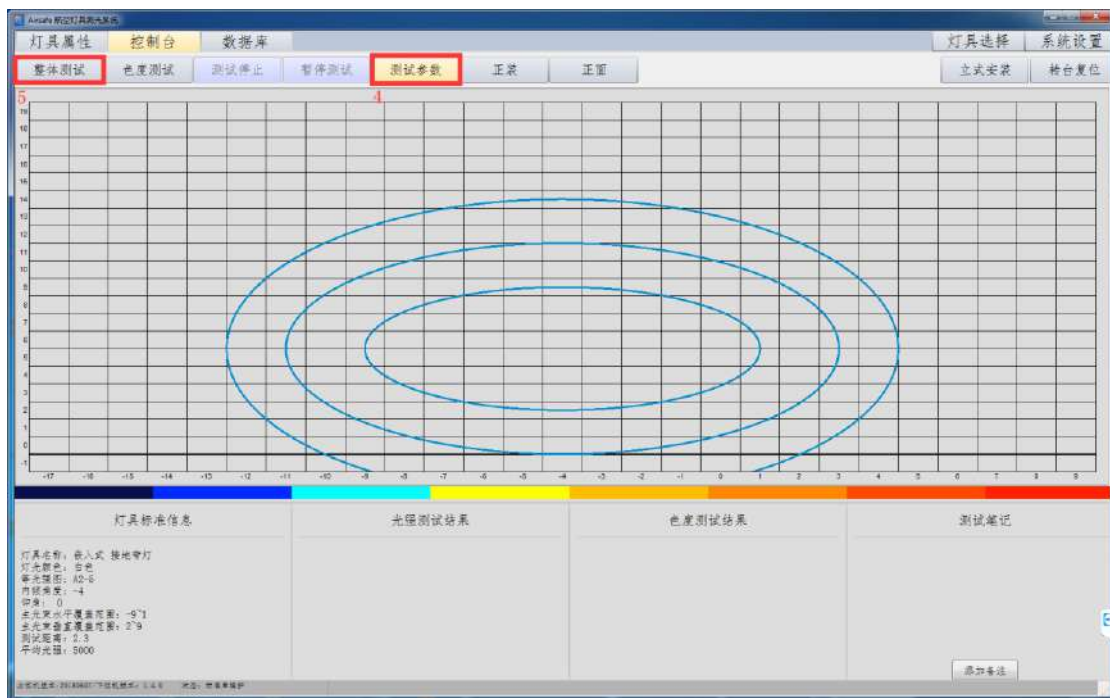
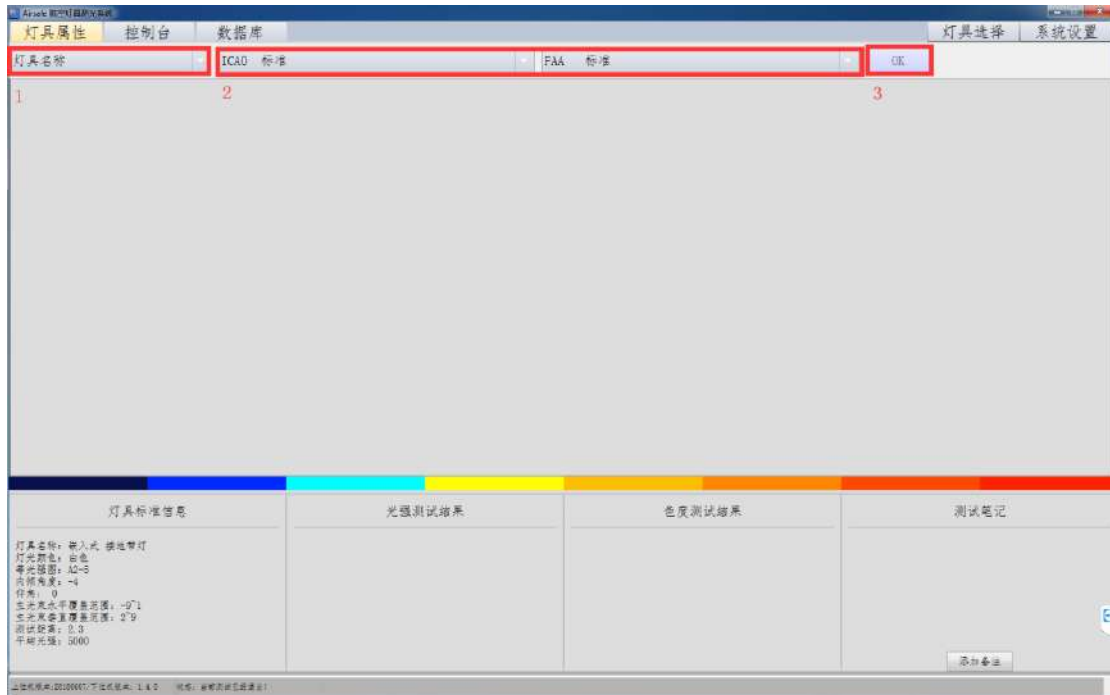
In the lower right corner of the interface, there is a "Testing Notes" column, as shown in the following figure. In the process of lamp testing and after the completion of the test, users can fill in the annotations in the "Testing Notes" column if necessary. The annotations are very helpful for users to recall historical data. After filling in the notes, click on "Add

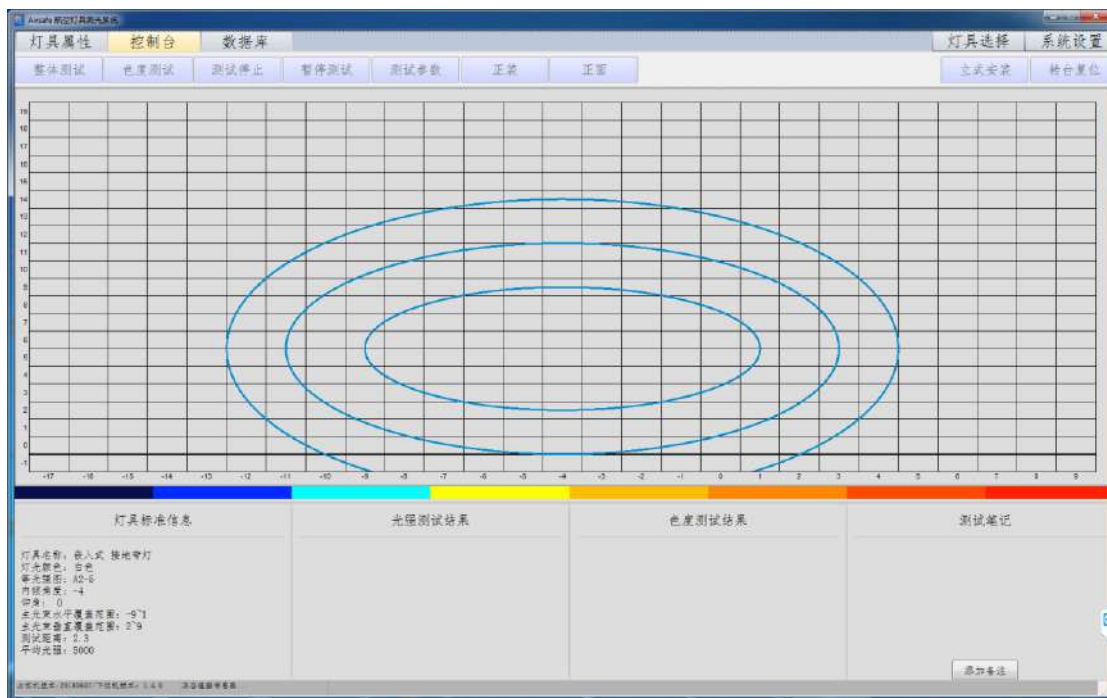
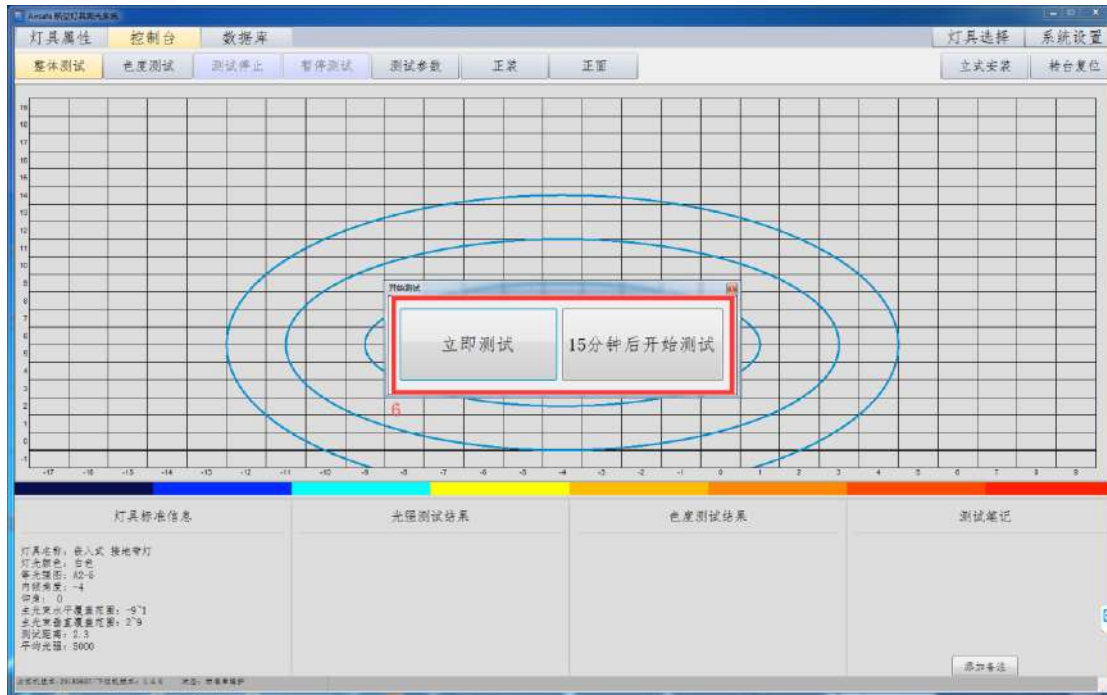
Notes" and the system automatically saves them in the notes bar of the corresponding reports. At the same time, the button is renamed as "Notes have been added". Remarks can be modified at any time. Users can modify the contents of the notes directly on the interface. Wherever it is modified, once the content is saved, the comments on the interface will be the same as those in the test report.

