NovaCLB-Cabinet Quick Start User Manual

2017-08-10 V4.0.0

Step 1 Preparations before calibration

1.1 Arrange the darkroom

The following requirements and suggestions are proposed for the arrangement of the darkroom to ensure good calibration effect:

1) The calibration darkroom has to be sealed and not disrupted by the external light, and in the meantime, the darkroom shall be covered with low-reflectance black materials on the surrounding to reduce the reflected light.

2) Width: 3 m (suggested); length: correction distance of camera, related to the pixel interval thereof: pixel interval X 800< correction distance < pixel internal X 3000; however, our suggested best correction distance of the product is: correction distance = pixel interval X 1500.

In order to guarantee the measurement accuracy of colorimeter, we hope that the colorimeter can measure a wider LED area, and its distance depends on LED cabinet width (or height) and field angle θ : the measurement distance = 0.4X cabinet height/tan θ . With consideration of space pre-left for the computer, camera and personnel activities, the maximum distance of the darkroom shall be added with 2-3m;

Taking the P6 cabinet of 96*96 as an example, the best correction distance of camera is about 9, and with field angle at 1° , the

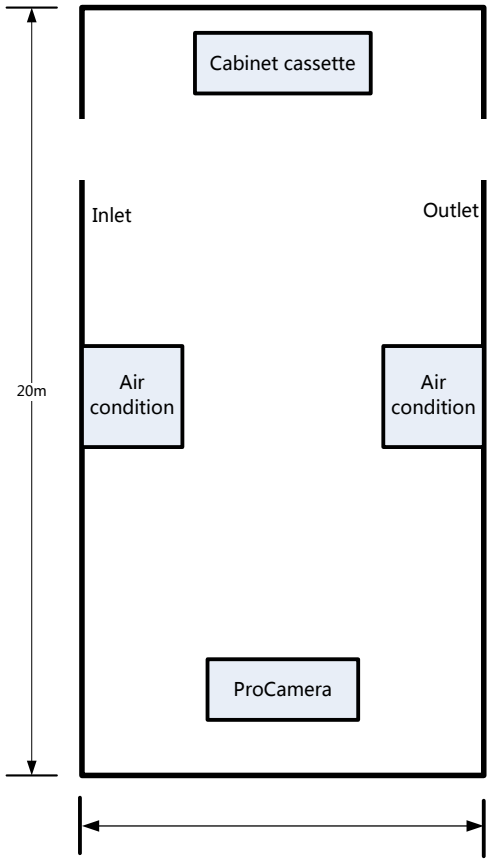
measurement distance of light gun is 13.2 m;

Pixel interval(mm)	Correction distance of camera (m)	The best correction distance of camera(m)
16	13~48	24
10	8~30	15
6	4.8~18	9
3	2.4~9	5
2.5	2.0~6	5
1.4	2.0~6	5

Cabinet height (m)	The best measurement distance of light gun
0.4	9
0.6	14
0.8	18
1	23
1.2	27

Table.1 Calibration distance recommended

For small-interval screens of different specifications, our suggesting camera distance is maintained at 5 m; to be compatible with cabinets of most specifications, the ideal length for the darkroom shall be about 20 m.



Darkroom layout

3) Length of calibration room should be more than 20m, and draw a scale on the ground with paint to facilitate calibration distance positioning.
4) Install hygrometer to track change situations of temperature and humidity. The calibration darkroom should be equipped with an air conditioner, which should be turned on half an hour before each calibration to adjust the temperature and humidity to the specified value, and when calibrating cabinets of the same batch, the temperature fluctuation shall be no more than 2℃.
5) All cabinets should be performed fully aging before calibration, it is not recommended for calibrating the cabinets with different aging time.
6) During the calibration, the position of the cabinet and calibration instrument must be fixed, and the cabinet must be placed on a pedestal to prevent it from being affected by the light reflected from the ground.
7) Suitable cabinet handling processes to avoid too long time delay in cabinet replacement.
8) Outfit high performance computer, improve the calibration efficiency.

1.2 Determine the appropriate preheat program

It needs to select different preheat time according to the heat dissipation capacity of the cabinet:

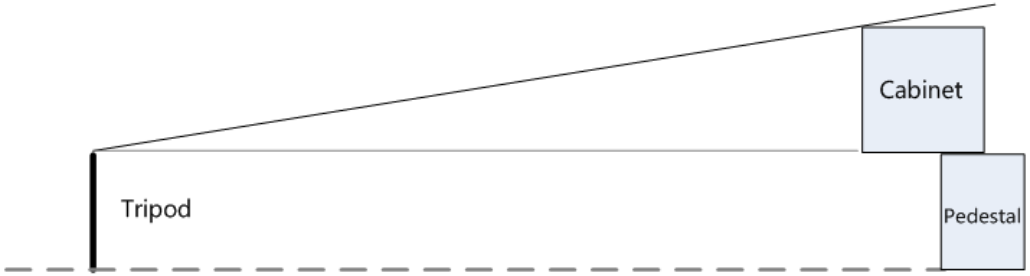
- **No preheat mode:**In this mode, we don’ t have to consider the uniformity change of the brightness chromaticity brought by the temperature changes in cabinet pre-heating ,as the **calibration of the cabinet will be carried out immediately after the cabinet is lighted up.**Thecalibration efficiency of this method is higher and the calibration time of each cabinet is within 2 minutes.

- **Preheat mode:**Under this mode, the cabinet is required to be preheated for a designated time according to certain brightness, and calibrate it after its temperature tends to balance. The calibration efficiency of this method is lower and generally, the calibration time of each cabinet is about 4 to 6 minutes. Users can design a special preheating chamber to preheat the cabinet to be calibrated in advance in order to improve the calibration efficiency.

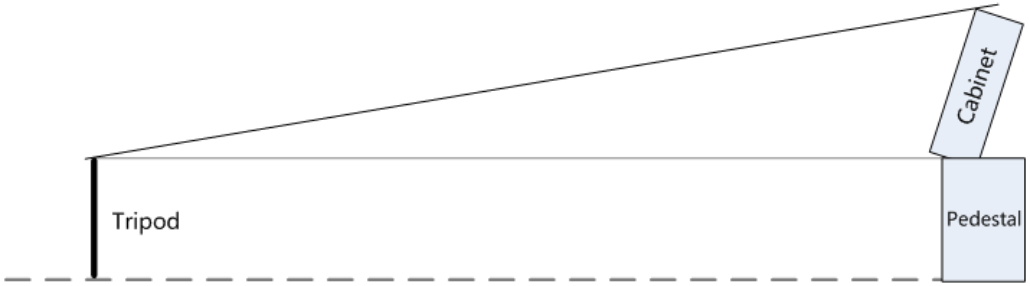
Notes: The pre-heating time of all the cabinets must be kept consistent, as the inconsistent pre-heating time will lead to the brightness and chromaticity difference between the cabinet, and seriously affect the brightness and chromaticity consistency of the cabinets after the calibration.

1.3 Select the appropriate calibration position

- When measuring, the camera must be placed right ahead of the cabinet and must be perpendicular to the surface of the cabinet.



The height of the pedestal is slightly higher than that of the tripod (there is no elevation on site, and it is generally used in indoor screen)



Tilt the cabinet to simulate the on-site elevation (there is elevation on site, and it is generally used in outdoor screen)

Notes:The location of the pedestal can not be moved in the calibration process, and the location of the camera and calibration parameters can not be changed after adjusting.

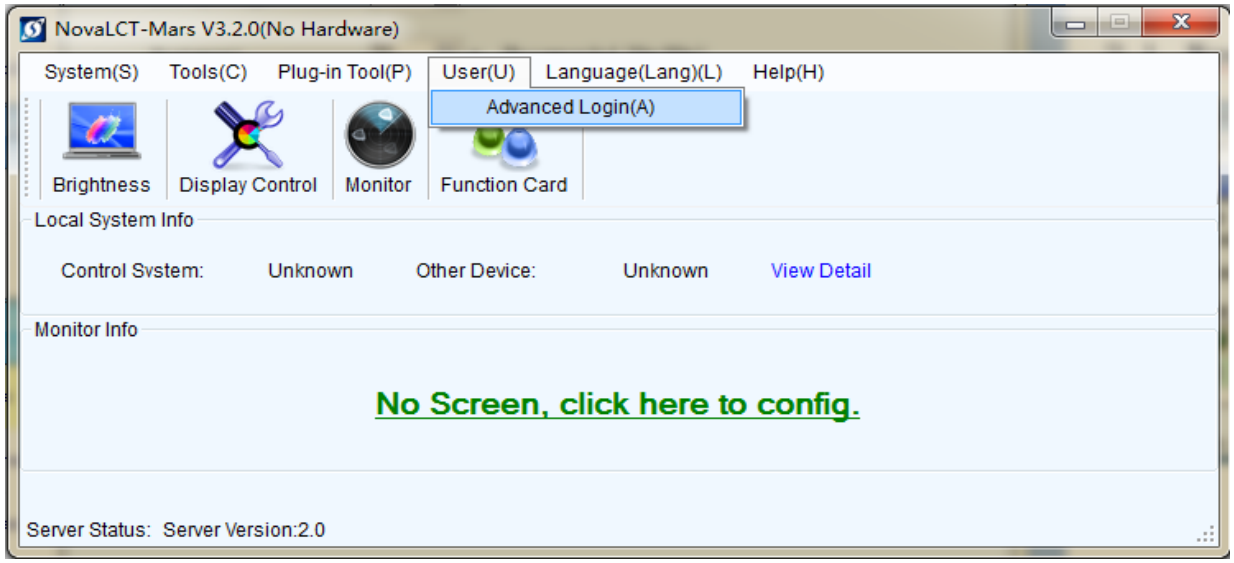
- Refer to algorithm of correction distance provided in 1.1.Arrange the darkroom for the cabinet correction distance.

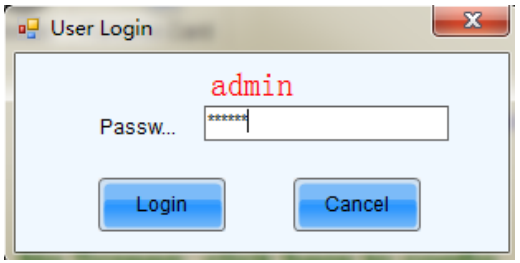
1.4 Calibrate the location of the first cabinet

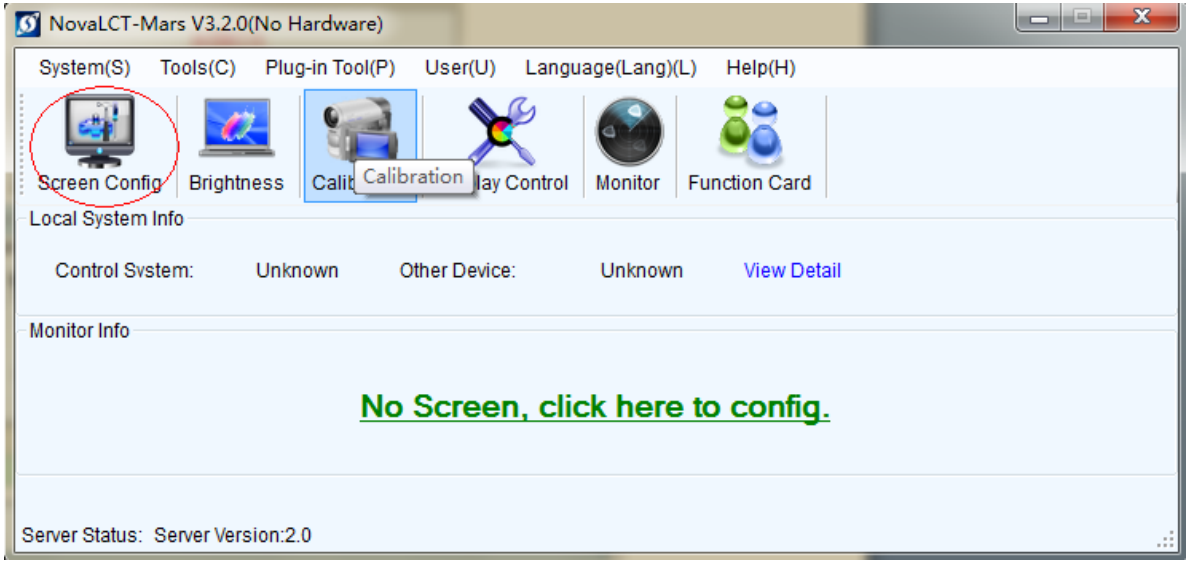
Calibrate the location of the first cabinet; the locating place of the first cabinet can be recorded by the means of drawing scribed line and using black tape. The locating places of the subsequent cabinets shall be strictly the same as the first cabinet, including the placing angle.

