

## Camera Calibration: Lens Calibration

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If you have done a **corner calibration** (<https://support.mr-beam.org/a/solutions/articles/43000065908?lang=en>), and the arrows you engraved for the corner calibration line up perfectly with the edge of the picture, but you still have **bad precision in the centre or edges** (misalignment of **more than 5mm**) of the frame, you can try to correct it with a lens calibration. In some cases you might get a warning message, asking you to do a corner calibration prior to the lens calibration.

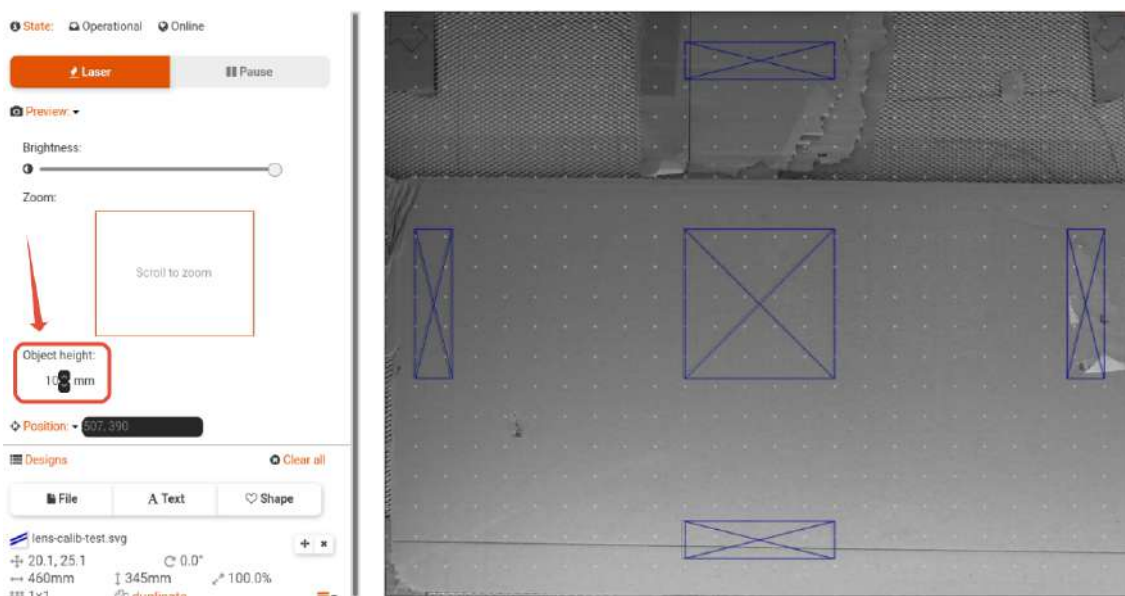
**The lens calibration** is made to remove the fish-eye effect from your camera picture. Only do this if you think that your camera precision is bad, specially in the centre.



### How do I test the quality of my lens calibration?

If you don't know how precise your design engraving is compared to the camera, then we suggest to laser several patterns in different places of the work area. You can download **this file** (<https://www.mr-beam.org/wp-content/uploads/2020/10/lens-calib-test.zip>) for testing. Make sure that the pink markers are still visible to the camera when you put in your test material - otherwise you won't have the best result!

In this example, the height of the cardboard surface used is 10mm. Therefore, we have to set it in the "Object height" parameter to 10 mm in the Preview tab.



The blue boxes on the left and bottom are misaligned by 1 to 3 mm. Be aware that this is already pretty good. **You might not be able to achieve a better precision than 1 mm** after performing your own calibration of the camera.