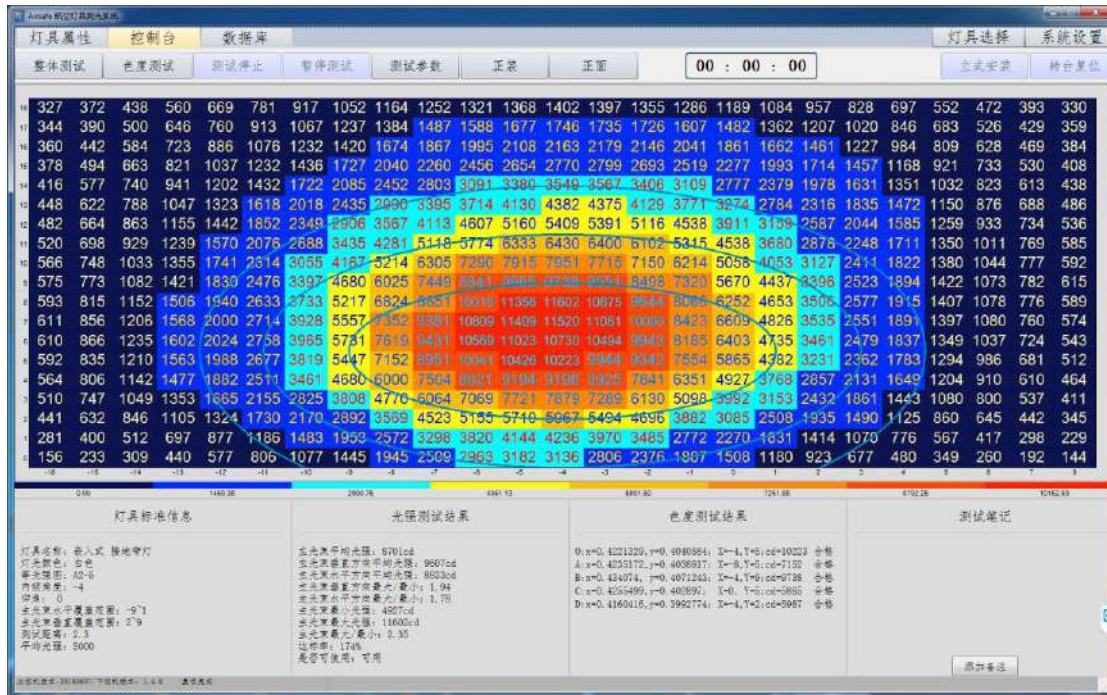
In addition, for the existing historical data, you can still modify the "testing notes" on the database page in the same way as the above method.



To sum up, the overall testing of the lamps can be carried out in the following steps:



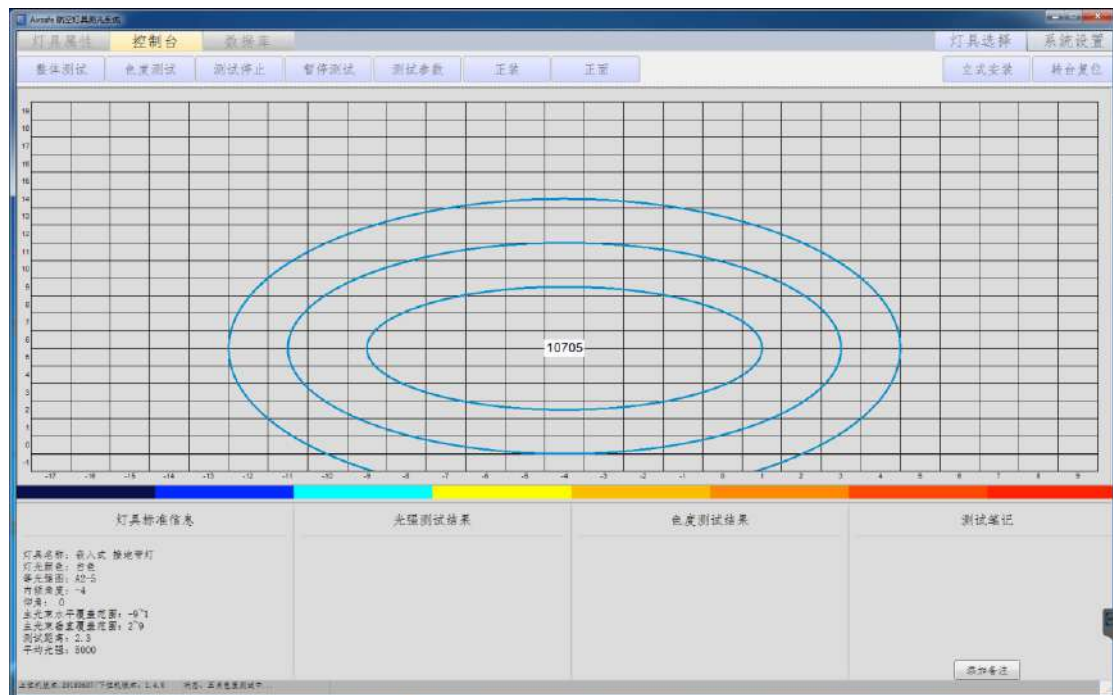




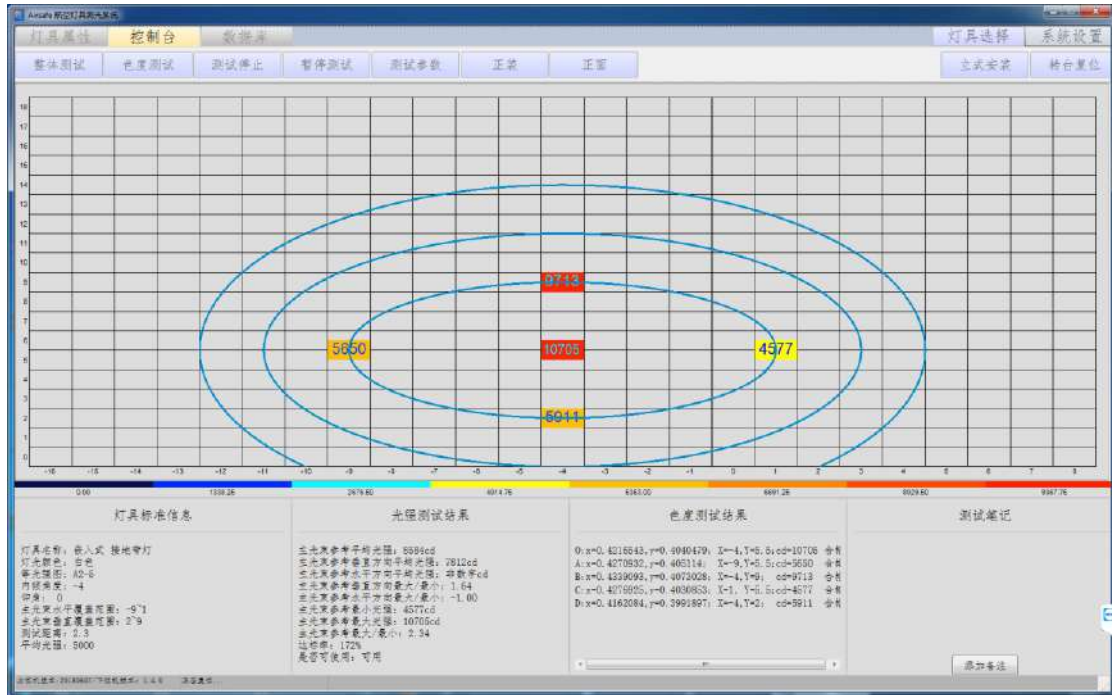
4.3 Testing Method 2 : Chromaticity Testing

After choosing the lamp, enter the console and click on the "Chromaticity Testing" button.

The system starts the test. The buttons such as "Overall Testing", "Stop Test" and "Pause Test" are not available at this time. As shown in the following figure:

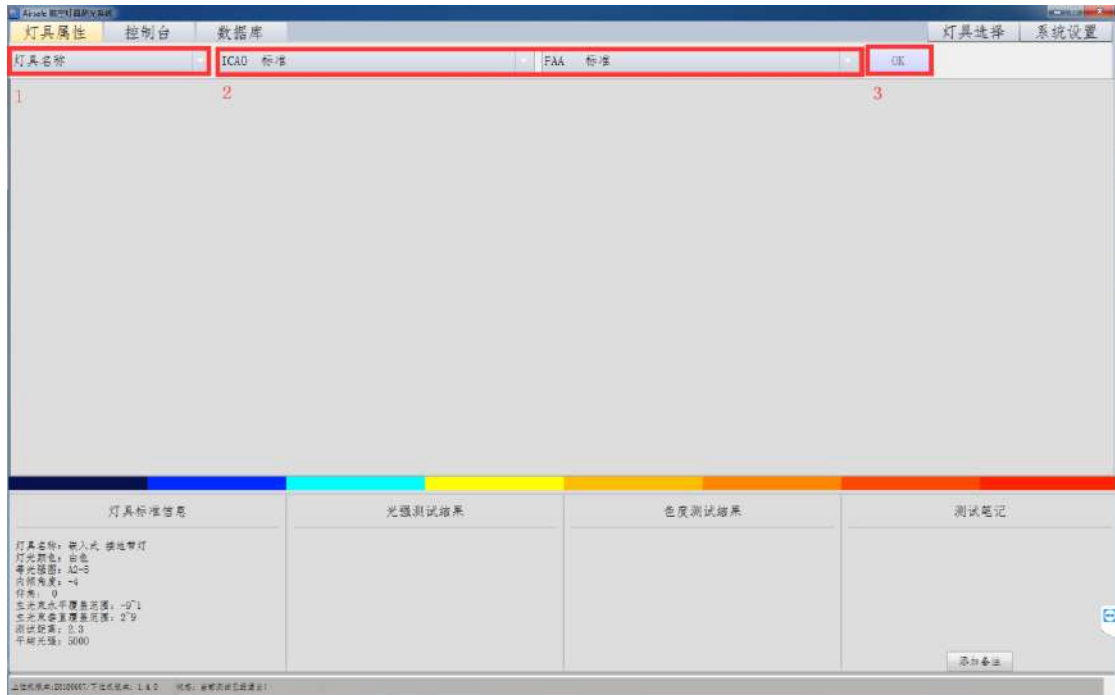


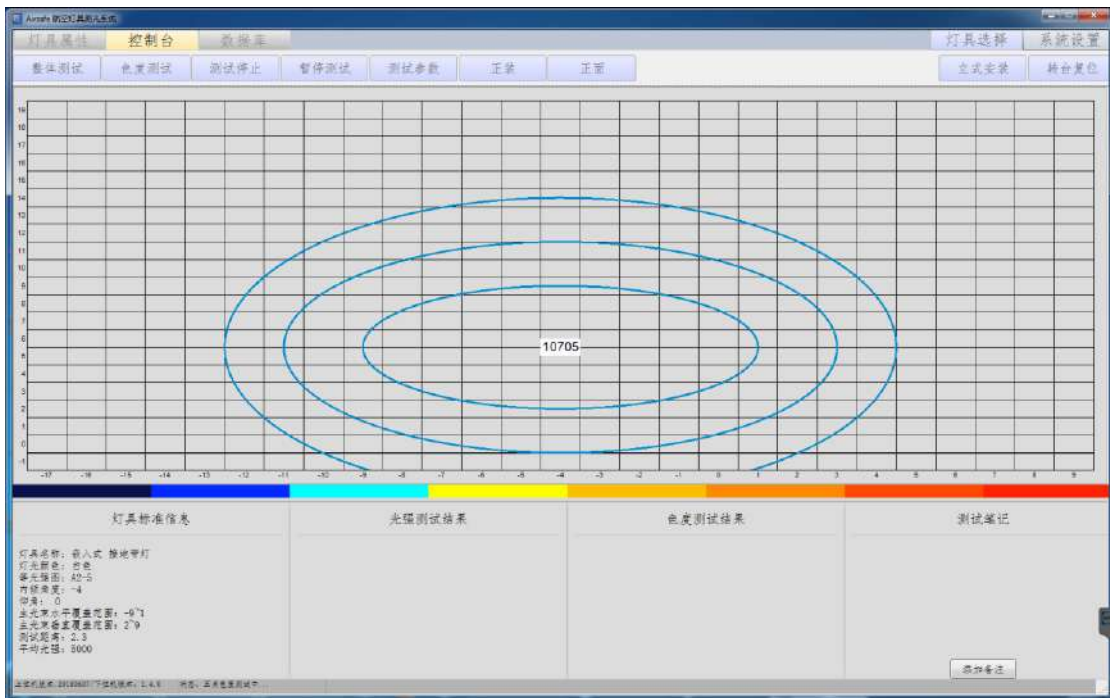
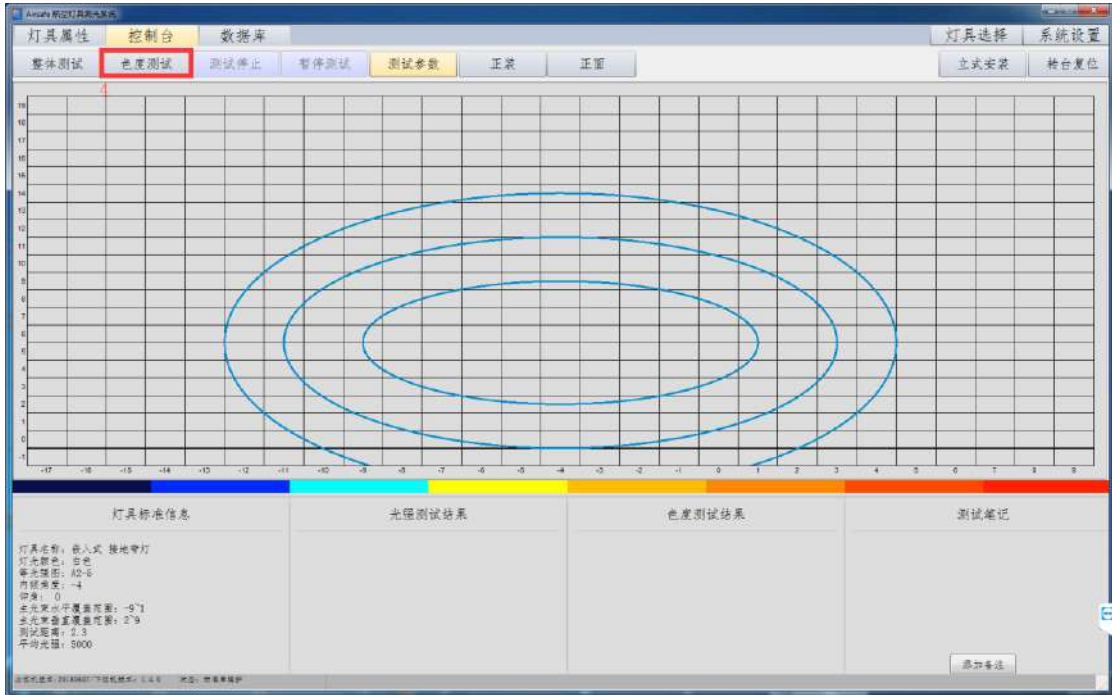
After clicking on "Start the test", the suspension rack turntable equipped with the tested lamps starts from the initial position. The chromatic meter reads the data respectively and consecutively, including the lighting intensity and chromaticity value. The system continuously fills the data into the corresponding grid on the interface, and the data displayed on the location are the actual measured lighting intensity and the chromaticity value of the point. After the last data is read, the system automatically switches to the following interface:

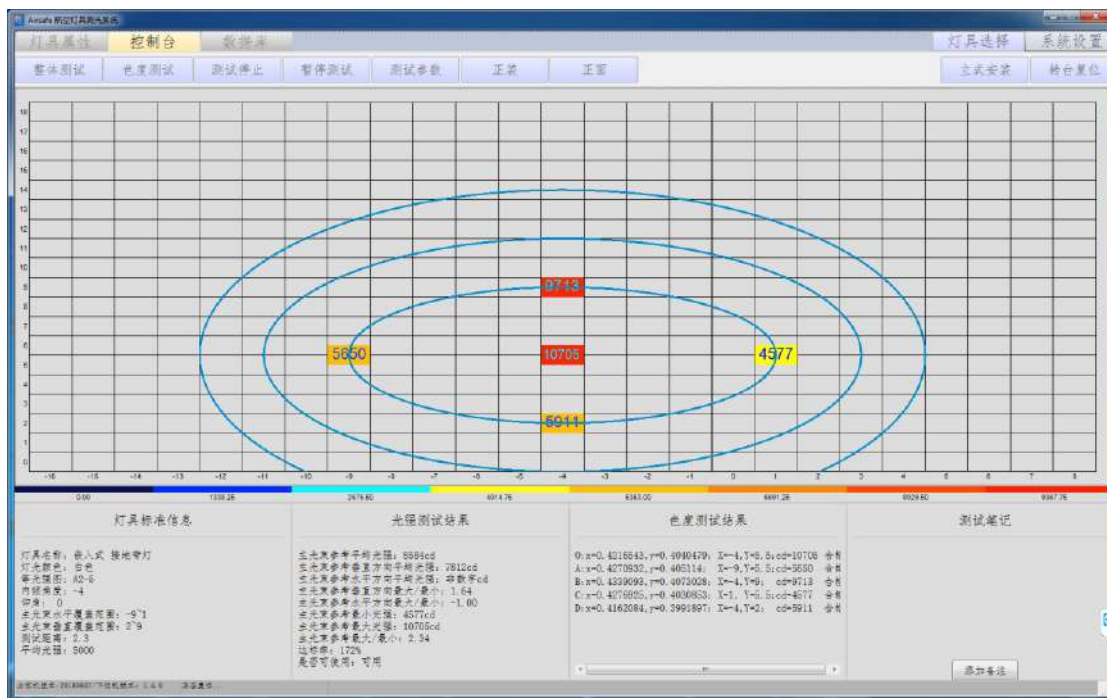
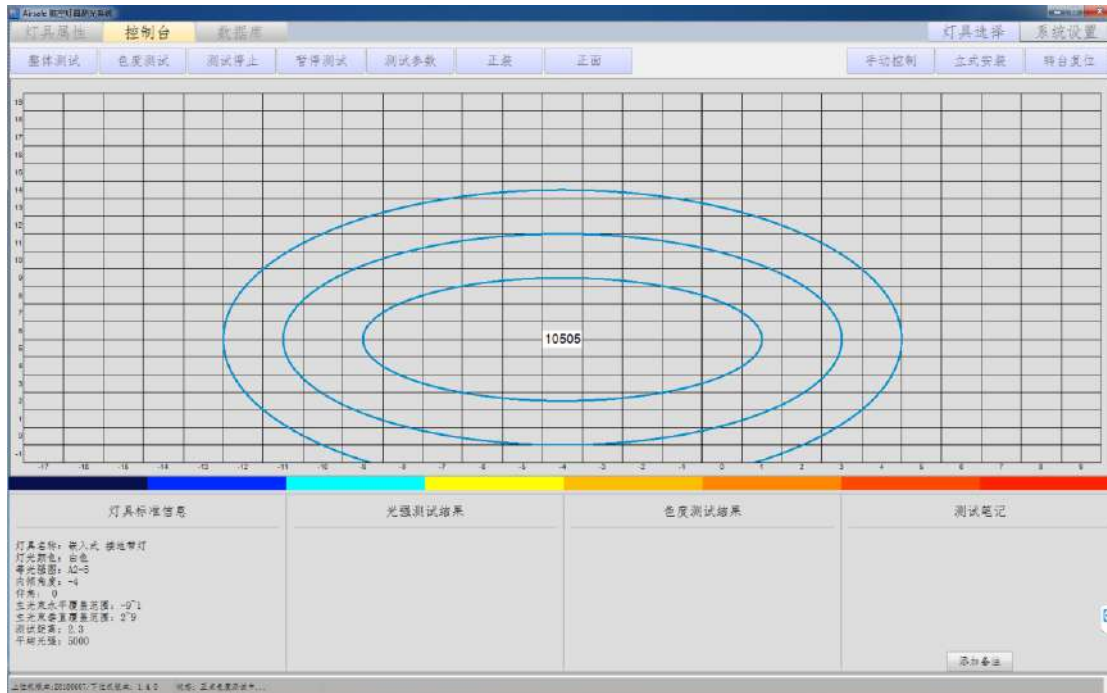


The chromatic report of each test is stored in the database. Users can query the data analysis content in the "database" interface and print the data report.

To sum up, the chromaticity testing of the lamps can be carried out in the following steps:







5 Naming the Data File of the Lamp

After the test of the lamps, all data files will be named and stored in the designated location in the database. The naming method adopts the systematically automatic naming method.