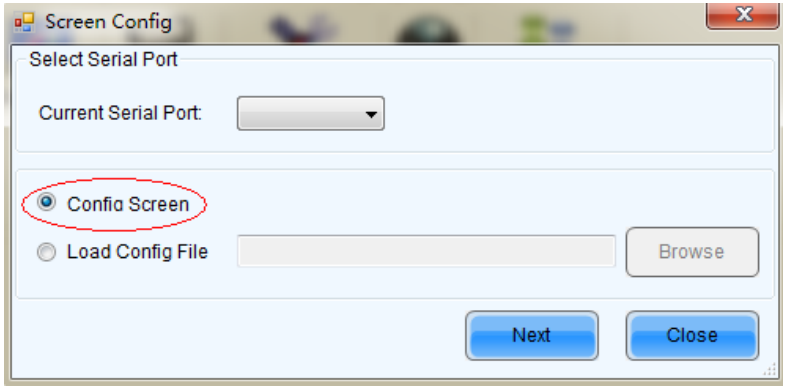
Step 2 The calibration of the first cabinet

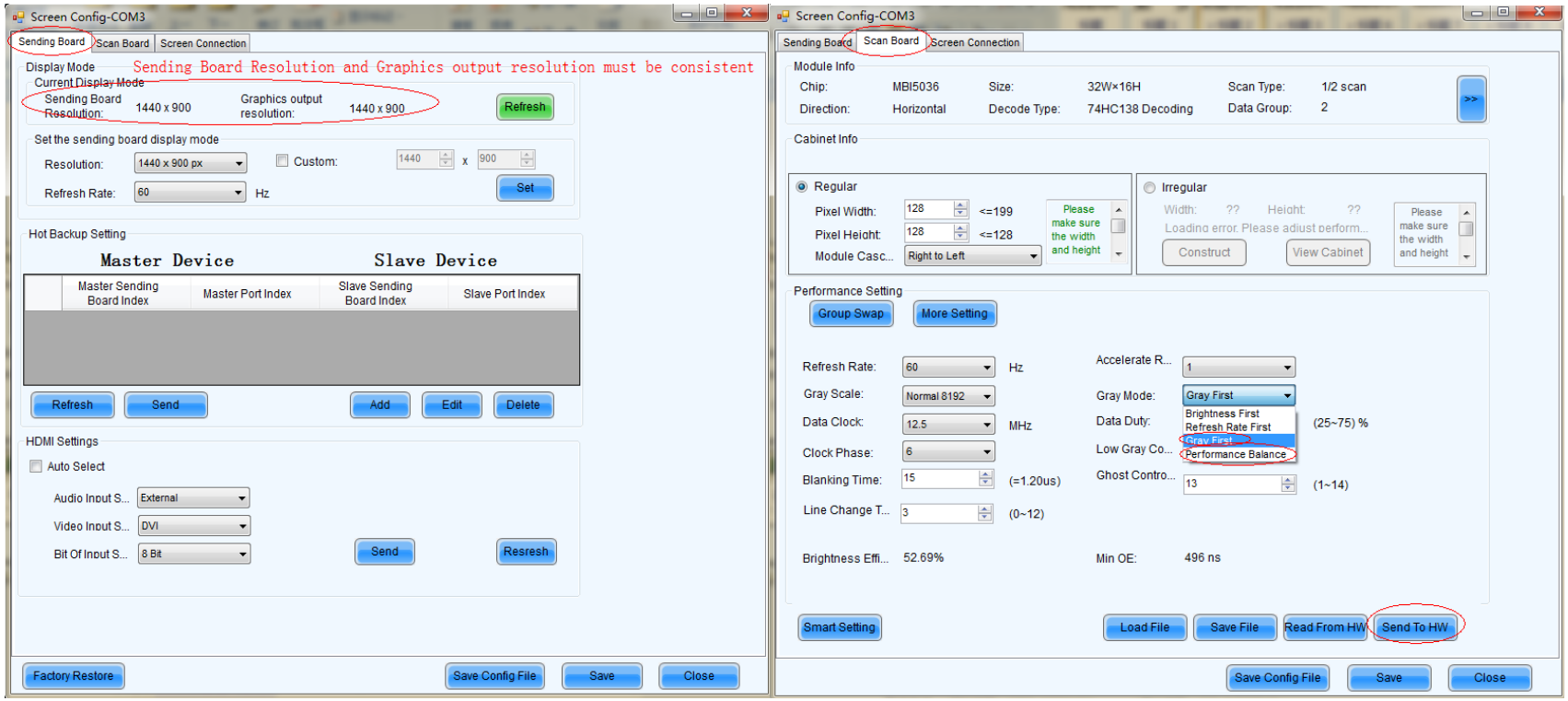
2.1 NovaLCT-Mars preparation






NovaLCT-Mars V3.2.0(No Hardware)
System(S)
Tools(C)
Plug-in Tool(P)
User(U)
Language(Lang)(L)
Help(H)
Screen Config
Brightness
Calibration
Monitor
Function Card
Local System Info
Control System:
Unknown
Other Device:
Unknown
View Detail
Monitor Info
No Screen, click here to config.
Server Status: Server Version:2.0


Screen Config
Select Serial Port
Current Serial Port:
Config Screen
Load Config File
Browse
Next
Close



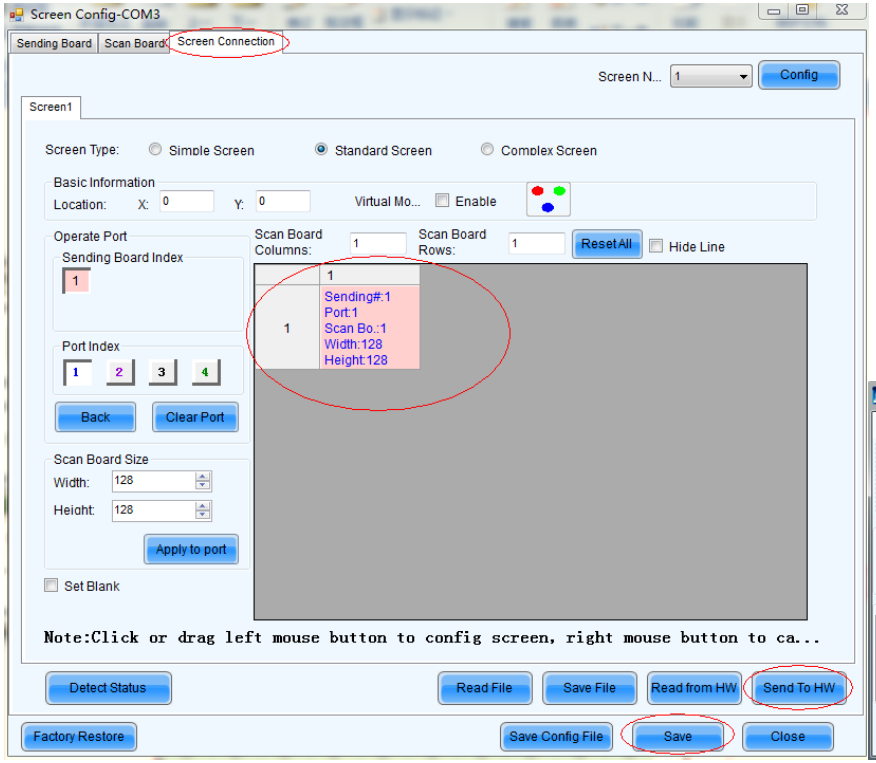
Receiving Card interface:Lighten the cabinet normally(Please refer to the NovaLCT-Mars user manual)

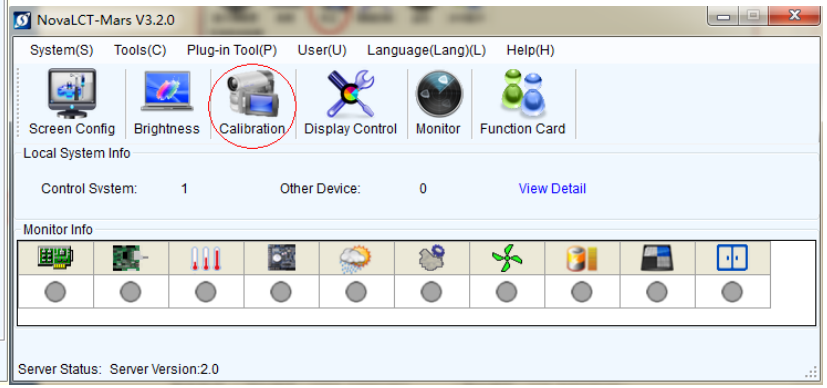
Tip: The outdoor screens generally have high brightness, which could cause overexposure of photos easily, There are two solutions at present:

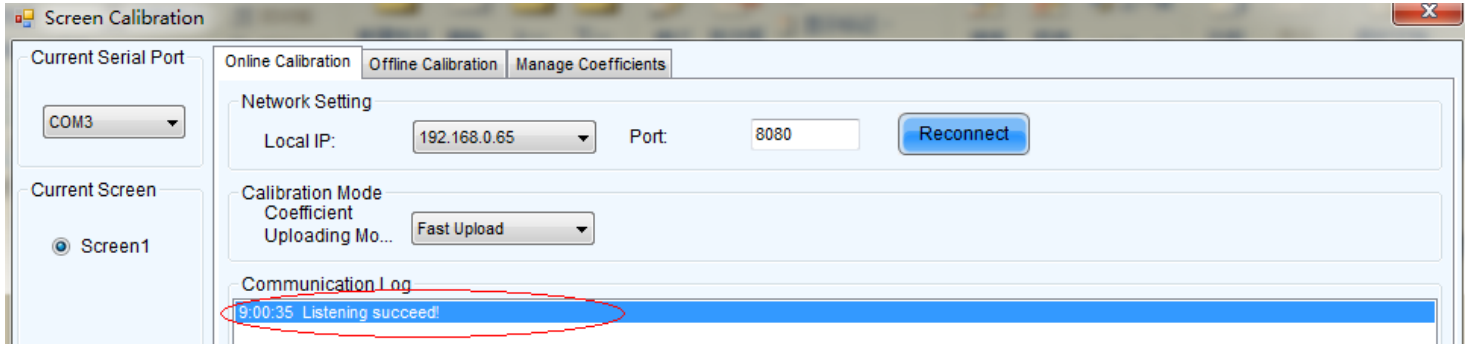
（1）the brightness efficiency of "Gray First" and "Performance Balance" will be lower, so we advise you to select "Gray First" or "Performance Balance" when calibrating outdoor screens.

(2)Choose proper lens, for example,the focal length from 18mm to 200mm, use maximum value, at the same time, increase calbration dista

nce properly.



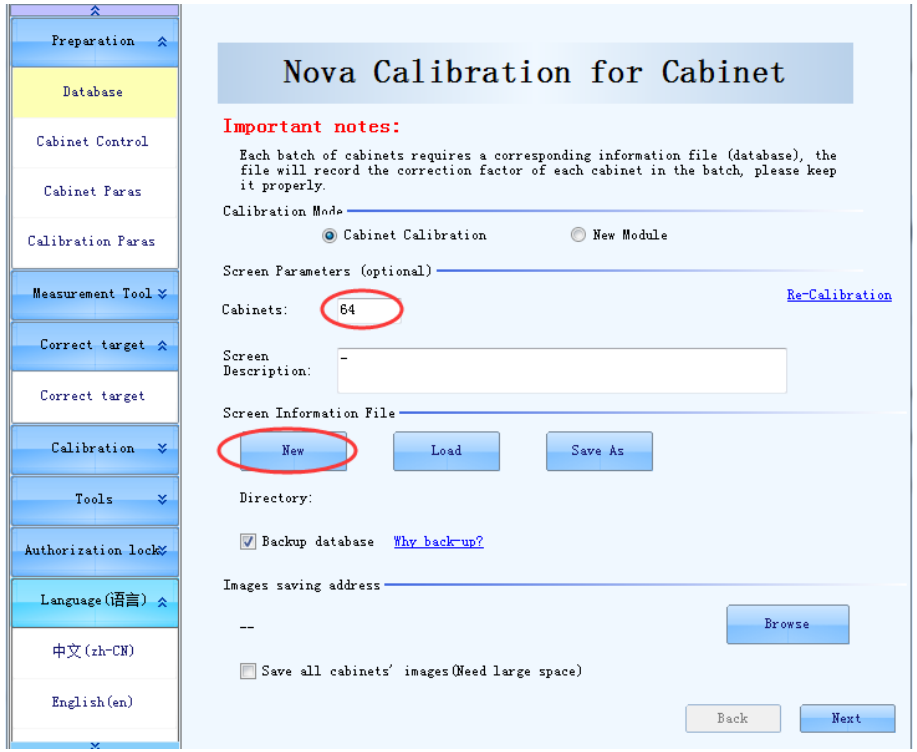




2.2 NovaCLB-Cabinet preparation

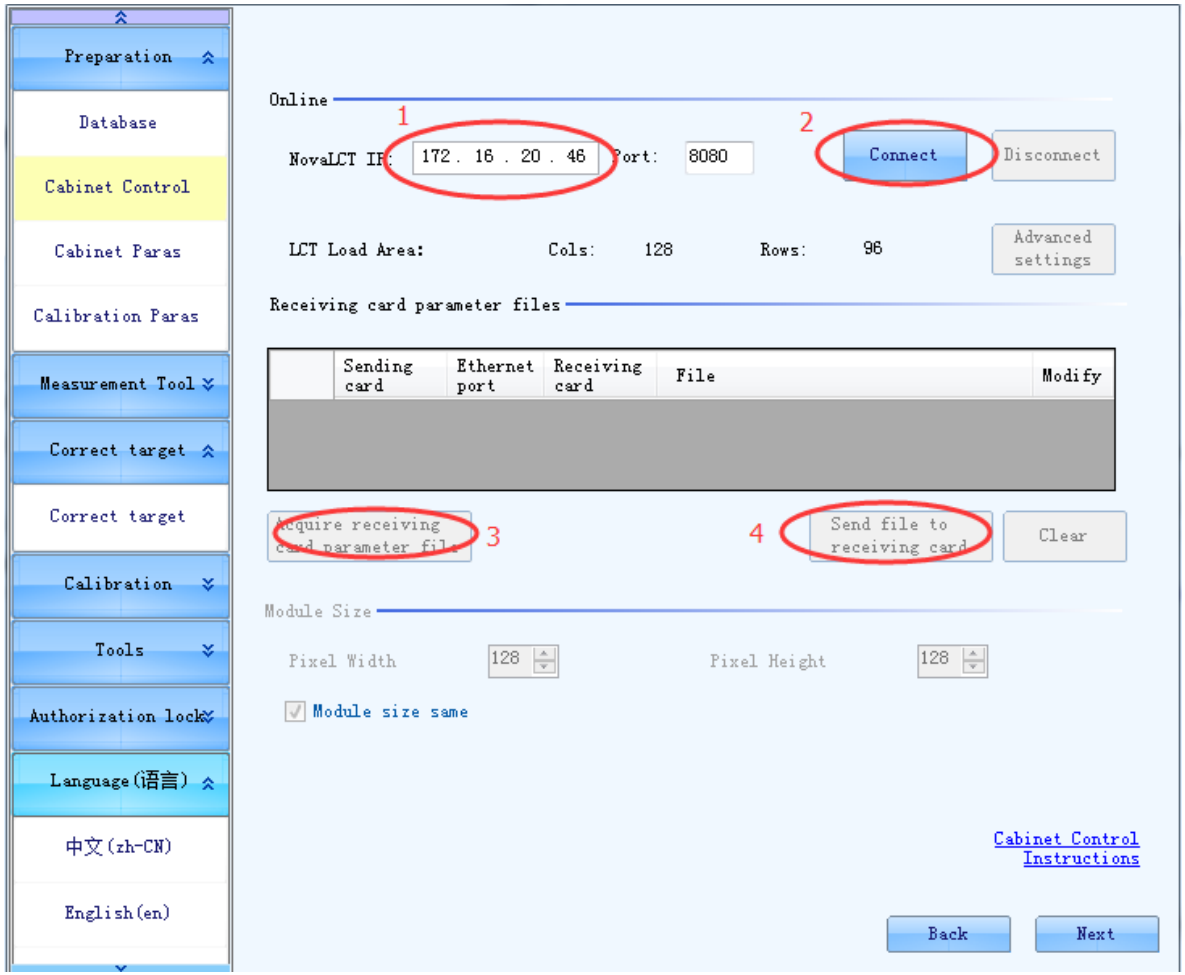
2.2.1 Calibration preparation

➢ Input the number of the cabinet to be calibrated and "New create" a database.