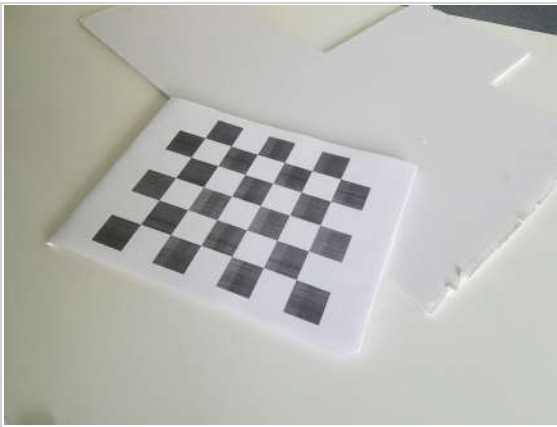
If the misalignment is bigger - **around 5 mm or more** - or if you really want to achieve the best possible precision in case you are engraving thin objects (pencils, kitchen utensils ... ) then we suggest that you take some time to perform an extra lens calibration.

## How do I calibrate my camera lens?

### Steps

**1. Download and print this chessboard** ([https://www.mr-beam.org/wp-content/uploads/2020/09/calibration\\_chessboard\\_pattern.pdf](https://www.mr-beam.org/wp-content/uploads/2020/09/calibration_chessboard_pattern.pdf)). **Take care to print it in portrait mode - vertically.**

If you print it on a regular sheet of paper, then please make sure to keep it flat against another surface (e.g. stick it to a flat piece of wood or thin foam board).



**2. Place it inside your Mr Beam, horizontally.**



**3. Go to the Camera settings and select the "Start" button of the Lens Calibration.**

*We do not need to detect the markers for the following steps, so don't worry about the red cross. They are only needed when you wish to test your calibration.*

About This Mr Beam  
Software Update  
Access Control  
Maintenance  
Network Connection  
find mr-beam  
File Import Settings  
**Camera**  
Precision Calibration  
Custom Material Settings  
Analytics  
Reminders  
Mr Beam Lights  
Logs  
Debug  
DEV Design Store

## Camera

**Status** ✖

The camera is not able to take new pictures. Please check the following:

- ✔ The lid is open
- ✔ Mr Beam is in state Operational
- ✖ No markers found since camera did not launch (More about markers [here](#).)

Do you have problems with the camera? Please check out our [troubleshooting guide](#).

### Settings

**Marker detection**

Select one of the two marker detection modes: **reliable** to always get an image or **accurate** to only get precise images.

Reliable Accurate

### Camera calibration

Your Mr Beam's camera is factory calibrated by default, so there is **normally no need to calibrate the camera**.

A new calibration of the camera is **only necessary** if:

- One of the pink markings has been changed. (For example, if the mark was peeled off and glued in again.)
- You notice a **deviation larger than 5mm** between the processed camera picture (as you see it in the software working area) and the laser result.

For more information, please have a look at our article on [camera calibration](#).

#### CORNER CALIBRATION

The corner calibration uses the pink markers to calibrate the camera. Use this in case one of the markers has been changed or if there is a large deviation between the screen position and the laser result.

Start

#### LENS CALIBRATION

The lens calibration is made to remove the fish-eye effect from the picture. Only do this if you think that your camera precision is bad, specially in the center.

Start

## 4. Start the calibration by clicking on the "Start Calibration" button

### ← Lens Calibration

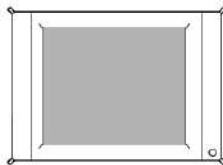
The lens calibration removes the fish-eye effect of the camera. Use this if you are dissatisfied with the precision of the camera and a new corner calibration does not make it better.

To test the quality of your current lens calibration please follow the instructions shown in our Knowledge Base article [Test your camera calibration](#).

If you do a new lens calibration and later want to go back to the default calibration, you can reset to factory settings here: Restore .npz

#### Steps

- Download and print [this chessboard](#). If you print it on a regular sheet of paper, then please make sure to keep it flat against another surface (e.g. a flat piece of wood or foam board).
- Place it inside your Mr Beam, horizontally.
- Start the calibration by clicking on the button, and then follow these steps until the picture of the working area in the right is mostly green (9-20 times):
  - Press the button on your Mr Beam to take a picture of the chessboard: the Status Lights will flash in blue.
  - Wait for the blue flashing to stop and check if the new picture has a green check on it. If it shows a red cross or takes too long, delete it and take a new picture.
  - Move the chessboard to a new position.