After the test of each lamp is finished, the measured data of lighting intensity and chromaticity will be automatically stored in the systematic database. The system produces a unified naming for the lamp. The naming method consists of "prefix" and "suffix". The prefix part mainly classifies lamps, including testing methods, lamps name, testing criteria, etc. The suffix part indicates the testing time. Besides, this method is named according to "year, month, day + time" (time is the time when the last data of the test is obtained, accurate to "second"). Since the suffix part is completely named according to time, the filename in the system will not duplicate.

The Nomenclature of "Overall Testing": Standard + Lamp Name + Testing Time

For example, a lamp is named as: taxiway centerline lamp ICAO A2-15 embedded yellow 20150511184232

The specific meaning is that the name of the lamp is Taxiway centerline lamp

The implementation standard is ICAO, and the standard intensity distribution map is A2-15.

The testing time was 18:42:32 seconds on May 11, 2015.

The Nomenclature of "Chromaticity Testing": Chromaticity + Lamp Name + Testing Time

For example, a lamp named: taxiway midline lamp ICAO A2-15 embedded yellow 20150511184232

The specific meaning is that the name of the lamp is Taxiway centerline lamp

The implementation standard is ICAO, and the standard intensity distribution map is A2-15.

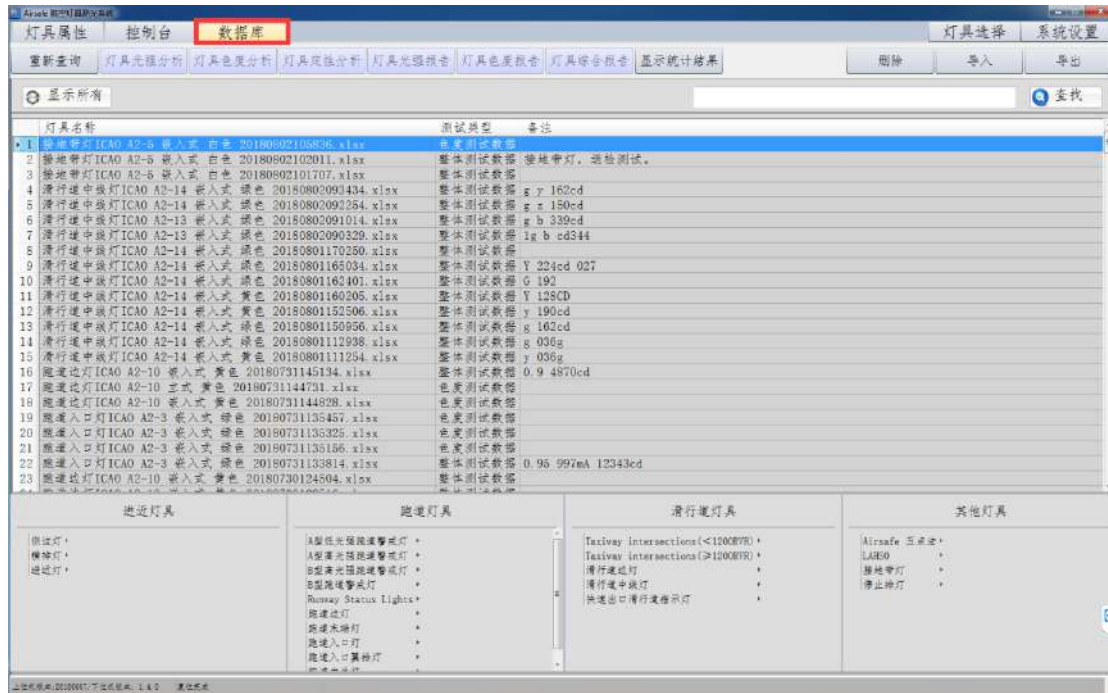
The testing time was 18:42:32 on May 11, 2015.

To sum up, the naming of all the tested lamps includes time factor, so these naming are unique. All data after the test, including various testing reports, are named uniformly and uniquely and stored in the "database" of the system.

6 Database Queries and Reports

All kinds of test and analysis reports of lamps are stored in "database". No matter what kind of test is carried out, after it is completed, the main interface will change from "testing control" to "database", analyze the data of tested lamps in the shortest time and present the real-time analysis report within several seconds, the form of which is introduced in the section of lamp testing according to the different testing methods.

The database interface is as follows:



6.1 Testing Data Queries of the Lamps

The testing data of each lamp is stored in the "database", where users can query. The data of the just tested lamp is stored at the head of the lamp inquiry form, while the rest is ranked by testing time.

There are three ways to query the lamp: 1. Visually search directly in the list; 2. Enter the name of lamp in the search box, then click to find; 3. Screen according to the type of the lamp. After finding the corresponding file, double-click on it, all the data and analysis related to the lamp can be obtained.

If users need to query historical testing data, they can click on the "database" button, and the interface will be converted to the corresponding one. When users inquire, they can search directly according to the sequence of the testing time, or first select the name of the lamp, and then search according to the sequence of the testing time. No matter which query method is used, the query results are consistent.

6.1.1 Query by the testing time

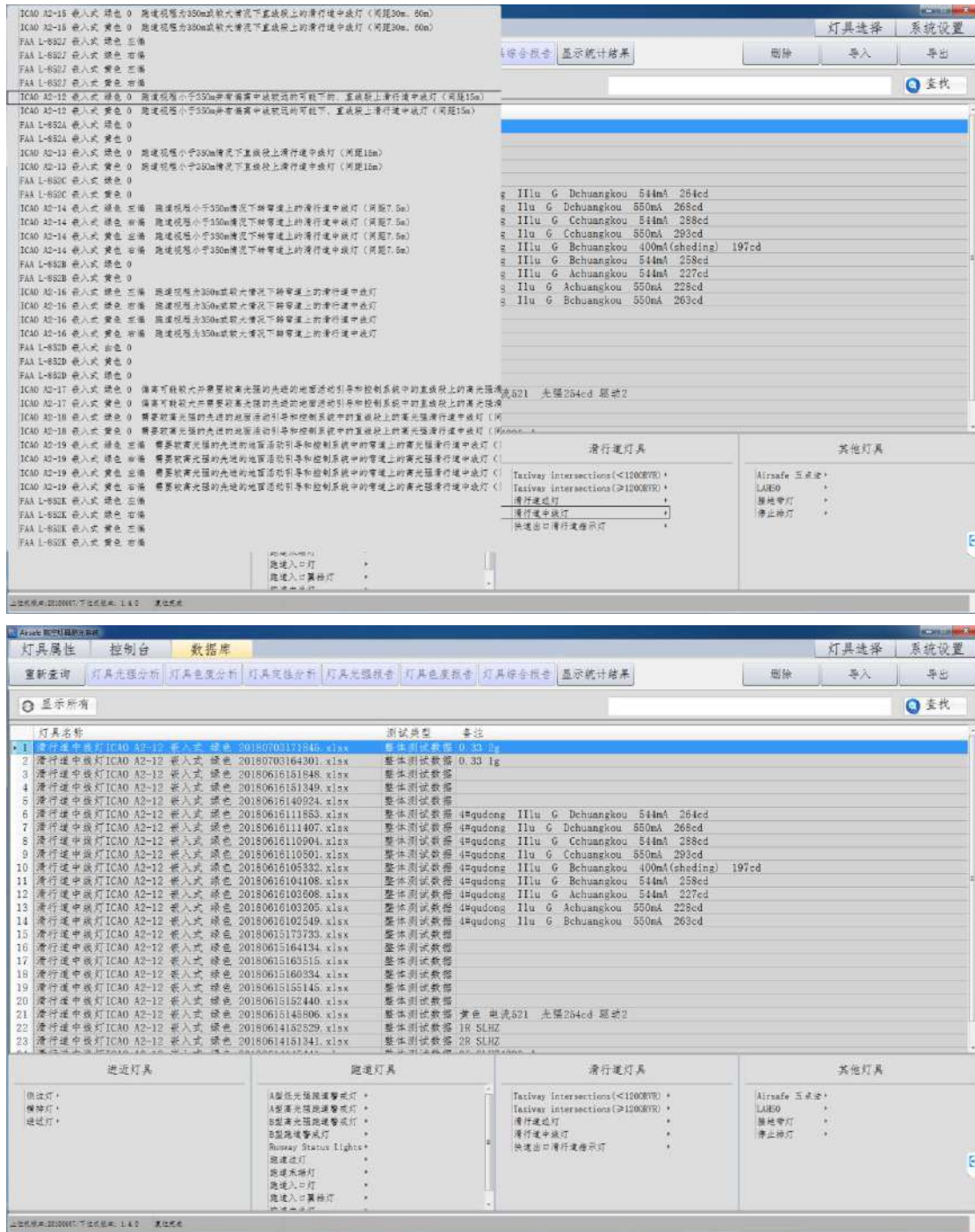
All the testing reports are displayed in the "Lighting Database" box, and ranked by time. The latest testing reports are at the head. Users choose the report they want according to the testing time. This method is suitable for searching recently tested lamps.

6.1.2 Query by search

Enter the full or part name of the lamp in the search box, then the system can search the testing data of the corresponding lamp, and user can select the corresponding testing data according to the actual needs.