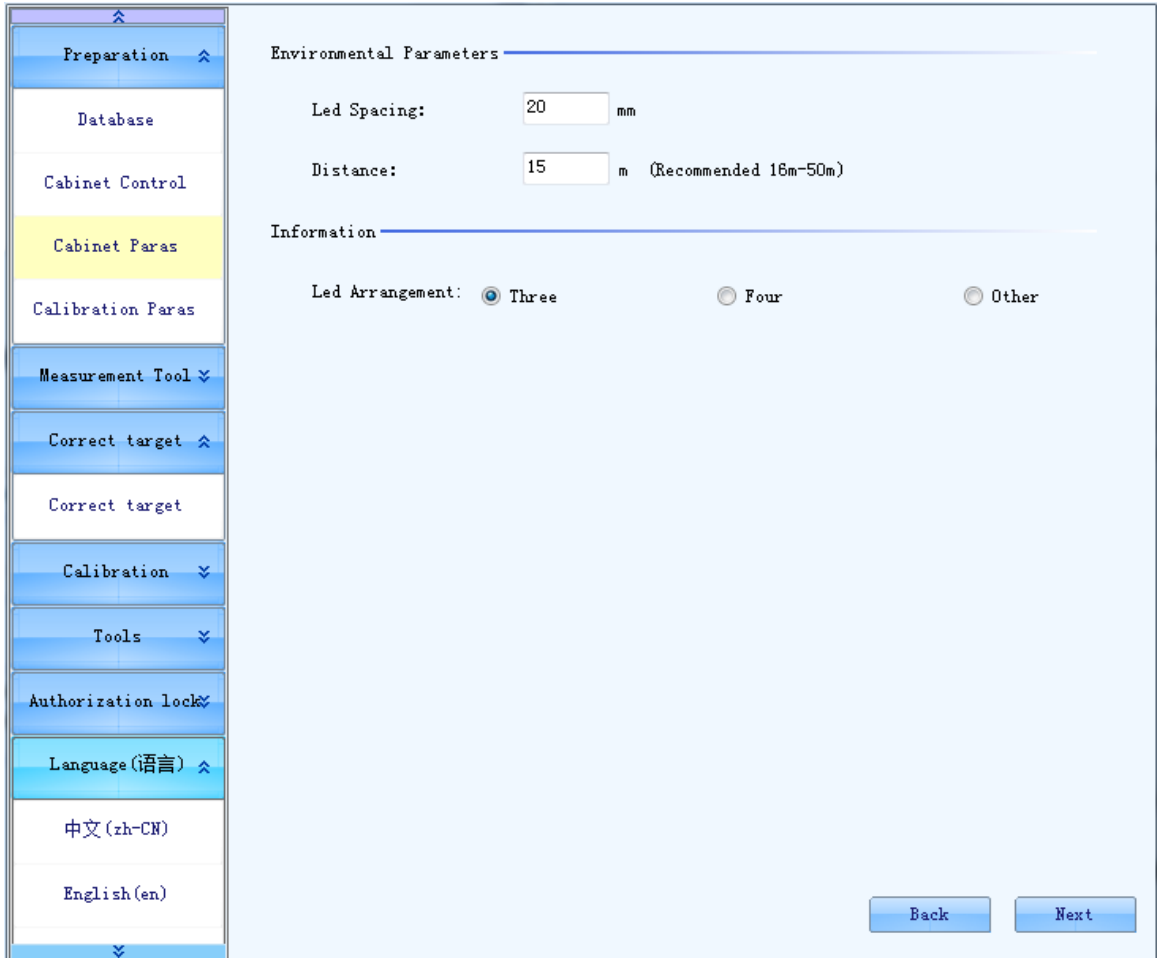
➢ **Online calibration:**Input the computer IP and port number operated at the LCT client, click "Connect" to establish the communication between NovaCLB and NovaLCT, then you will see that the Gamma value of LED screen is set to be 1.

LCT configuration file: Click the "Get from LCT and Save" button to get the receiving card parameter (the last receiving card parameter sent by NovaLCT).



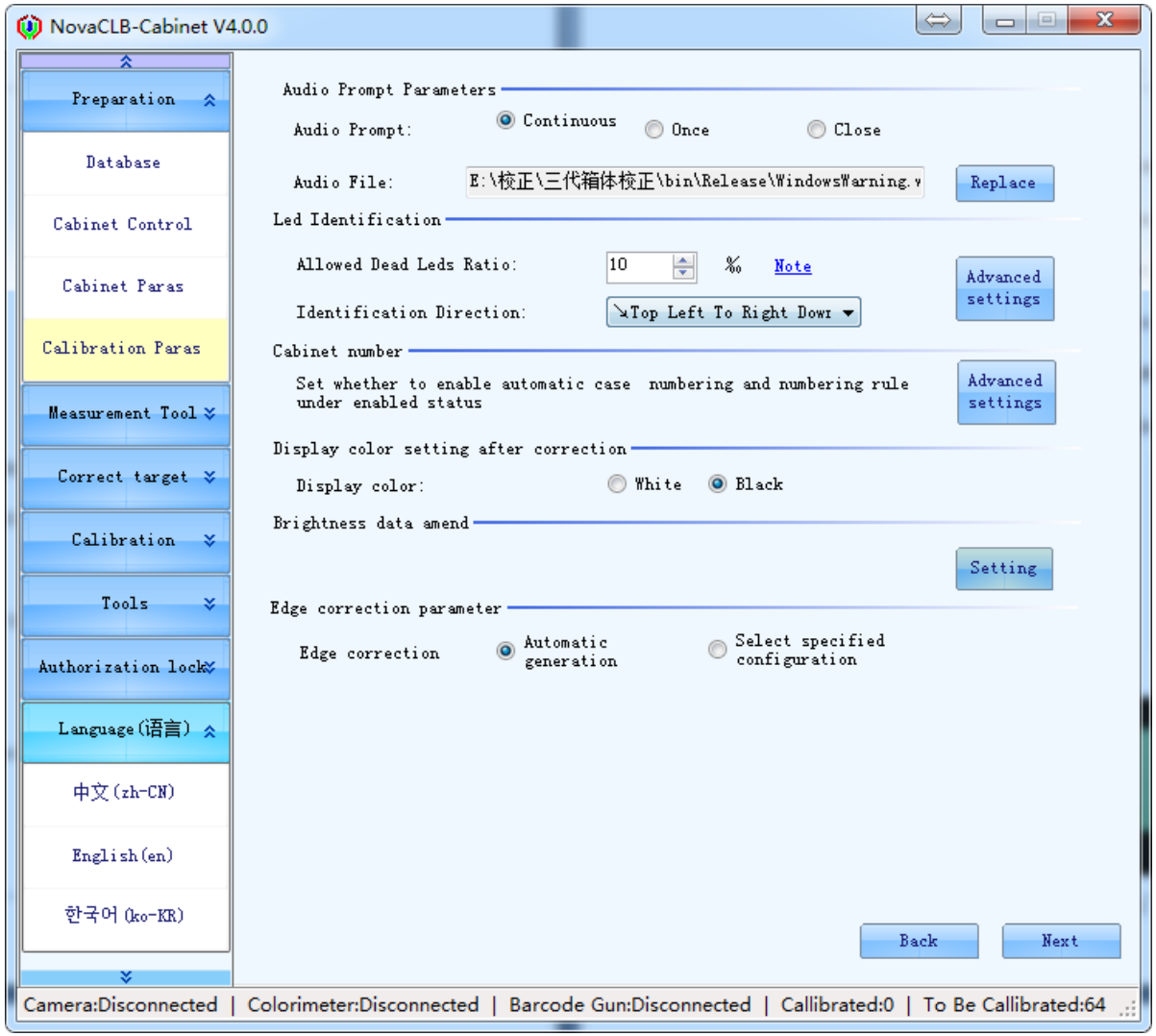
➢ Cabinet Paras

The parameters on this page base on real situation.



➢ Calibration Paras

Use default parameter settings will be okay.



2.2.2 Configuration of measuring instrument

- **Camera preparation（Digital Camera）**

a) Connect the camera to a computer via a USB cable, and toggle the camera switch on the ON state. Click the "Connect the Camera" button, and the camera can be controlled automatically via the software after it hinting "Connection Successful".

b) Set the mode dial  to M gear (manual), and set the lens focus to M (manual)  . If the lens has the anti-jitter function (Sigma is OS), turn off 

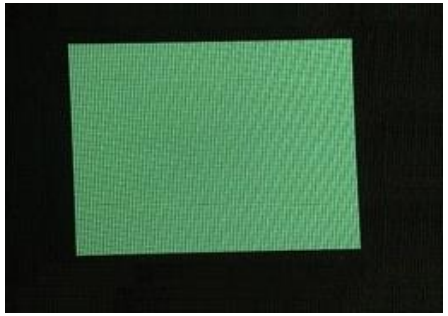
c) Switch between the eyepiece framing and LCD framing: by starting "real-time display shooting" in the menu of the camera, you will be 

able to switch between eyepiece framing and LCD framing.

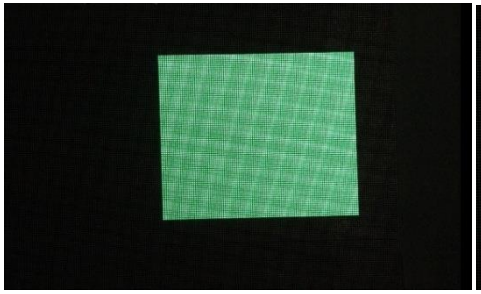
- **Camera focusing （Digital Camera）**

When performing cabinet calibration, the camera lens shall be directed at the cabinet to be calibrated, and adjust the lens focal distance and include the cabinet into the field of the camera. The number of pixel of the cabinet is generally less than the maximum resolution for the partition supported by the camera. Therefore, it' s not advisable to adjust the focal distance to the maximum. Generally we will adjust the focal distance to let the cabinet locate in the center of the image, that is, to take up half of the width and length of the image,

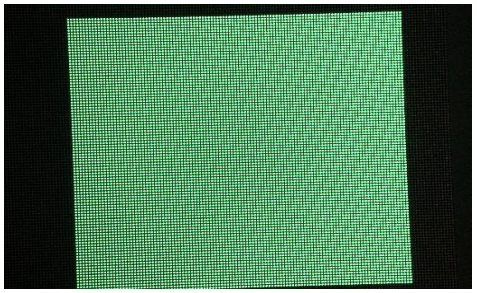
i.e., reserve 1/5 of the total length and the width on the four sides. The imaging is too small or too large both will lead to the unsatisfactory calibration effect, so it needs to adjust the focal distance to make the imaging size close to the standard size.



(a) The imaging is standard



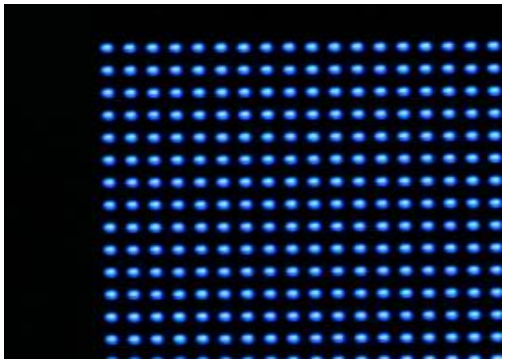
(b) The imaging is too small



(c) The imaging is too large

Schematic diagram of the partition imaging size

After imaging picture size properly, then focus the camera, make the pixel imaging vague little bit, it’ s need to adjust focusing when analysis camera parameters in following steps.

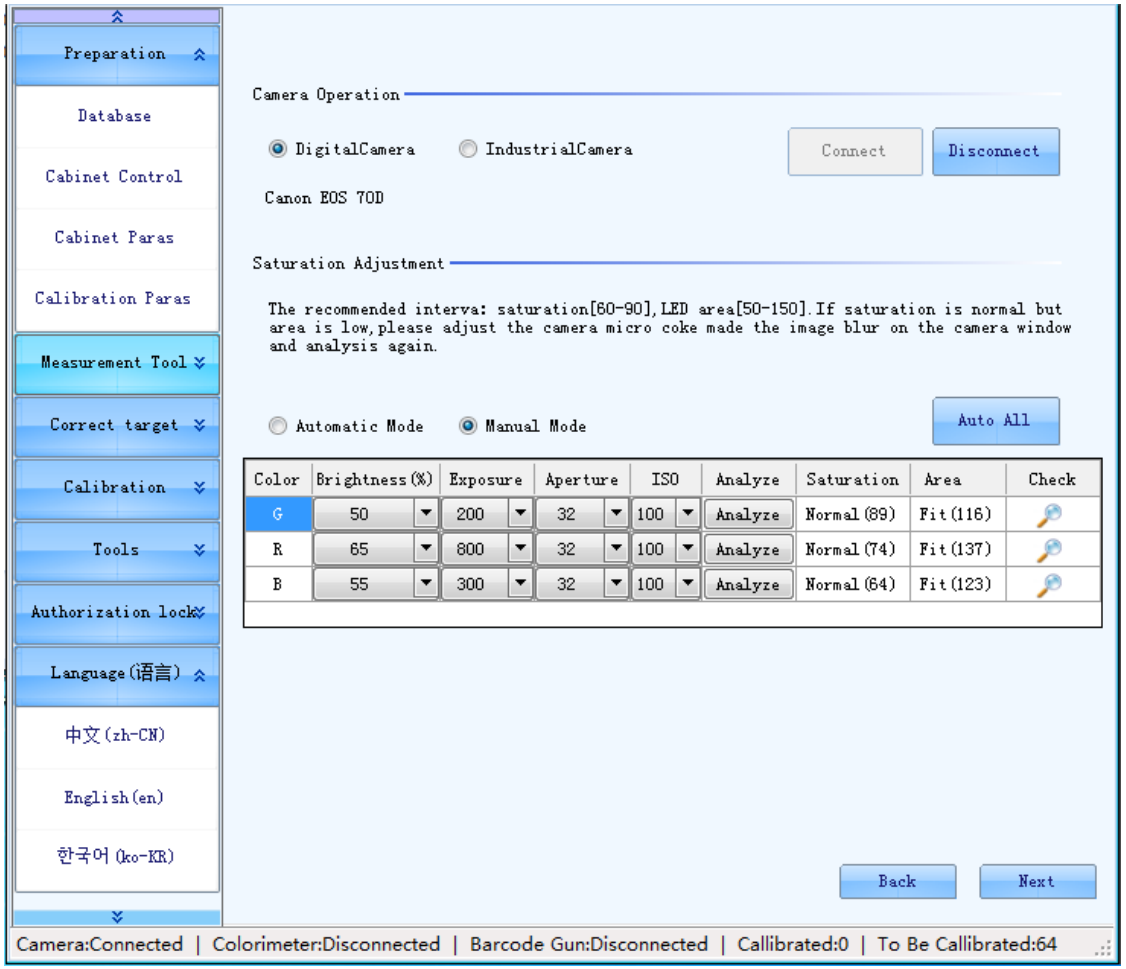


Cabinet imaging schematic diagram

Tip: When start the LCD framing, press the button  allows the image to switch among its original size, 5x magnification and 10x magnification,  。

- **Adjustment of camera saturation**

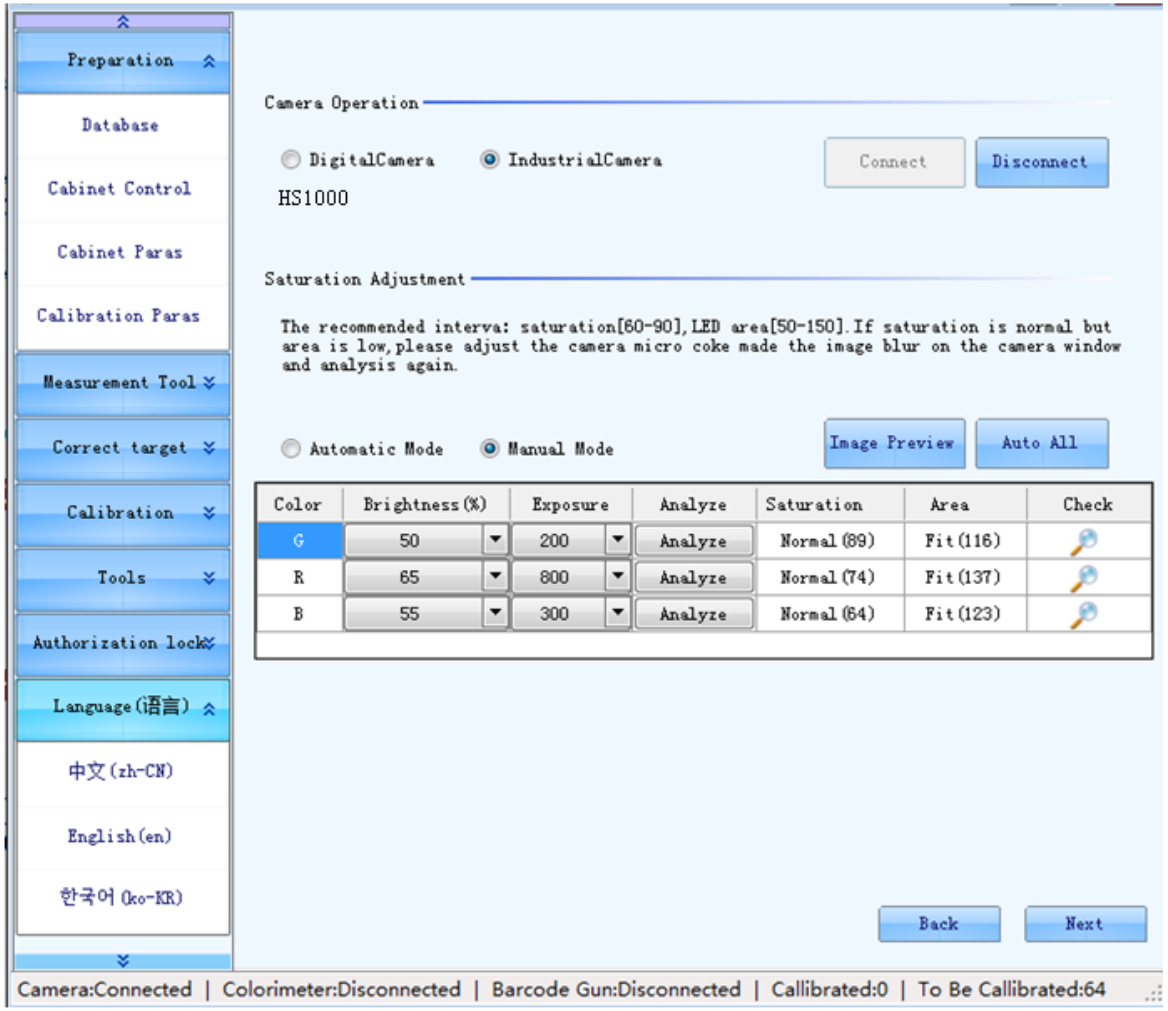
Disconnect camera then re-connect, click" Auto All" . Adjust focusing make imaging vague little bit if imaging size smaller, click "Auto All" again, adjust focusing make imaging in focus if imaging size bigger, click " Auto All" again.



Tips: it’s need to re-connect camera after adjust focus then can get present aperture value.

- **Camera focusing （Industrial Camera）**

After connecting to the industrial camera, connect “Image Preview”,than you can see the pictures timely when adjust camra location or lens etc.，if you can see all cabinet’s on the picture and every LEDs can be distinguished easily, that is OK.

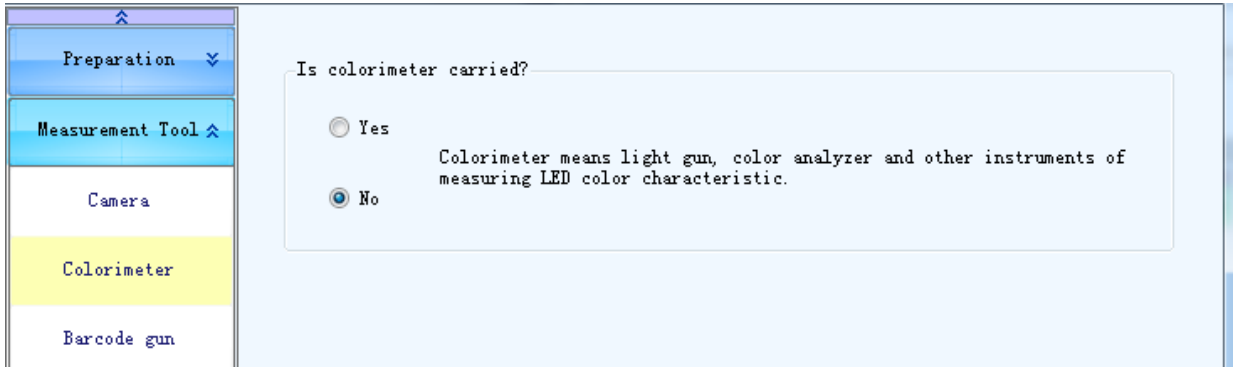


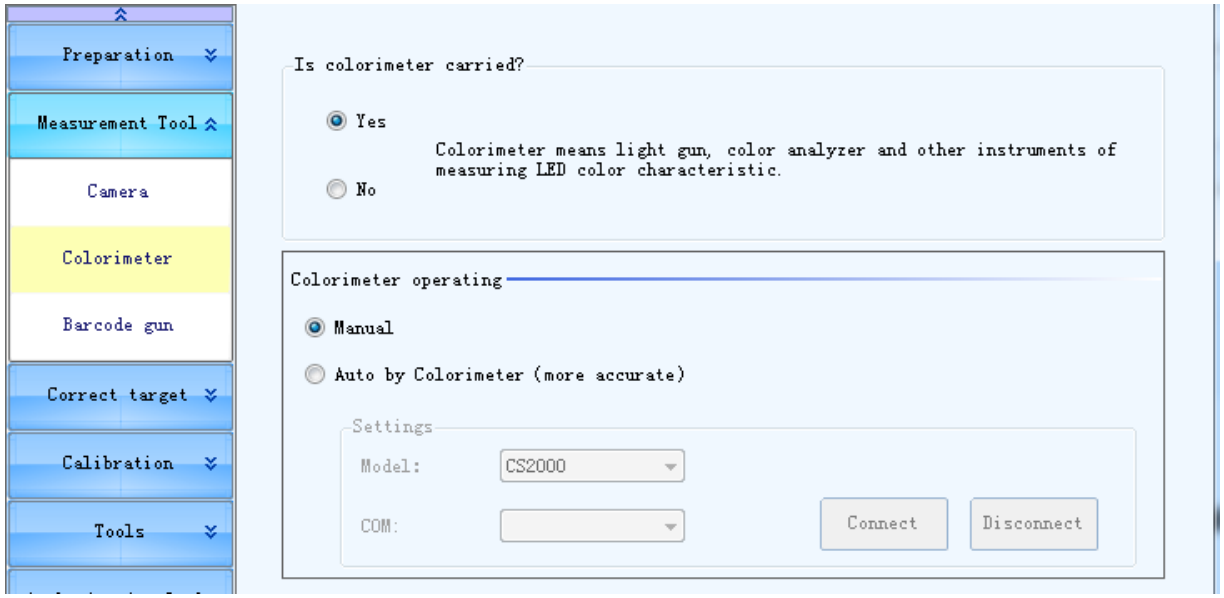
➢ Colorimeter

Click "No" if no need colorimeter to calibrate cabinet' s color and brightness values.

Click "Yes" if need colorimeter to calibrate cabinet' s color and brightness values. You can choose measure "manual" or "Auto by

colorimeter” .





2.2.3 There is no bright and color difference among cabinets or modules

1) Measure original values

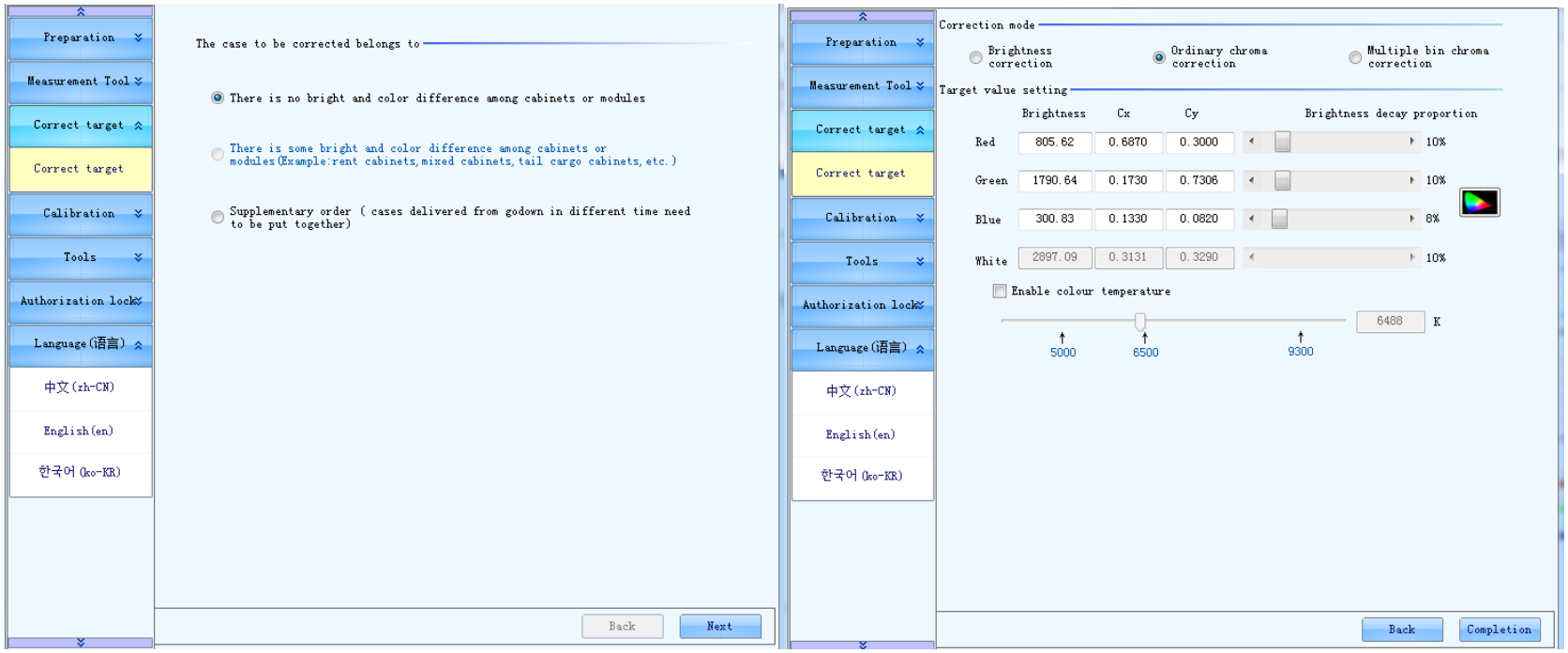
If no colorimeter is available, skip this step adopt default values.