6.1.3 Query by the attribute of lamps

According to the name, type, color, inclination etc. of the lamp, users can display all the testing report files of the same type, which are ranked by the testing time, and select among them. As shown in the following figure:

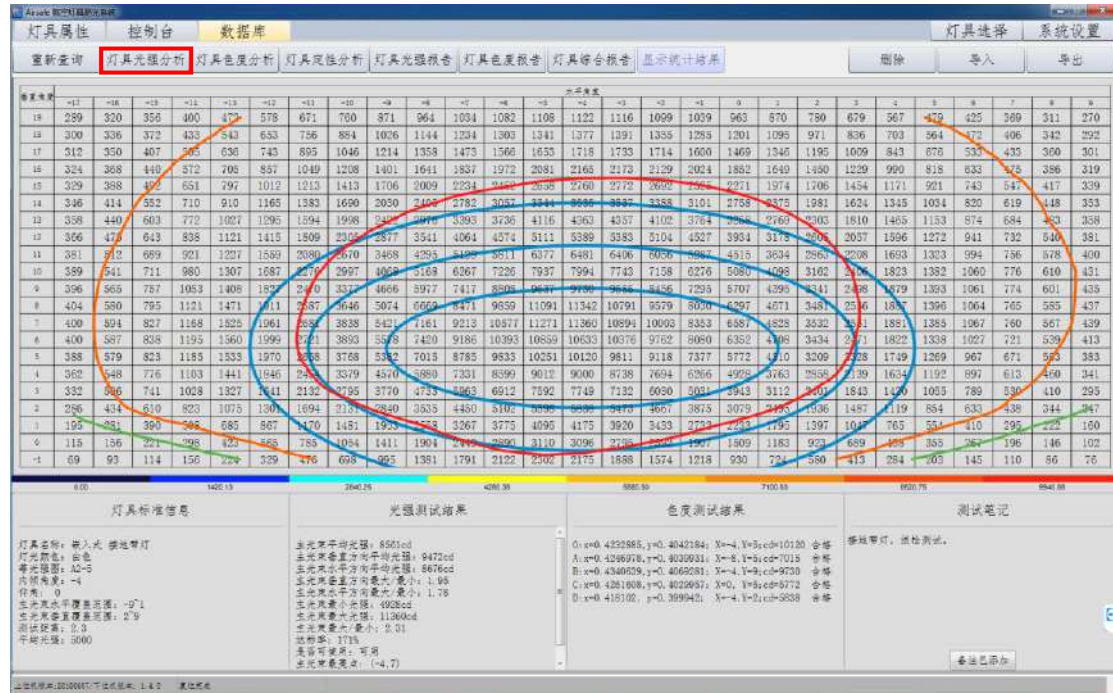


6.2 Testing Data Analysis of the Lamps

The "database" in the main interface provides three different interfaces: lighting intensity analysis of the lamp, chromaticity analysis of the lamp" and "qualitative analysis of the lamp" for users to understand the characteristics of the tested lamps from different sides. In addition, the system provides users with three corresponding reports, "lighting intensity report of the lamp",

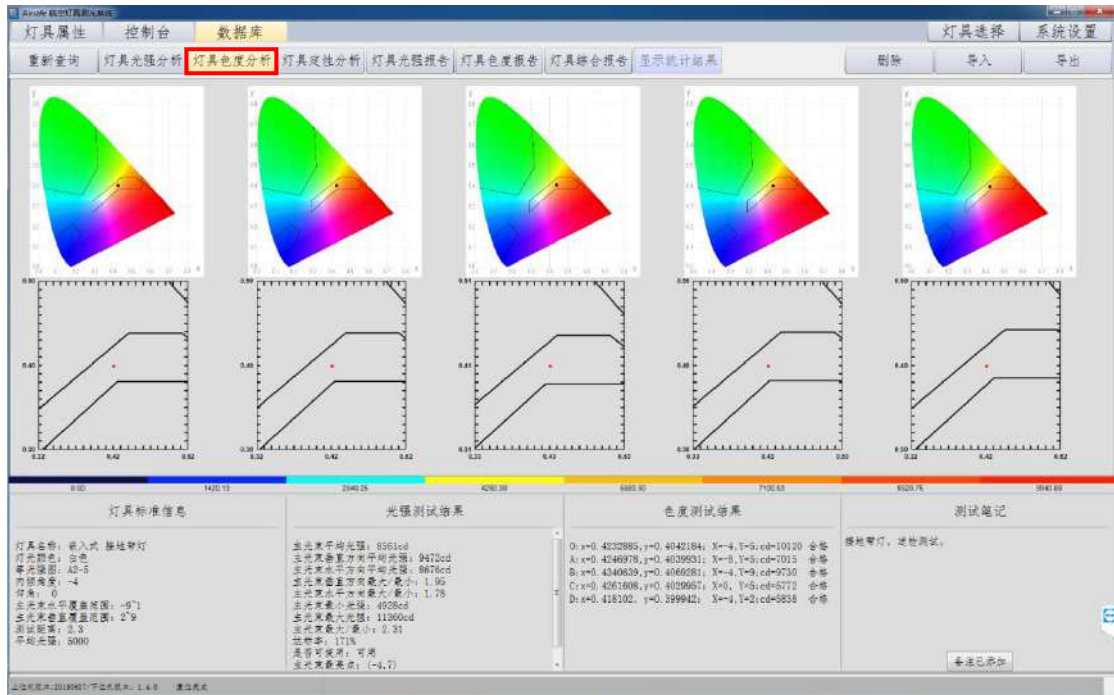
“chromaticity report of the lamp” and “comprehensive report of the lamp” to print and save conveniently.

Click on the button "Lighting Intensity Analysis of the Lamps", which is located in the red box, the system appears the following interface:



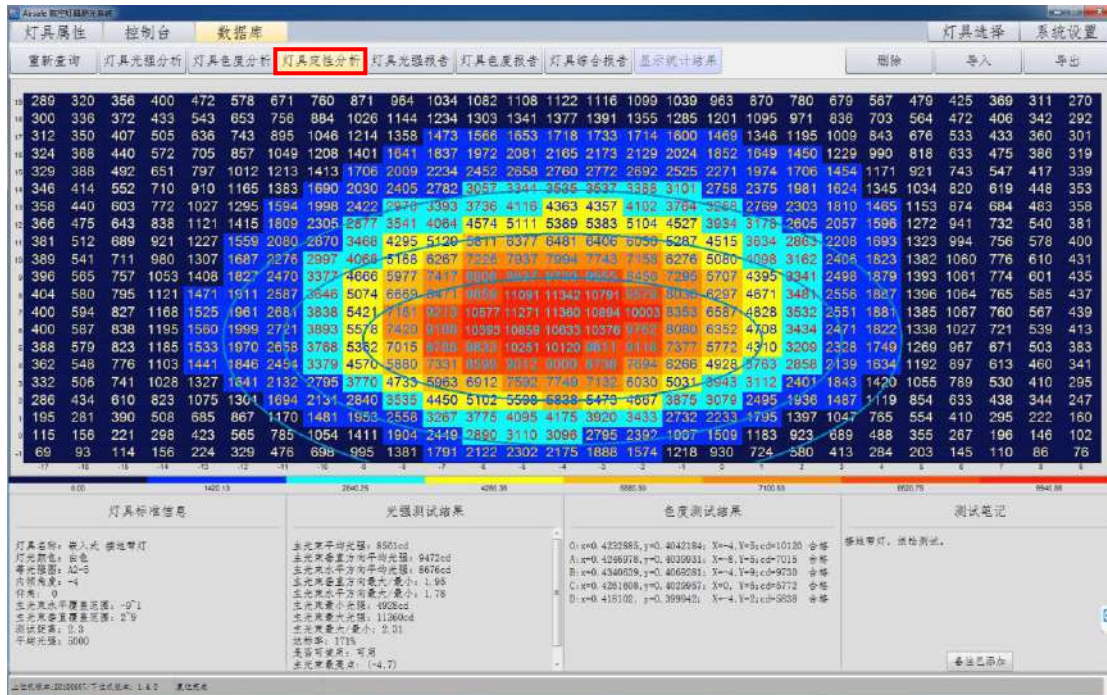
The interface shows a lighting iso-intensity curve, from which the user can directly observe whether the measured curve of the tested lamp envelopes the standard type. Envelope indicates the lighting intensity is qualified, while non-envelope indicates unqualified. The data on the left side of the picture is the data analysis of the lighting intensity data, and the judgment of whether the data is available or not. Under the ribbon is the attribute of the tested lamp, the preliminary data analysis of the lighting intensity and chromaticity value and notes.

Click on the button "Chromaticity Analysis of the lamp", the system appears the following interface:



In the interface, the landing point of the chromaticity value of the five special points of the tested lamp is presented, within range means qualified. Only all the landing points are within range means qualified chromaticity value. Under the ribbon is the attribute of the tested lamp, the preliminary data analysis of the lighting intensity and chromaticity value and notes.

After clicking on the button "Qualitative Analysis of the Lamps", the following interface appears:



The color image in the center of the interface is a two-dimensional image of the lighting intensity. Each grid in the table represents the lighting intensity of the tested lamp at each specific position. Under the ribbon is the attribute of the tested lamp, the preliminary data analysis of the lighting intensity and chromaticity value and notes.

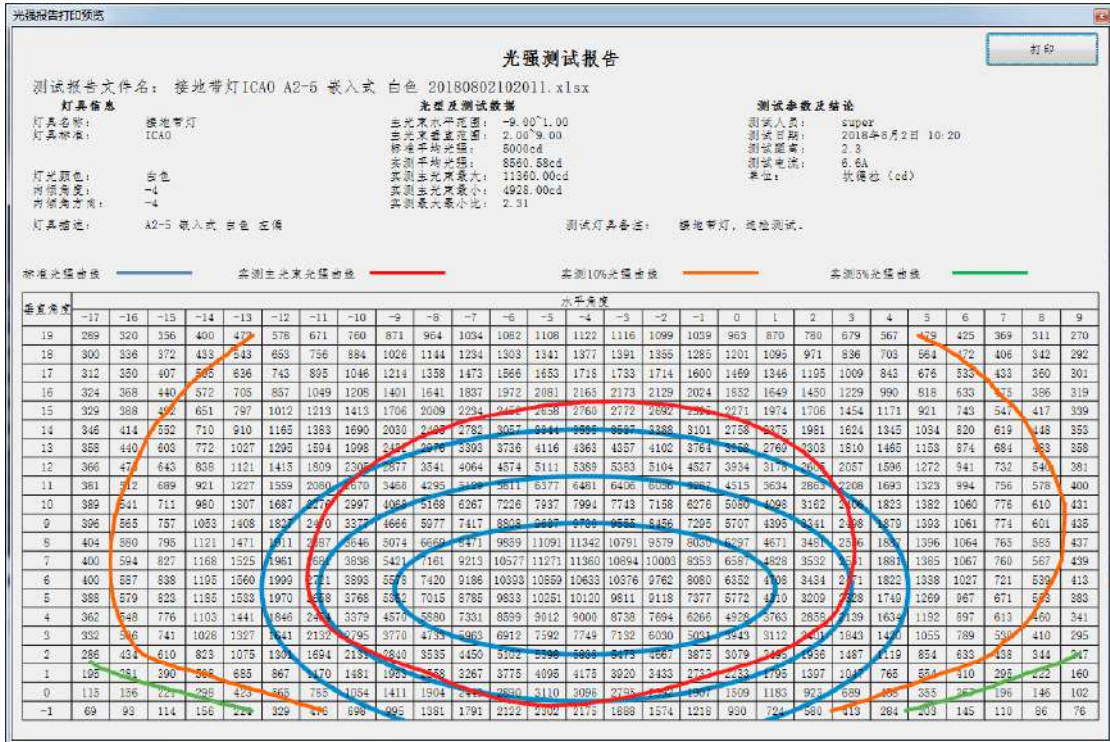
These three interfaces above are converted to each other.