2) Set the calibration target

The software supports the three modes of **brightness correction**, **Ordinary chroma correction**, and **Multiple bin chroma correction**. **Brightness correction** will only change the brightness of the three primary colors R, G and B, without sacrificing the color gamut of the display screen, but it could not eliminate the difference of chromaticity on the LED; **Ordinary chroma correction** will change the brightness of the three primary colors and sacrifice a small part of the color gamut, but it could make the LED brightness and chromaticity attain high consistency; **Multiple bin chroma correction** can eliminate difference of brightness and chroma between modules or cabinets, supports blue adjustment (mainly blue effect optimization; which will sacrifice the effect of the color white).

you can adjust the “brightness decay” pull rod and choose the proper brightness decay proportion. When “Ordinary chroma correction” is selected, the software will generate an coefficient in accordance with the “chromaticity calibration standard”; when “brightness correction” is selected, it will generate the coefficient in accordance with the “brightness calibration standard”, when “Multiple bin chroma correction” is selected, it will generate the coefficient in accordance with the “Multiple bin chroma correction standard”, for example, when “20%” is selected for the brightness calibration, the brightness after the calibration will be 20% decayed than the brightness before the

calibration.



Set the Correction mode and target value setting

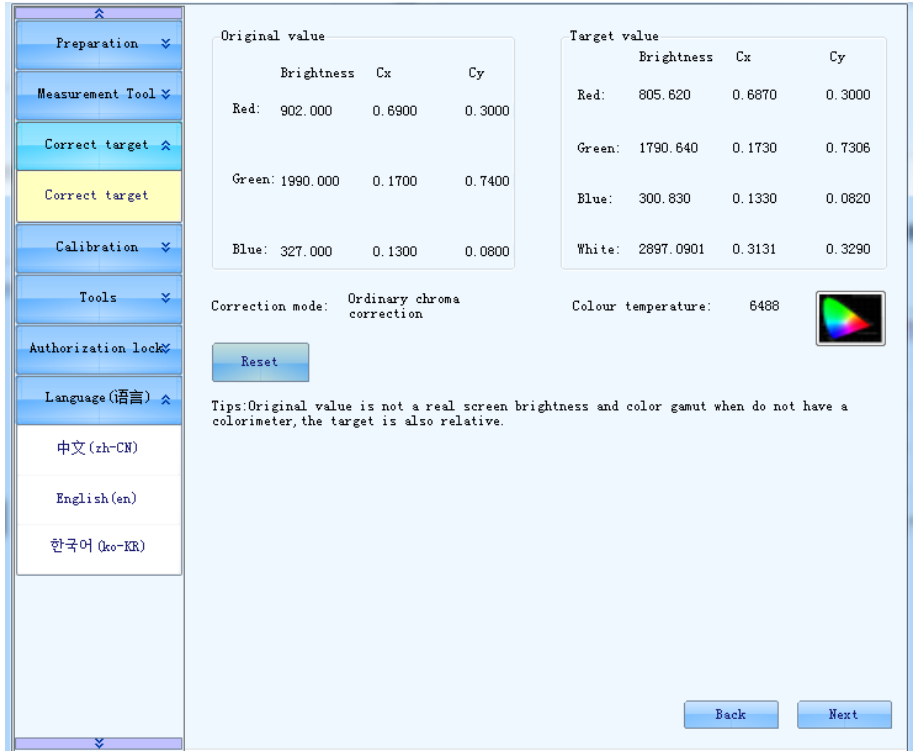
Check "Enable color temperature". The color temperature of the screen will not changed when you pull the rod to set brightness decay.

Check "Color gamut picture" to set chroma value in color gamut mapping.

Note: The original color gamut value here is not the true original value of the display,it 's just a relative original value that software default, the resulting target color gamut value is also relative target value.

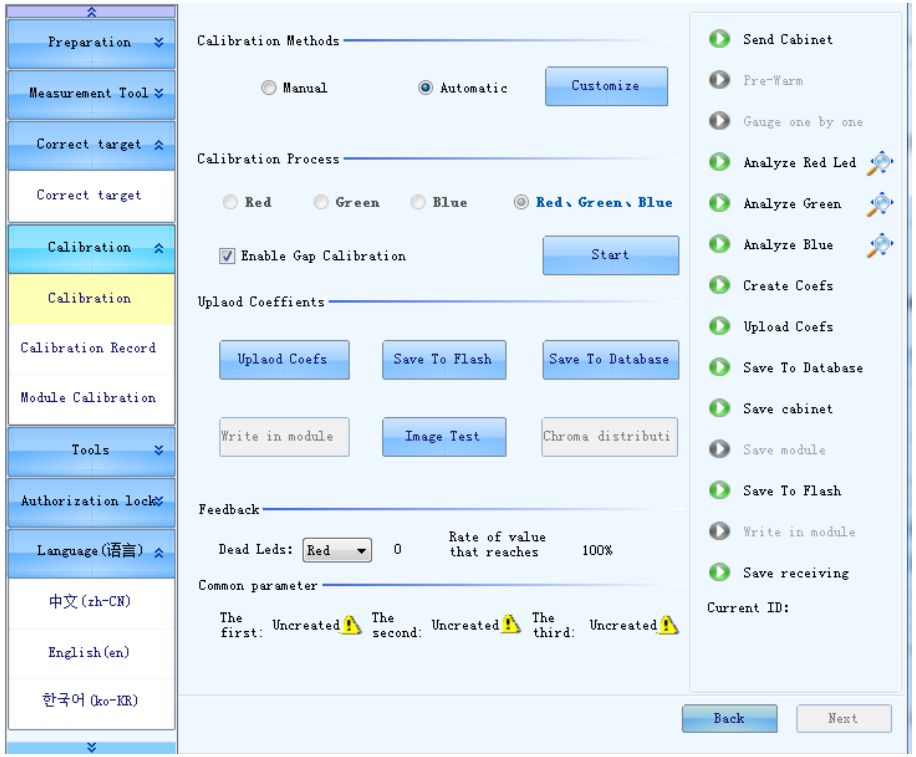
3) After target values are set, click "Finished" to enter the following interface. To modify a value, click "Re-set" to go back to the

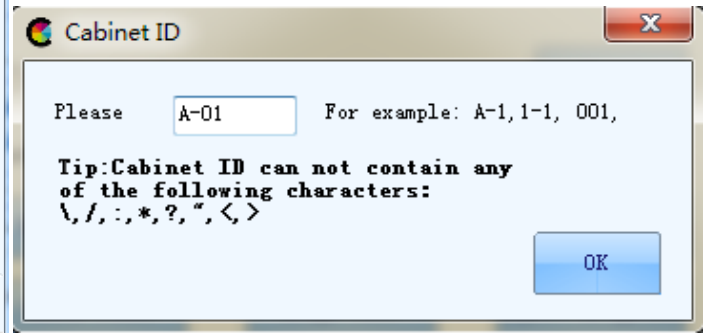
preceding step.



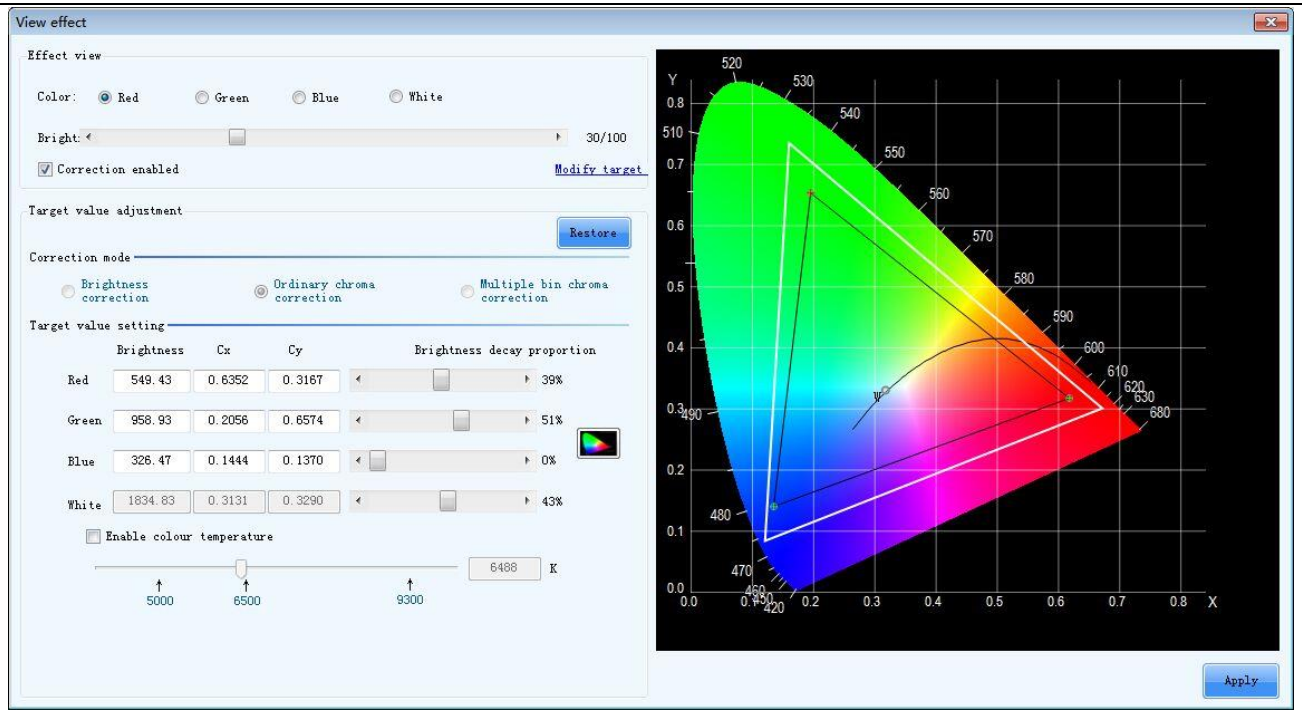
Original value and Target value

2.2.4 Start the calibration of the first cabinet



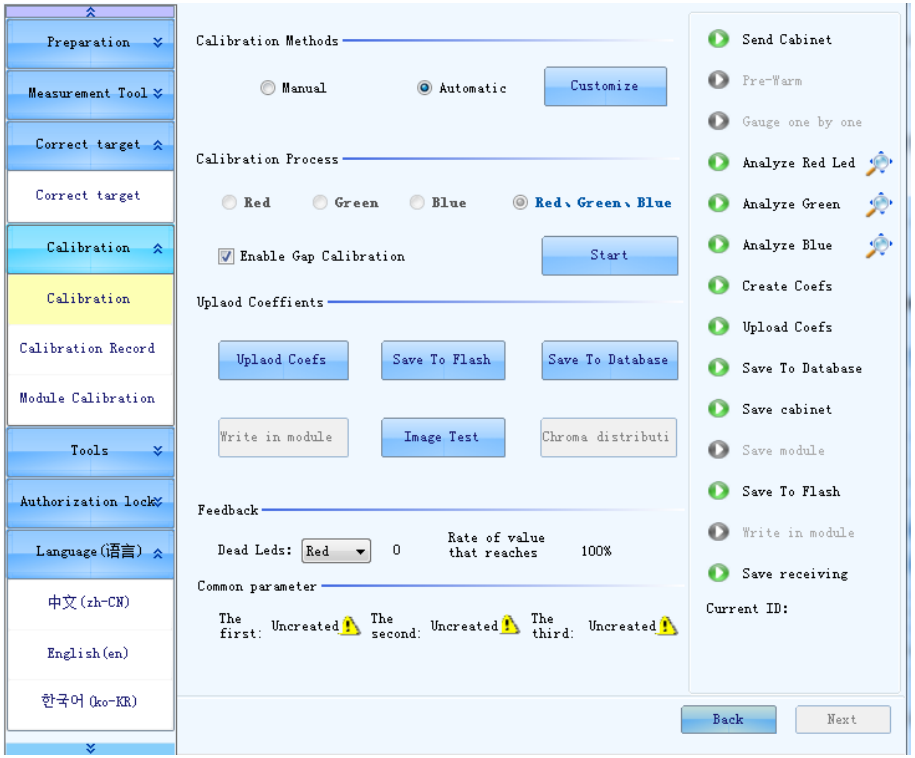


Before generating a coefficient, the following interface will show. To modify a calibration value, adjust the target value on the interface or directly adjust the color gamut and click "Apply" to apply the new value. Subsequent cabinets will use this value as well.



Step 3 **Calibration of subsequent cabinets**

Change the next cabinet and click "Start Calibration":



Notes:

1) It shall be guaranteed that during the entire calibration process the location of the pedestal of the cabinet to be calibrated and the camera, focal length and configuration shall remain unchanged. In case the improper operation results in the damage of the calibration site, a new database shall be re-created to calibrate the remaining cabinets which are seemed as another batch (at the same time, it shall be guaranteed that both brightness and chromaticity standard remain unchanged).

2) The locating place of each cabinet is required in strict conformance.

3) The first 30 cabinets, every 10 cabinets shall be monitored by measurement data simulation software for their calibration effects. After the first 30 cabinets, every 20-40 cabinets shall be simulated at the same time. The simulation of calibration database is a very important part of cabinet calibration. In the fourth step, we will give you a detailed introduction to the identification of simulation diagram with lots of content.

Step 4 **The identification of the simulation diagram**

We providethe cabinet database management platform NovaCLB-CabSolverto make a simulated analysis for part of the calibrated cabinet in advance. Through the analysis of the simulation diagram, we can know whether there is non-standard operations (for example, the camera is moved) or other reasons for the present cabinet calibration as soon as possible.

As splicing a simulation diagram by the effective utilization of cabinet requires some experience, next we will introduce the use ofthe cabinet database management platform, and give a detailed introduction on how to judge whether the measured data are ideal with the simulation diagram through several cases.

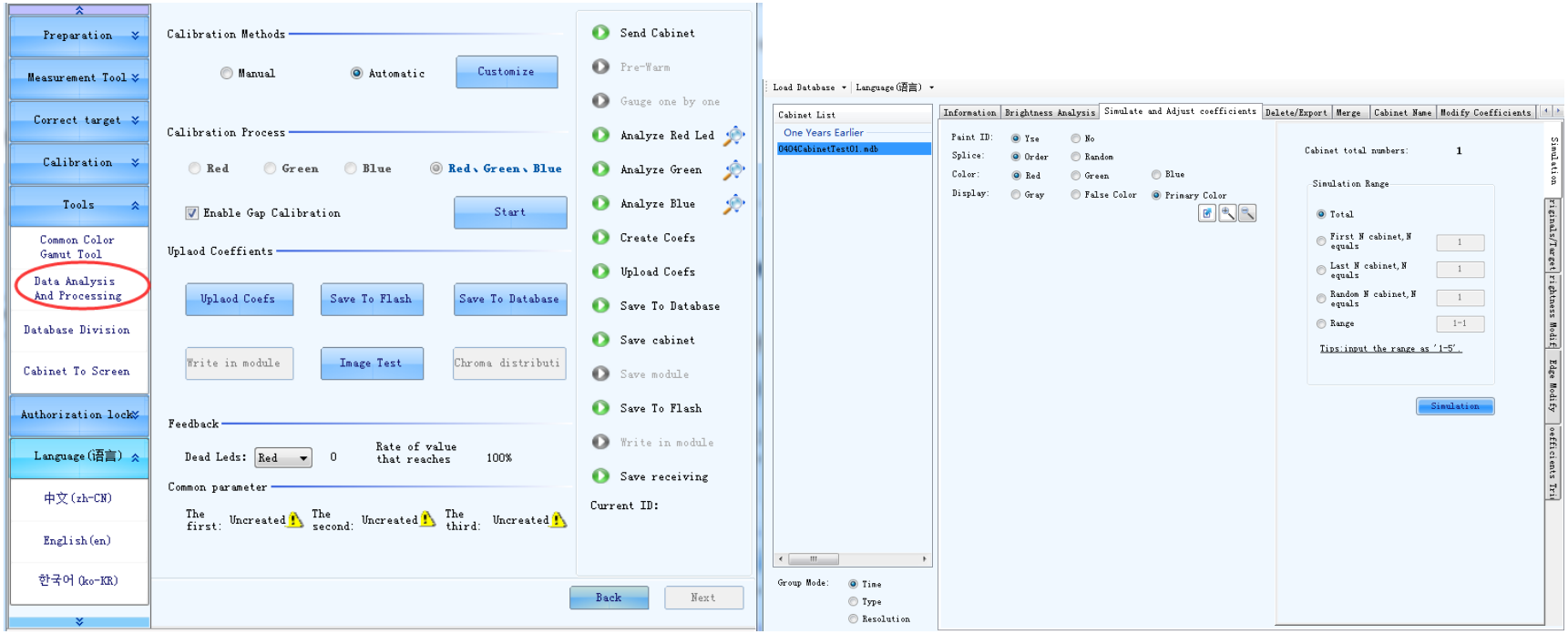
4.1 **The item "Simulate and Adjust coefficients" of NovaCLB-CabSolver**

Click the menu bar "Data Analysis And Processing" at the left lower corner to enter the cabinet database management platform NovaCLB-CabSolver.

Click the item “Simulate and Adjust coefficients” to generate the simulation image under this functional item.

TIP: Except the simulation function, NovaCLB-CabSolver also has functions of brightness analysis, database combination, and exporting/deleting cabinet.

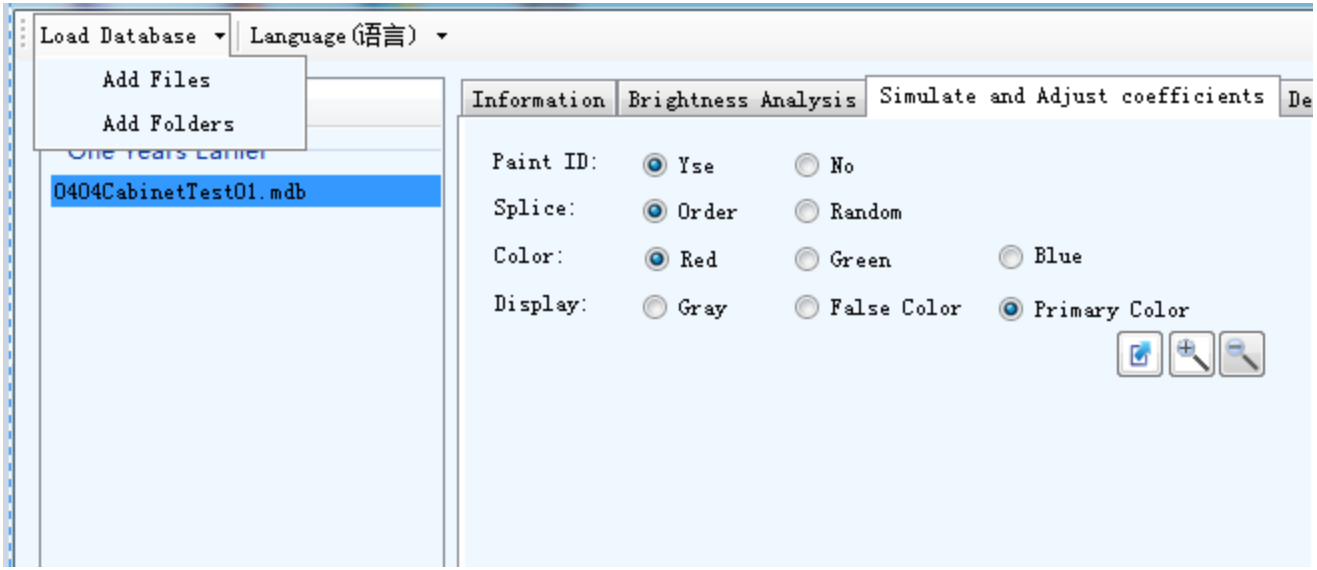
For detailed operation instructions of the management softwareNovaCLB-CabSolver, please refer to **NovaCLB-CabSolver Quick Start User Manual**.



Access toNova Cabinet database management software

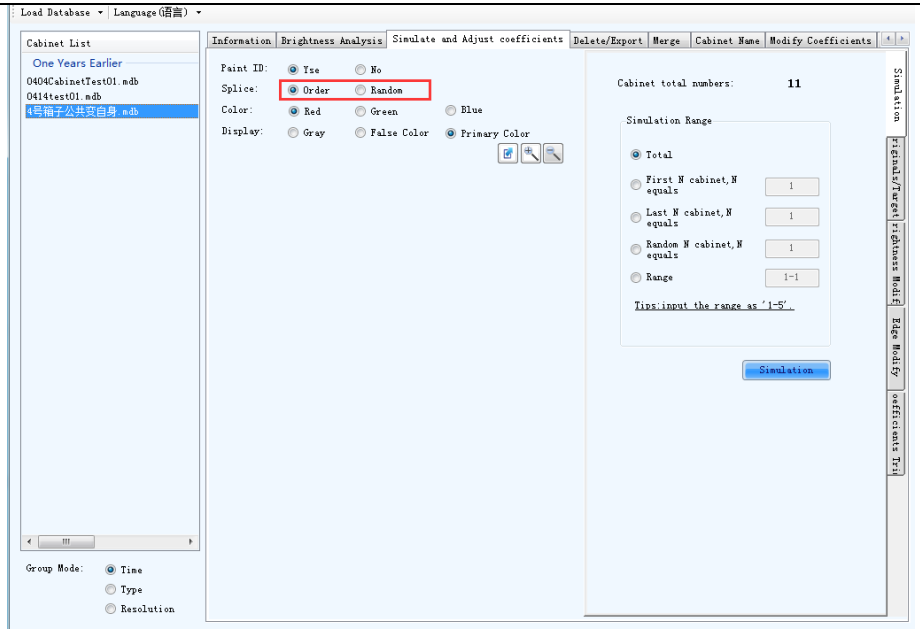
1) Load into the cabinet database:

Click "Load database", as shown in the following figure; click "Select database" to directly import the calibration database; or click "Select file" to import the database in the whole file.



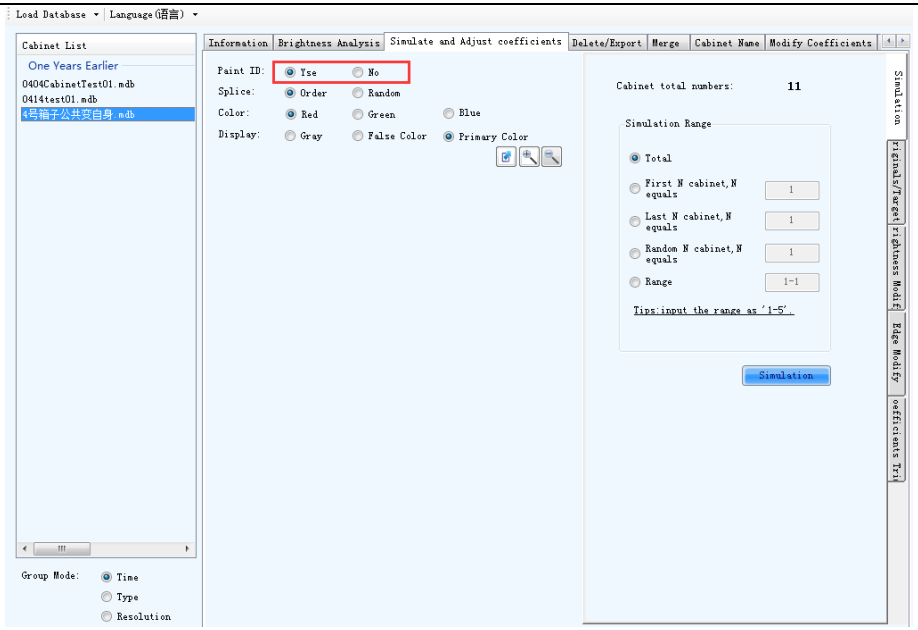
Database in a few cabinet

2) Select "Order Splicing Simulation," or "Random Splicing Simulation":



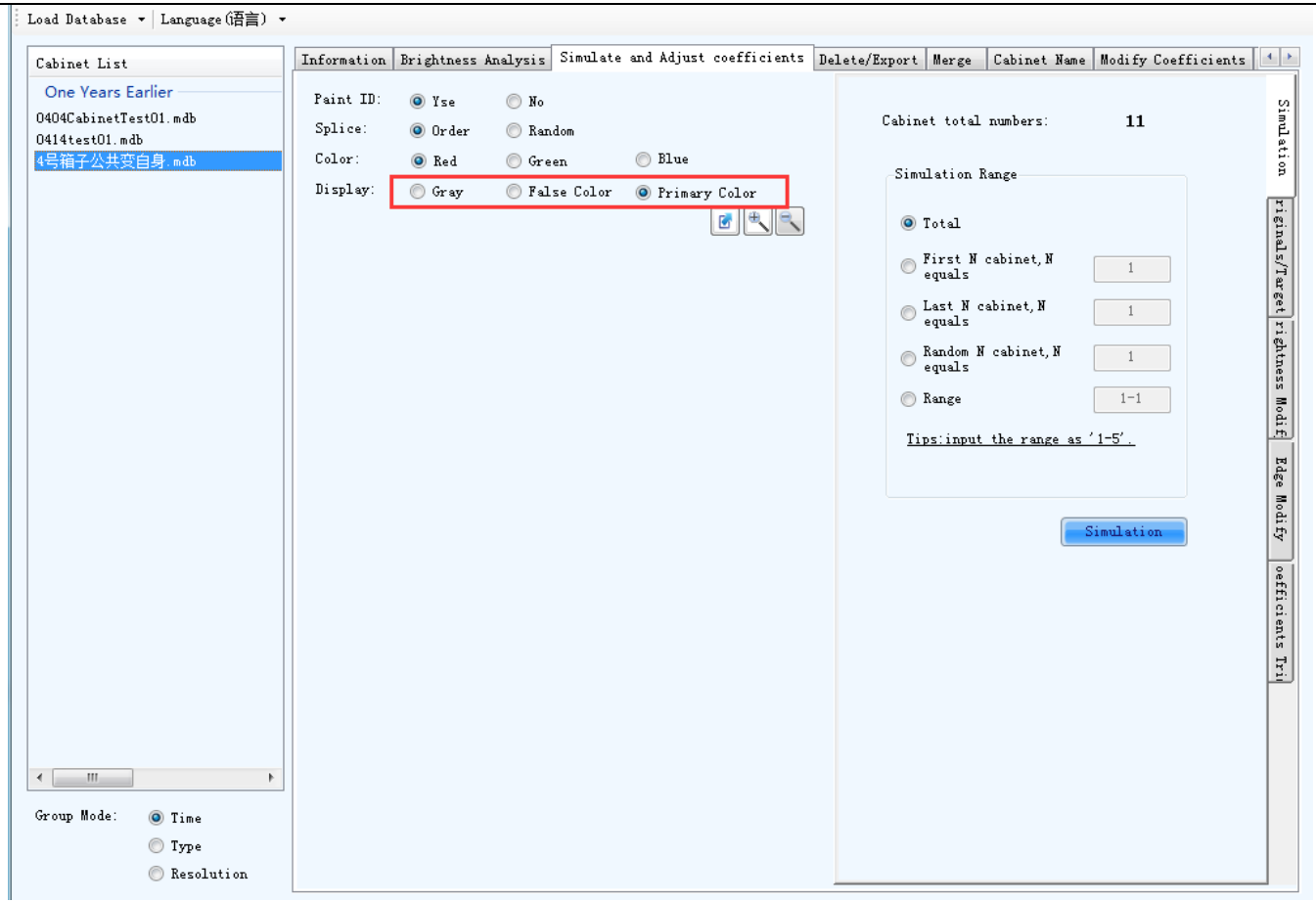
Select the simulation type

3) Switching "Do Not Draw ID" and "Draw All the IDs" to view whether the splicing between cabinet shown in the simulation diagram is normal.