6.3 Data Report of the Lamps

"Lighting intensity report of the lamp", "chromaticity report of the lamp" and "comprehensive report of the lamp can be acquired from the "database" in the main interface, which comes from the analysis of these contents. Users can print all kinds of reports as needed.

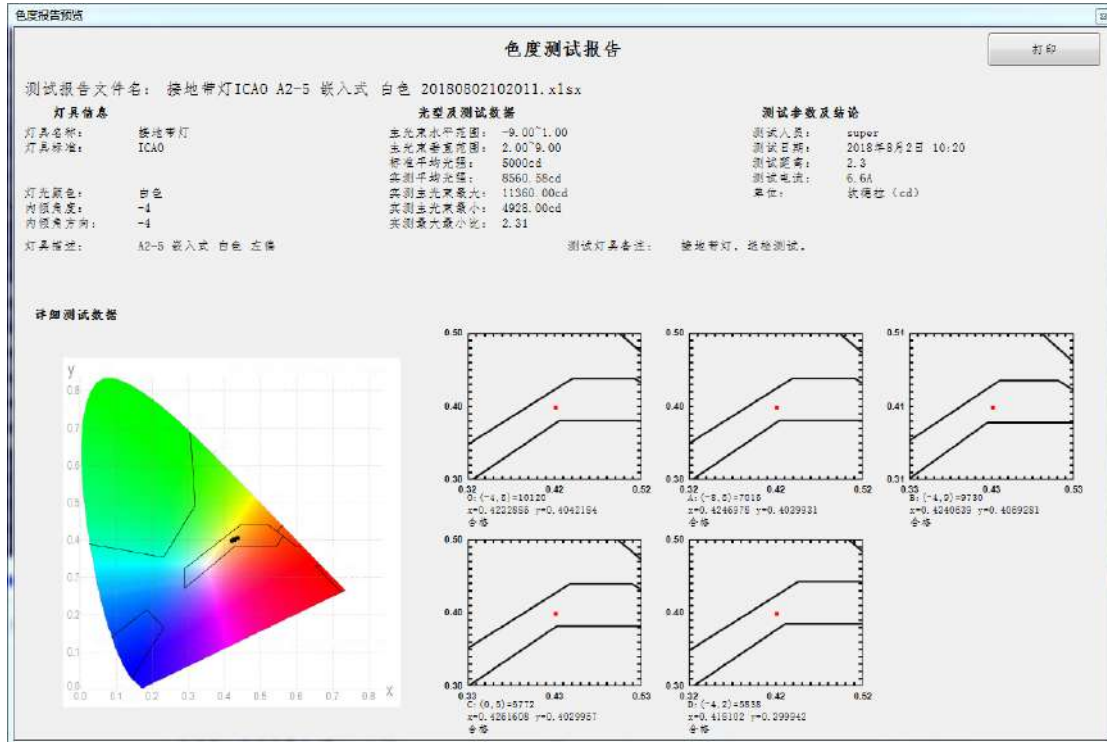
Click on the button "Lighting intensity report of the lamps" to get "Lighting intensity report of the lamps".

The upper part of the report shows the testing time, the attribute of the lamp, testing criteria and environment. It mainly provides iso-intensity curves and main beam intensity values. Finally, the report shows the analysis of the lighting in the end.



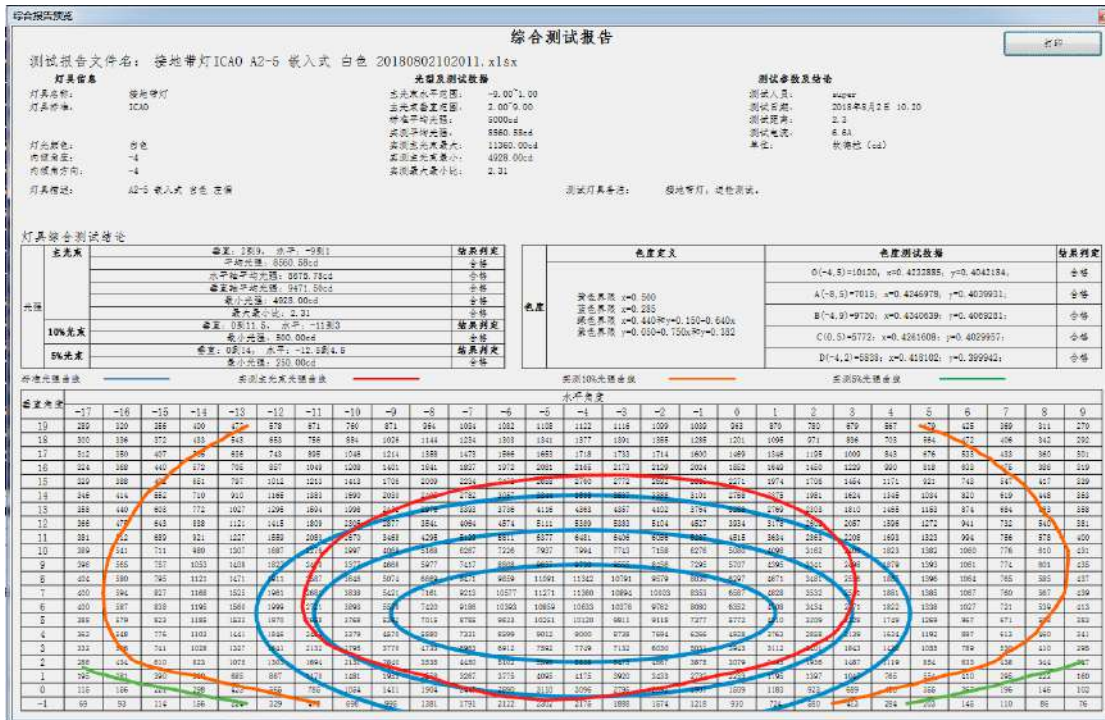
Click on the button "the Chromaticity Report of the lamp" to get "the Chromaticity Report of the lamp".

The upper part of the report shows the testing time, the attribute of the lamp, testing criteria and environment. It mainly shows the chromaticity value of the five special points, the landing points within range, and the final judgment on chromaticity.



Click on the button "the Comprehensive Report of the lamp" to get "the Comprehensive Report of the lamp". At the end of the report, the content of lighting intensity analysis and the analysis and judgment of five-point chromaticity value of lamps are displayed. Also, the system makes a final comprehensive judgment based on the judgment of lighting intensity and chromaticity.

The three keys to view the report can be used alternately. If you need to view the analysis of lighting intensity and chromaticity at this time, just click on the corresponding button immediately to view the report.