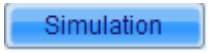


View simulation diagram

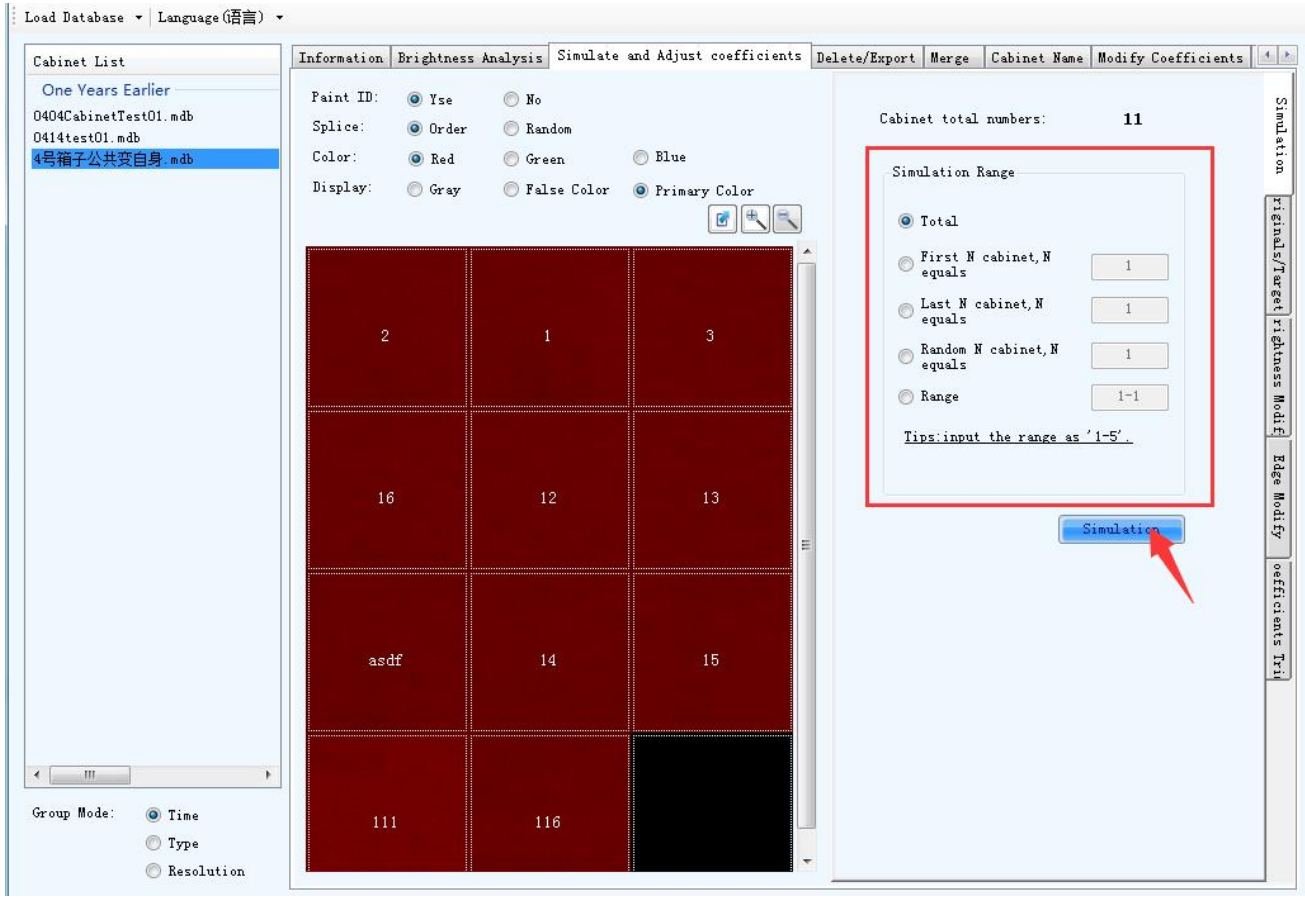
4) Switch display mode. Primarycolor,graying and pseudo color are the three expressions of measuring brightness. Some brightness differences difficult to be identified on the primary color diagram are easy to be identified on grayscale, pseudo color diagram.



Switch display mode

5) Select simulation range, and then click 

to generate the simulation image.



Simulation image

4.2 Identification case of the of simulation diagram

The simulation diagram of **NovaCLB-CabSolver** is generated through **some calculation based on the calibration coefficient of the**

cabinet. And what the simulation diagram tries to simulate is **the splicing condition of the cabinet before the calibration**. So we can think about the simulation diagram as the brightness analog diagram before the cabinet calibration. With the simulation diagram, the calibration personnel can see the rough result of spliced cabinet on the site (before the calibration), and if there is anything wrong with the measured brightness data, we would be able to see unreasonable places on the spliced simulation diagram, for example:

1) There are obvious boundary lines or difference between the cabinet, but actually there is none; (See Case 5)；

Reasons：There may be a problem with the lamp panel at the edge of the cabinet or some lines of LED lamps;

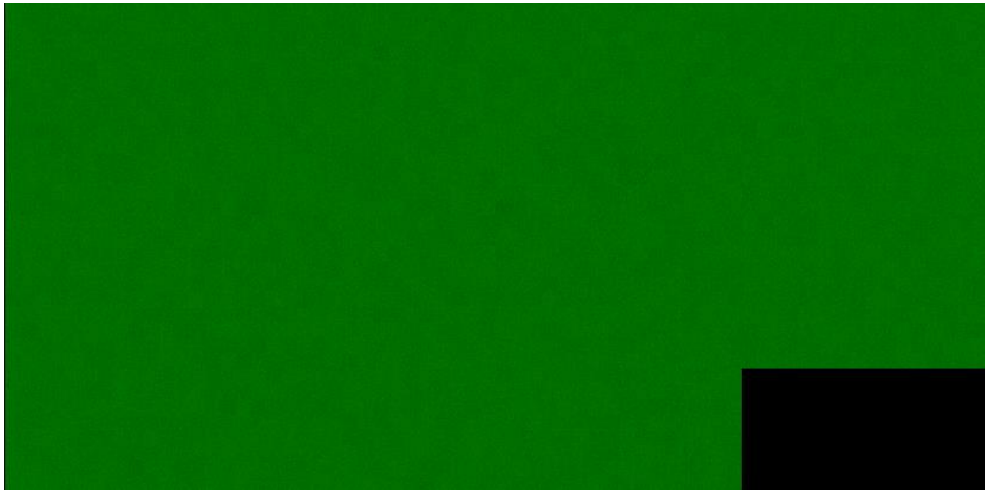
2) In the simulation diagram, the internal modular of most cabinets is serious or has regular defects; (See Case 3 and 4) ；

Reason：It is generally caused by the cabinet process, recommend that calibrate it on site;

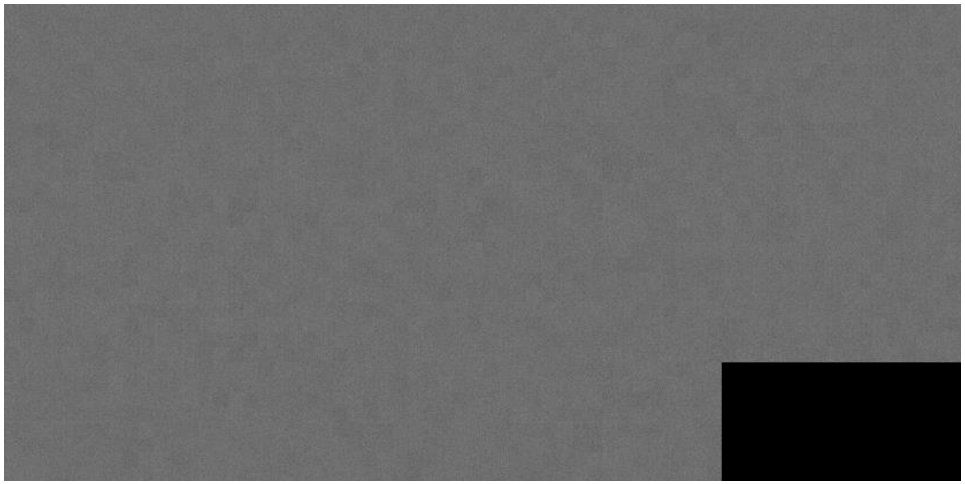
3) On the simulation diagram, compared with other cabinets, the individual cabinet has significant differences (gray-scale image or pseudo-color image); (See Case 6) ；

Reason：It may be caused by the instability of camera capture, recommend that re-calibrate these abnormal uniform cabinets;

4.2.1 CASE1: Good effect, qualified cabinet



Case 1 (a)　Green in primary color mode



Case 1 (b)　Green in graying mode

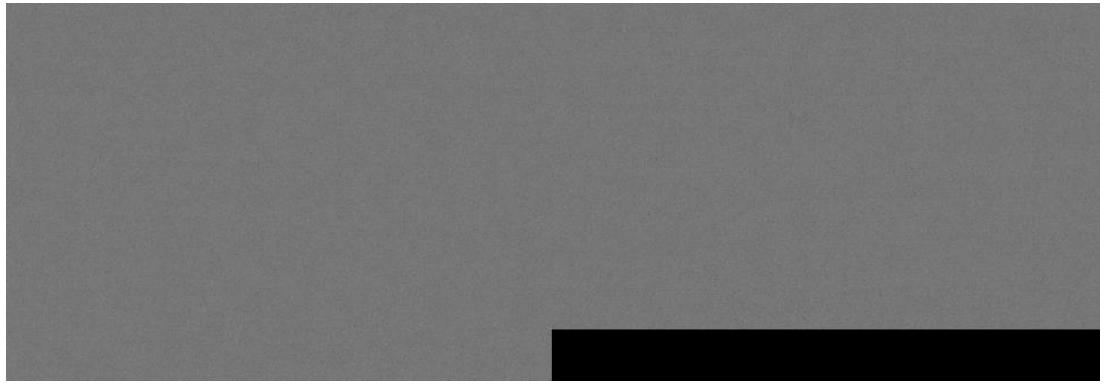
Analysis: In this case, the measurement data before green calibration is more ideal, there is no significant abnormal data, and it also reflects that

This batch of display screens has no obvious process problems although they have a handful of modular and slight vague screen phenomenon.

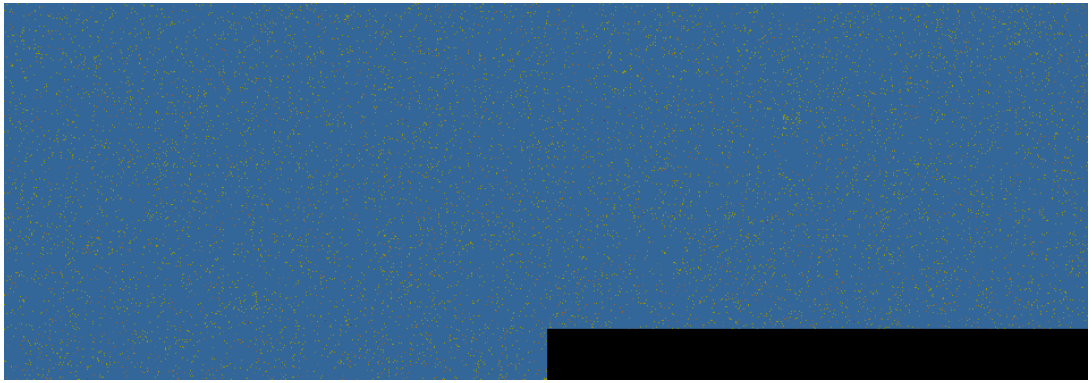
Conclusion: With no problem.

4.2.2 CASE2: Good effect, qualified cabinet

Case 2(a) Greenin primary color mode



Case 2(b) Green in graying mode

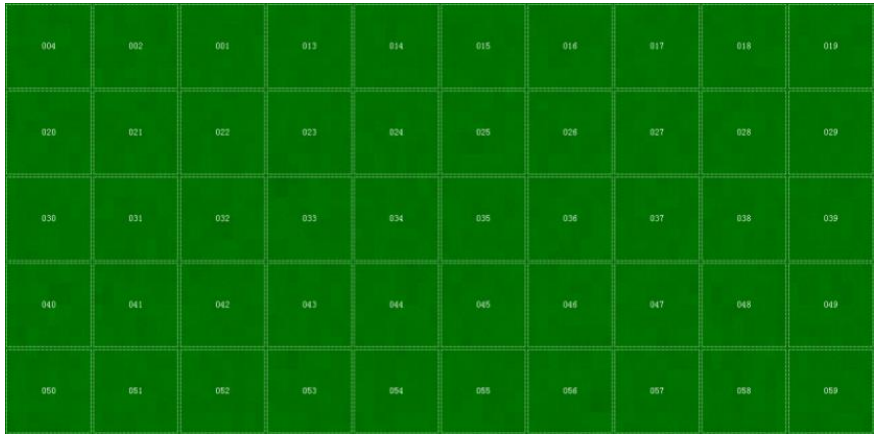


Case 2(c) Green in pseudo-color mode

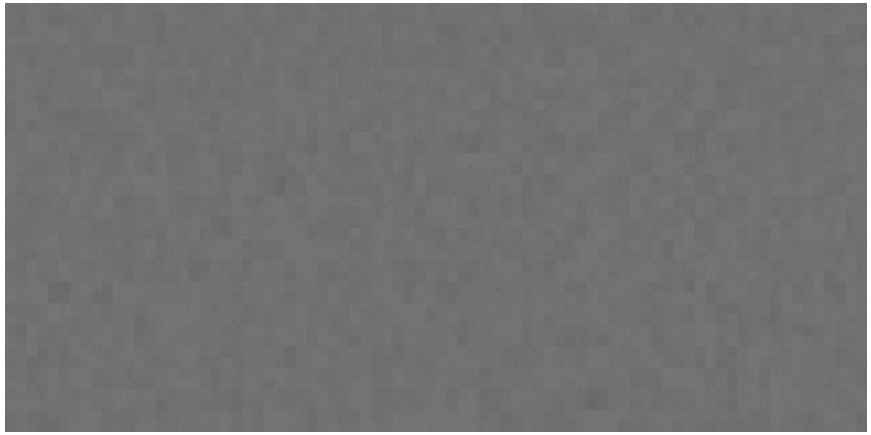
Analysis: The measured data before the green calibration is more ideal in this case. There is no significant abnormal data, and at the same time, it also reflects that this batch of display screens has no obvious process problems although they have a handful of modular and slight blurred screen phenomenon.