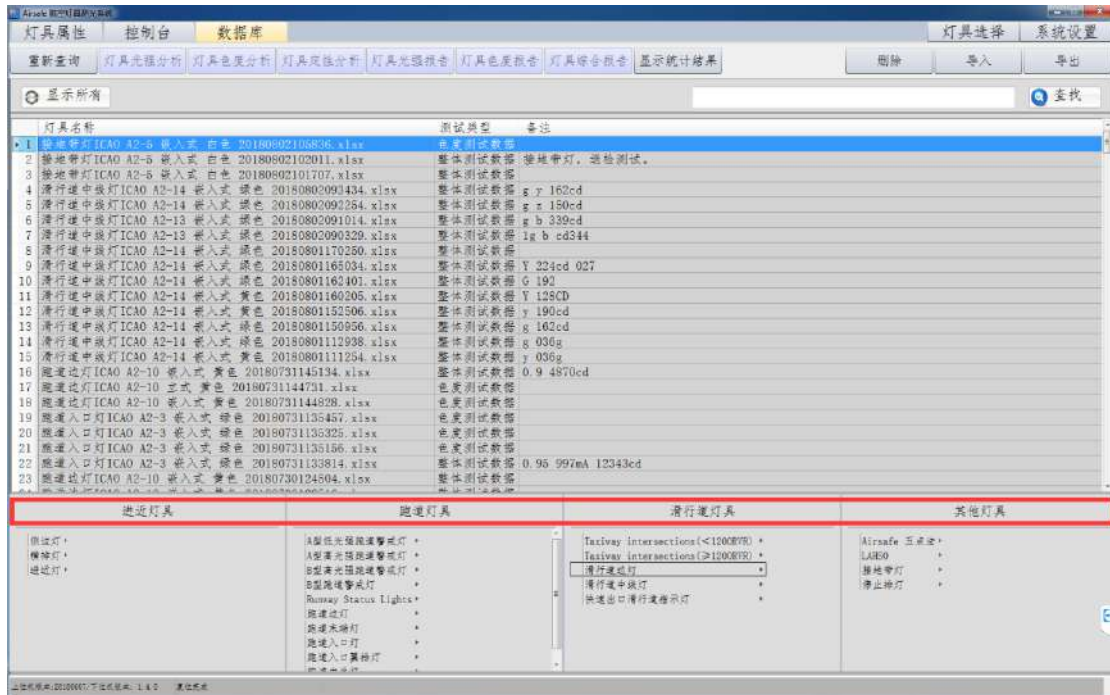


6.4 Data Statistics of the Lamps

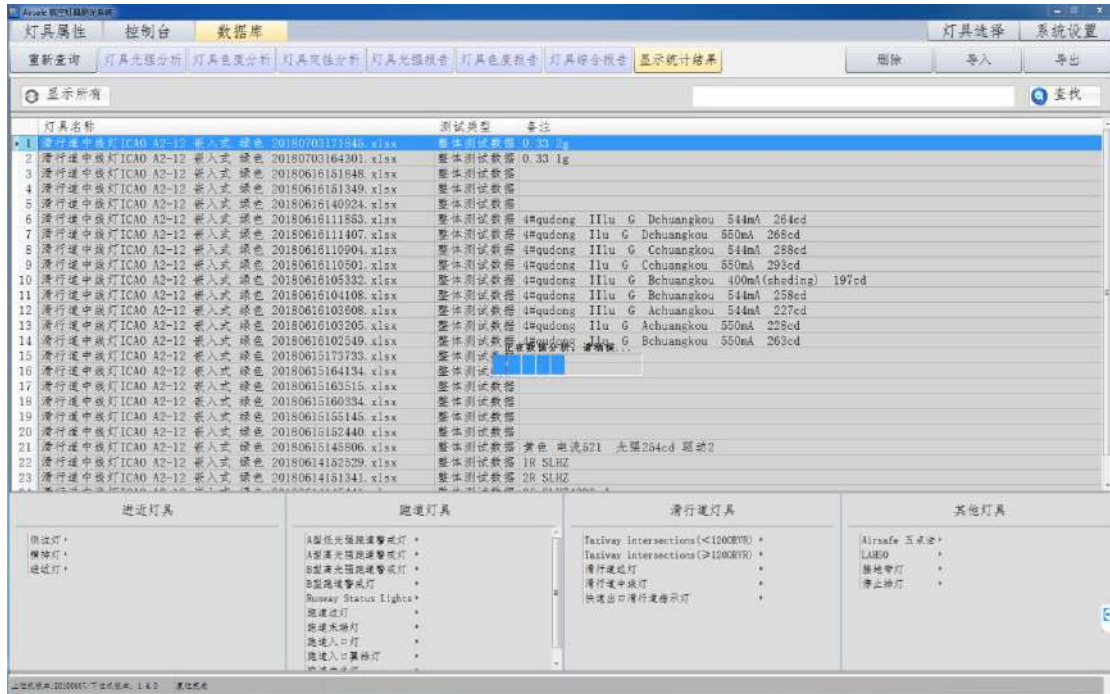
Users can use the same type of data to carry out systematic intensity data statistics, and analyze the difference of lighting intensity value according to the statistical content. Generally, this kind of statistics is used in the production and massive test of the same type of lamps.

Statistical methods:

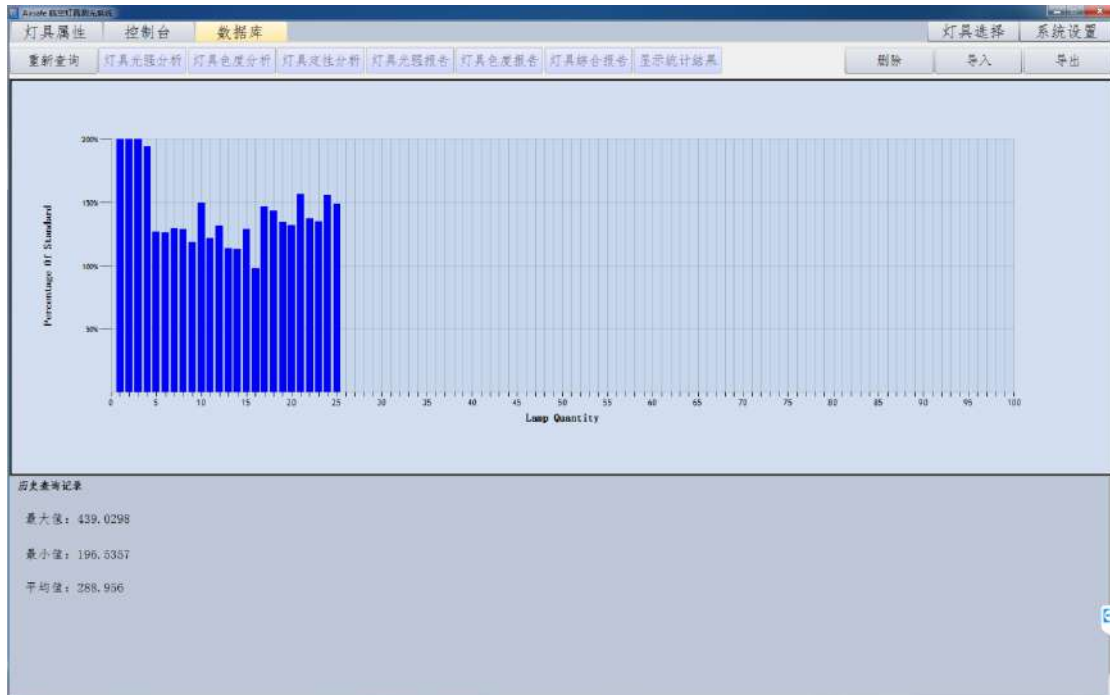
- 1) In the database, according to the four columns below the interface (see the red box below), select the specific type of the lamp. The data report of it appears in the list chronologically, as shown in the following figure:



2) After the selection, click on "Show Statistical Results", and the system will make statistics on the lighting intensity of the selected lamps, as shown in the following figure:



The statistical results are shown as follows:



After statistics, we can get the maximum and minimum lighting intensity. Click on the file name to see the data processing and report of lighting intensity and chromaticity directly. Statistical data analysis of the lamps can only be used for users to view, not to obtain or export.

7 Exit

In the upper right corner of each main control interface of the system, there is an "exit" button. At any time, the user clicks on it, and the system will pop up a dialog box to remind the user, as shown in the following figure:



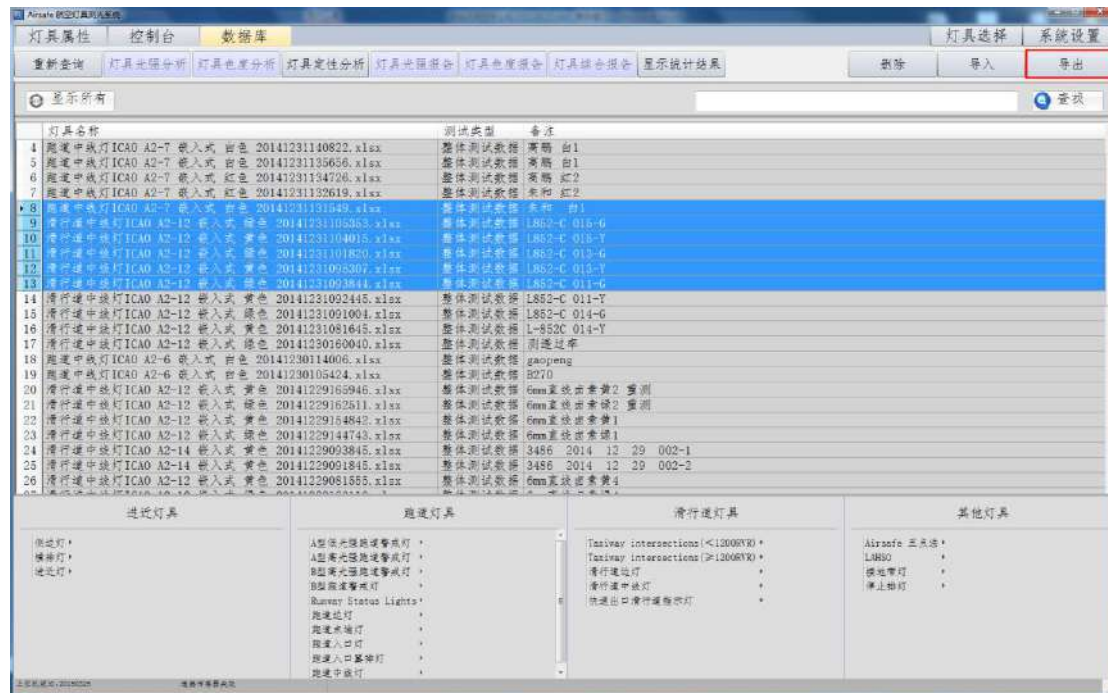
If you click on "yes" or "enter" button, the system will exit immediately; all the ongoing or being processed data will not be saved. And this exit won't reserve the testing status, that is, the overall testing attribute, any testing point or testing range. The system only retains the attribute of the complete test. If you click on "No", it will resume to work.

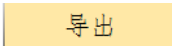
8 Additional Functions

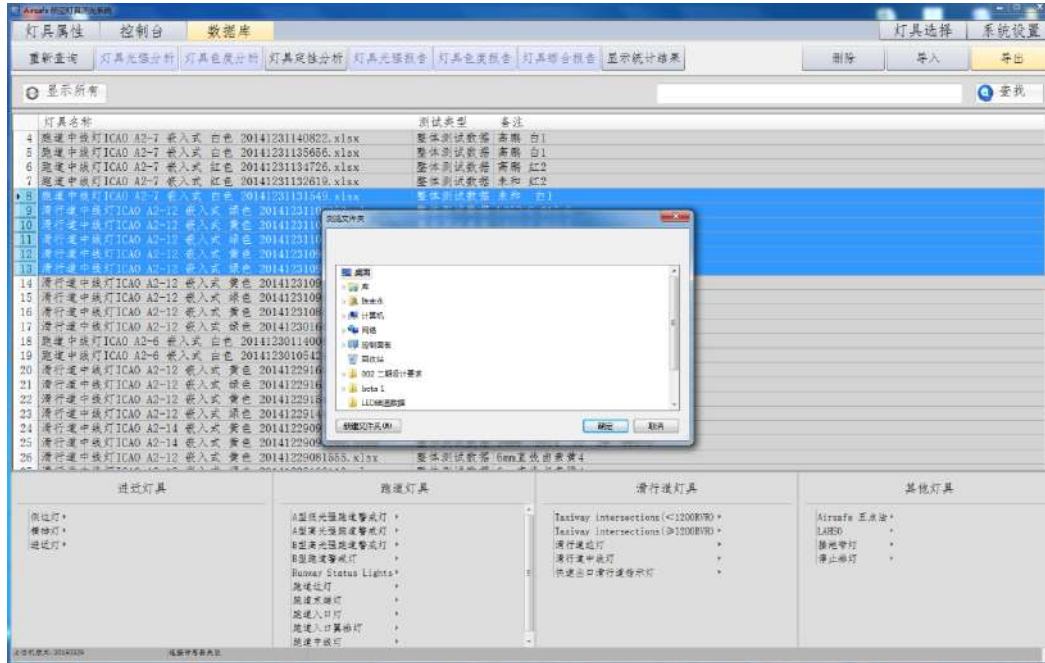
Users can complete the test of lighting intensity and chromaticity in the system and get the corresponding testing analysis and report. But some of them need to get the corresponding testing data. The system opens the function to users.