Conclusion: With no problem.

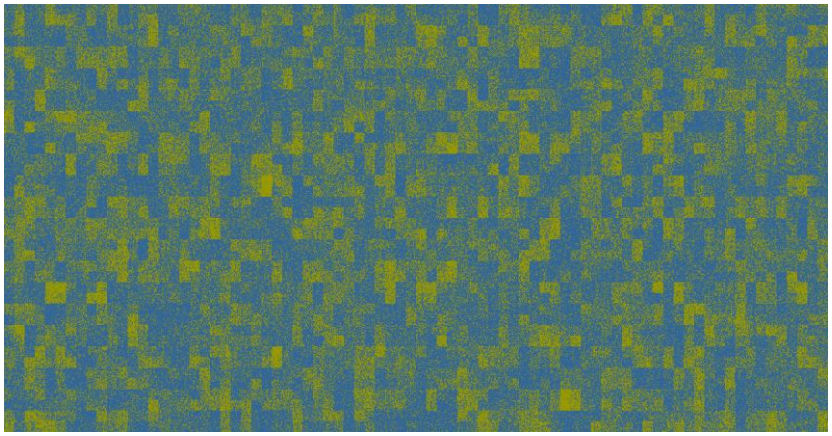
4.2.3 CASE3: Serious effects of module



Case 3(a) Green in primary color mode



Case 3(b) Green in graying mode



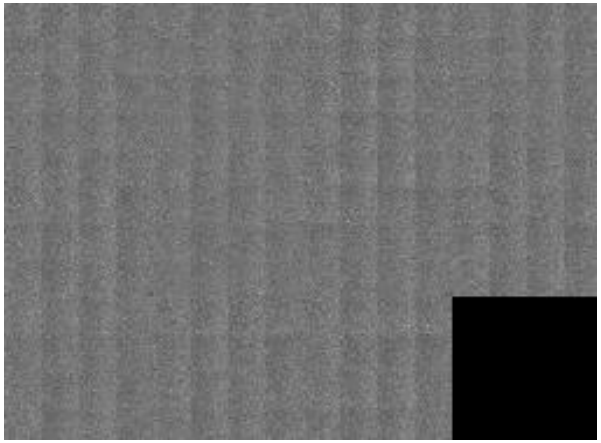
Case 3(c) Green in pseudo color mode

Analysis: In this case, the green has very serious effects of module. In which case, though the cabinet calibration can greatly improve the uniformity of cabinets, but as their brightness varies obviously, after splicing on the site, it is difficult to avoid a small brightness difference between the cabinet.

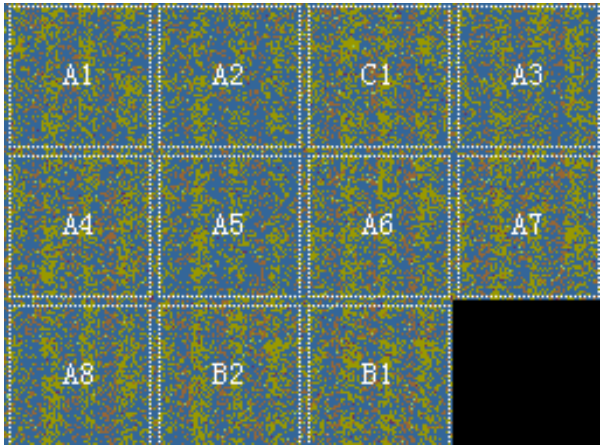
Conclusion: Recommend that calibrate it on site, and ensure the desired results; the cabinet calibration will have great improvement, but can not solve the problem completely.

4.2.4 CASE4: The displays of the cabinets viewed from different angles are inconsistent

Case 4(a) Blue in primary color mode



Case 4(b) Blue in graying mode

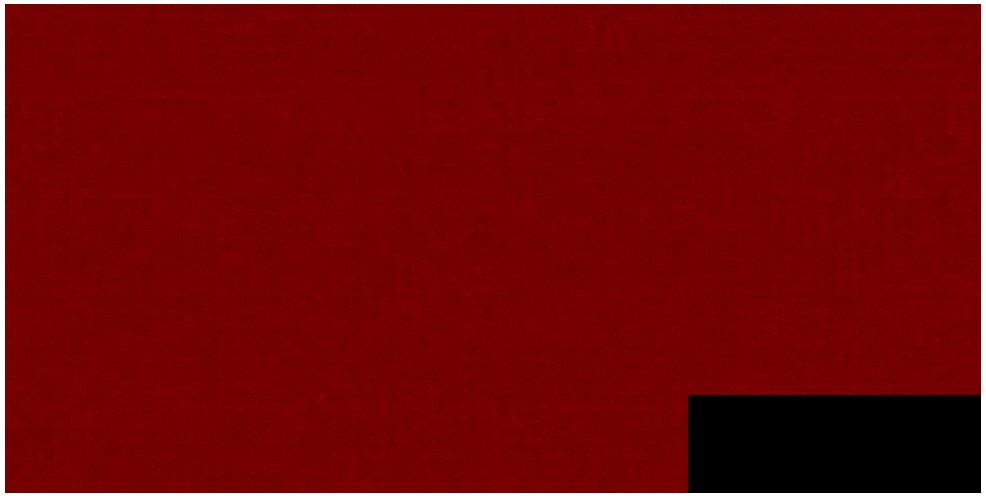


Case 4(c) Blue in pseudo color mode

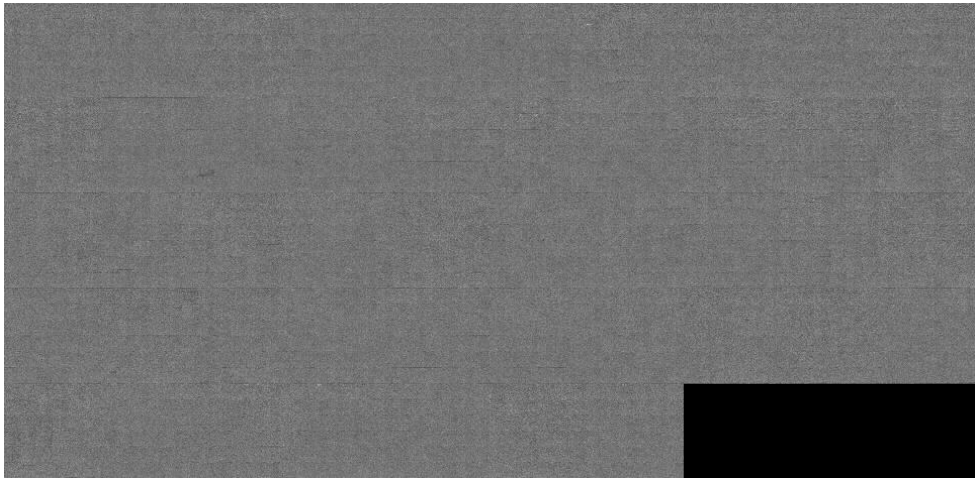
Analysis: In this case, the measurement data has serious vertical bars before the blue calibration, and place the cabinet with a 18° back elevation angle while calibrating. It is estimated that the vertical bars are caused by the emitting angle of the cabinet. Observe the performance of the cabinet before calibration: 1. The frontage of the cabinet has good performance (0° back elevation angle), and there is no vertical bar phenomenon. 2. With the increase of the back elevation angle, the vertical bar problem is getting worse, and the performance on the 18° direction is consistent with the simulation diagram of Case 4. Though the cabinet calibration can improve the cabinet uniformity at the 18°elevation direction, it could not guarantee the screen uniformity at the other angles. In this case, vertical bar may appear on the frontage after the screen calibration.

Conclusion: We advise you to carry out the on-site calibration to ensure an ideal result; and we do not advise you to conduct cabinet calibration for the cabinet that shows evident display difference in different directions.

4.2.5 CASE5: The abnormal dark line at the edge of the cabinet



Case 5(a) Red in primary color mode

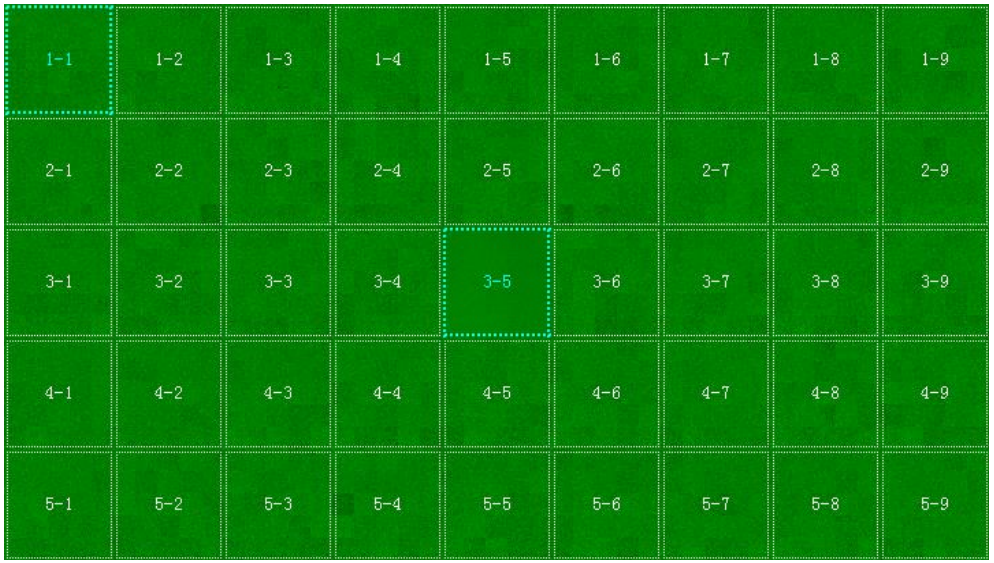


Case 5(b) Red in graying mode

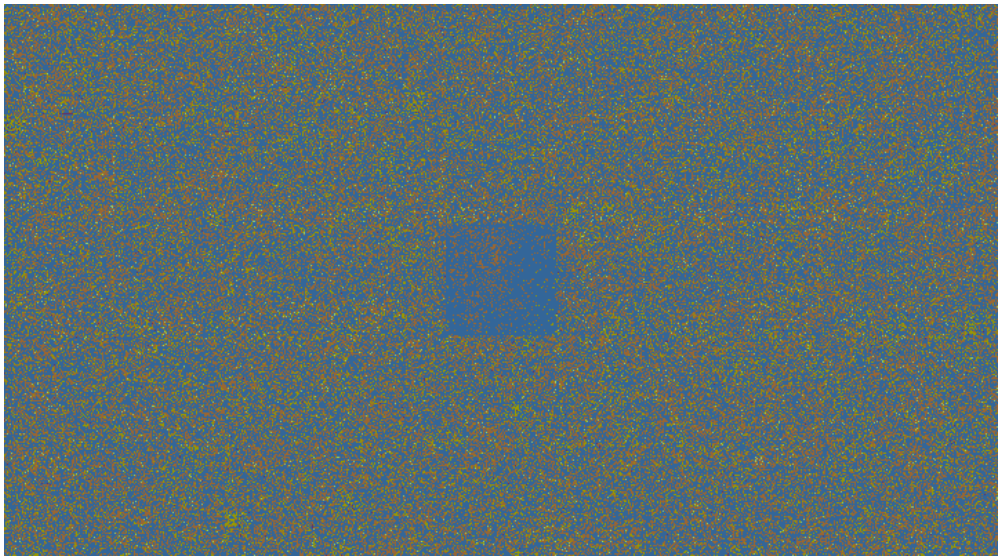
Analysis: In this case, the simulation diagram shows obvious dark lines between the red cabinets. We guess that it is caused by the problem of red LED lamps on the edge of the cabinet before the calibration. View the photographs shot by the cabinet and find that the last line red lights of the cabinet are darker. View the cabinet and find that the last line of red lights of the cabinet are tilted.

Conclusion: Recommend that calibrate the last line of red lights after calibrating their locations. Although the cabinet calibration can improve this situation in the calibration direction, it is still has dark line problem while viewing it in another direction after calibration.

4.2.6 CASE6: Individual cabinets with specially ideal uniformity exists



Case 3(a) Under primary color mode



Case 3(b) Green in pseudo color mode

Analysis: In this case, the measured data before the green calibration are more normal. But the uniformity of the cabinet 3-5 is obviously prior to that of all other cabinets, which seems extremely unreasonable.

Conclusion: Must re-calibrate 3 to 5 cabinet.

Handling method of common error

Error tips	Handling methods
Point positioning errors	1) Change "identify direction point-by-point" of "calibration parameters" 2) Amplify "allowable dead point scale".
Screen is vague after calibration	1) Please see "calibration" – "Measuring image", LED point is framed by square positioning under normal circumstances; 2) Change the "identify direction point-by-point" to re-calibrate.
Color error of image data	Please check whether the screen body is too dark or the color on the screen is wrong when using camera.
The camera is not connected	Please check connector wire between your camera and control computer; please check electric quantity of your camera.
Unexpected error	1) Please check whether the cabinet resolution is too large, 7D supports resolution of 192 * 144. 2) Attempt to restart the calibration software, restart the camera and restart computer.