The original data import function is shown in the following figure:

Data export function, enter the database, select the needed lamps, open the test and analyze, enter the lighting intensity test and analysis interface, as shown in the following figure:



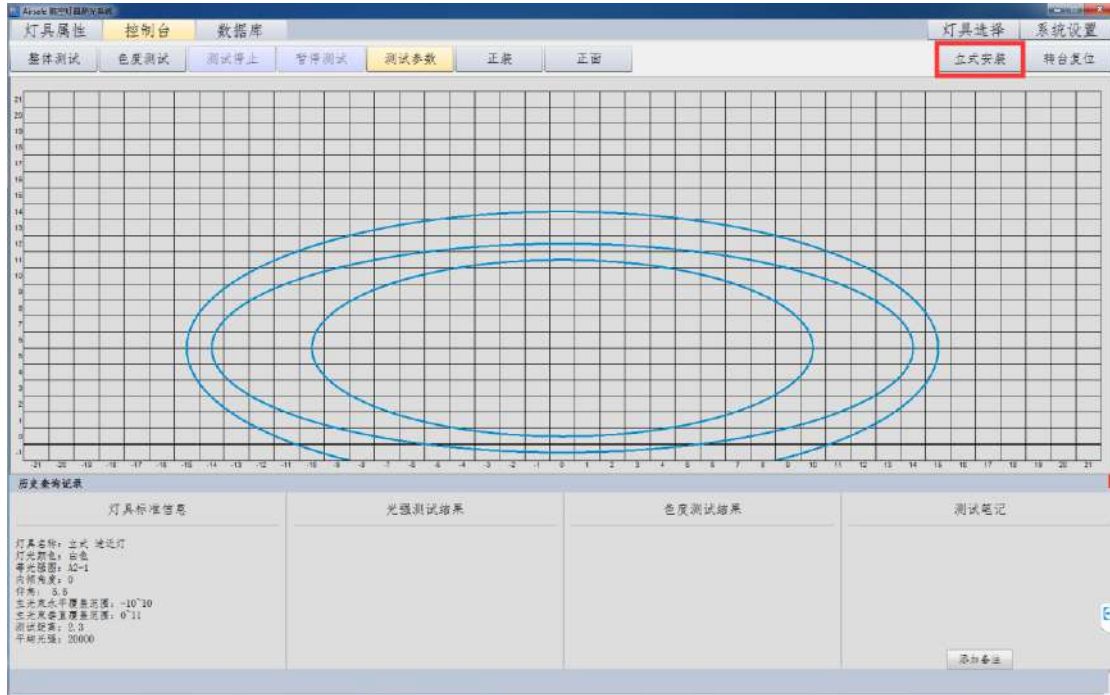
There is an "export" button on the left interface, , click on it, users can import the lighting intensity report and the chromaticity values of five special points of the selected lamps into Excel and place them in the position required by the user. As shown in the following figure:



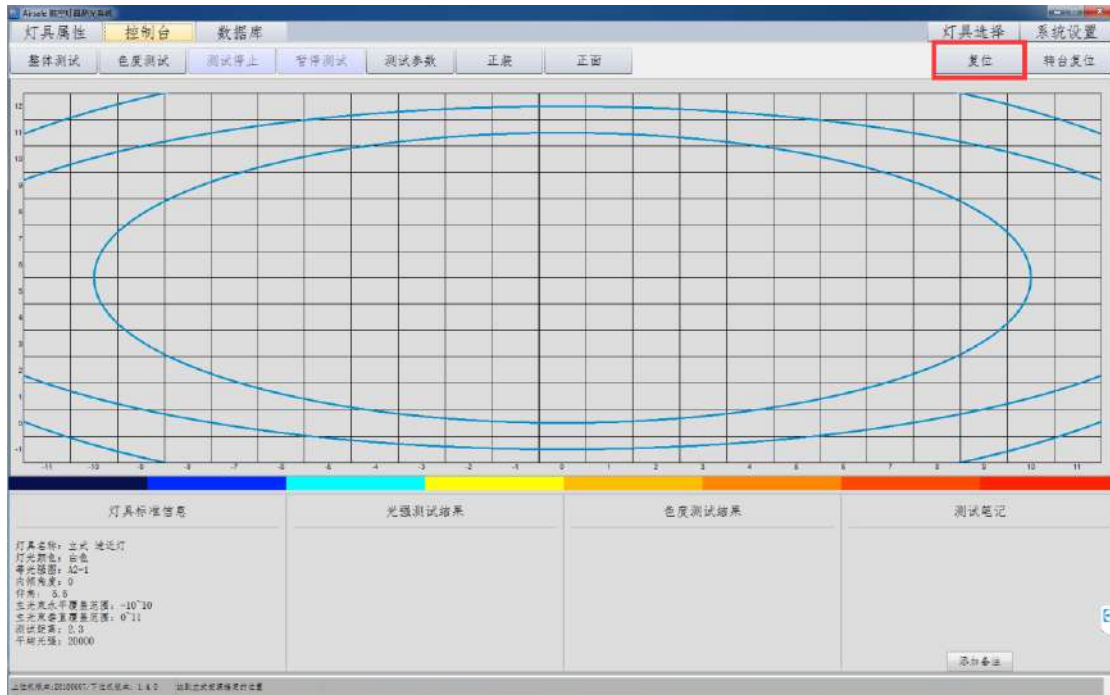
In addition, the system has the function of vertical installation, which is convenient for users to install vertical lamps. The specific operation is as follows: after clicking on the vertical installation, the turntable will raise a certain angle for users to install vertical lamps.

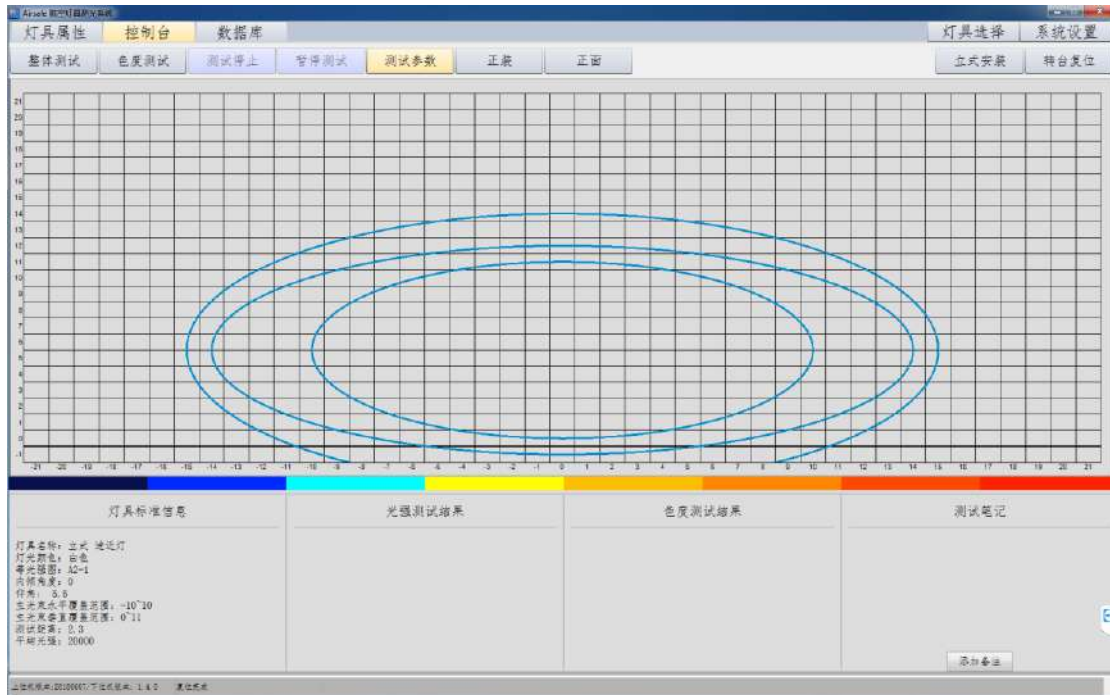
■ 立式安装时，注意操作安全

※ 谨防转台动作时压到手或操作工具



After the vertical installation is completed, click on the "reset" button to reset the system. So far, the vertical lamp has been installed to start test.





9 Daily Maintenance of System

- A Regular confirmation of center and testing distance
- B Half-year inspection of a double-axis clearance

Annex 1

Testing Procedure Chart

	Overall Testing	Chromaticity Testing
Select the Attribute	Needed	Needed
Enter the Console	Enter Automatically	Enter Automatically
Start the Test	Start manually, then start from the starting point automatically	Start manually, then start from resetting automatically
During the Test	Only “pause” and “stop” available	Only “end” available
After the Test	Reset automatically without any response of the interface, host control unlock	Reset automatically without any response of the interface, host control unlock
Data Save	Save	Save
The Second Test	Click on “start” again	If no need to modify the testing point, click on “start” again
The Database Interface	Enter manually	Enter manually
Data Process	Data export ; Data analysis ; Data statistics ; Data deletion.	Data export ; Data analysis ; Data deletion.
Naming the File	System automatic naming: overall + lamp name + testing time User autonomous naming : at will	System automatic naming: chromaticity + lamp name + testing time User autonomous naming : at wil
Report Process	Data report of the lighting intensity Data report of the chromaticity Data report of the comprehensive value	Data report of the lighting intensity

Annex 2

Order Number of the Spare Parts

Name of the Spare Parts	Order Number	Note
Photometric Table	62000-04	
Photometric Table (Accessories) -Test-bed Sensor	62070-01	
Photometric Table (Accessories) -Test-bed Calibrator	62060-01	
Photometric Table (Accessories) -15-12 Transition Ring Assembly (Standard)	620A0-01	
Photometric Table (Accessories) -15-8&11Transition Ring Assembly (Standard)	620C0-01	
Process Table	62090-01	
Photometric Table (Accessories) Computer (Host + Monitor)	620E0-01	
Laser Color Printer	HP CP2025	
Dimming Power Supply I-Type-400W(Suite)-02	MINCCR-SCR-400W-02	
17#-type Socket Wrench	51105-01	
Photometric Table (Accessories) -Vertical Lamp Testing Frame B	62048-01	
Photometric Table (Accessories) -Vertical Lamp Testing Frame A	62047-01	
Photometric Table (Accessories) - Nut G2	62049-01	
Steel Tape (5M)	L16-50	
Power Strip (5M)	JC-406	
Internal Hexagonal Wrench (1.5 ~ 10mm) Suite	54112-01	

Photometric Table (Accessories) -Vertical Lamp Testing Frame C	62043-02	
Photometric Table (Accessories) —Vertical One-way Lamp Testing Frame	62080-02	
Communication Cable (Four-bit Aviation Plug)	62071-01	
Communication Cable (Serial to Aviation Plug)	62072-01	
Circuit Board Components	962073-01	
36-200W Switching Mode Power Supply	AES-200-36	