Start Calibration

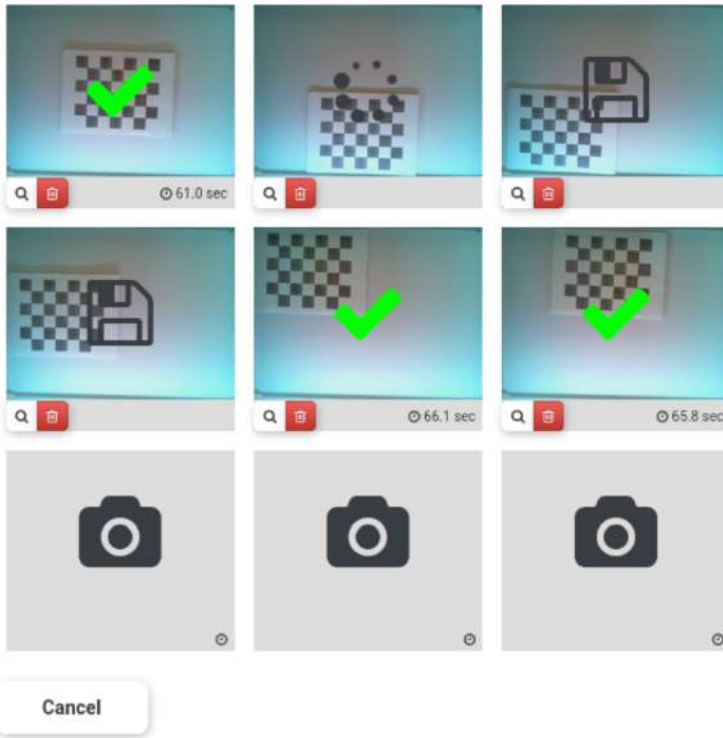
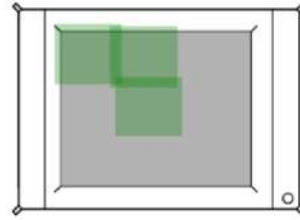
## 5. Follow these steps until the picture of the working area on the right is mostly green (9-20 times):

- Press the button on your Mr Beam for a short time to take a picture of the chessboard: the Status Lights will flash in blue.
- Wait for the blue flashing to stop.
- Move the chessboard to a new position and take another picture.
- Meanwhile, you can check if the previous pictures have a green check on them. If they show a red cross or takes too long, delete it and take a new picture. 3 minutes should be more than enough for the system to detect the chess-board.

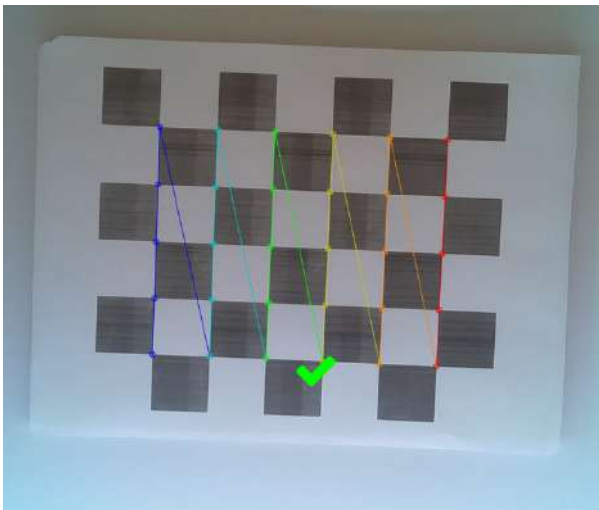
*While the software is processing a picture, you can already proceed with taking all the pictures you need - as long as you wait for the blue flash to stop between each shot.*

5. Start the calibration by clicking on the button, and then follow these steps until the picture of the working area in the right is mostly green (9-20 times):

- Press the button on your Mr Beam to take a picture of the chessboard: the Status Lights will flash in blue.
- Wait for the blue flashing to stop and check if the new picture has a green check on it. If it shows a red cross or takes too long, delete it and take a new picture.
- Move the chessboard to a new position.

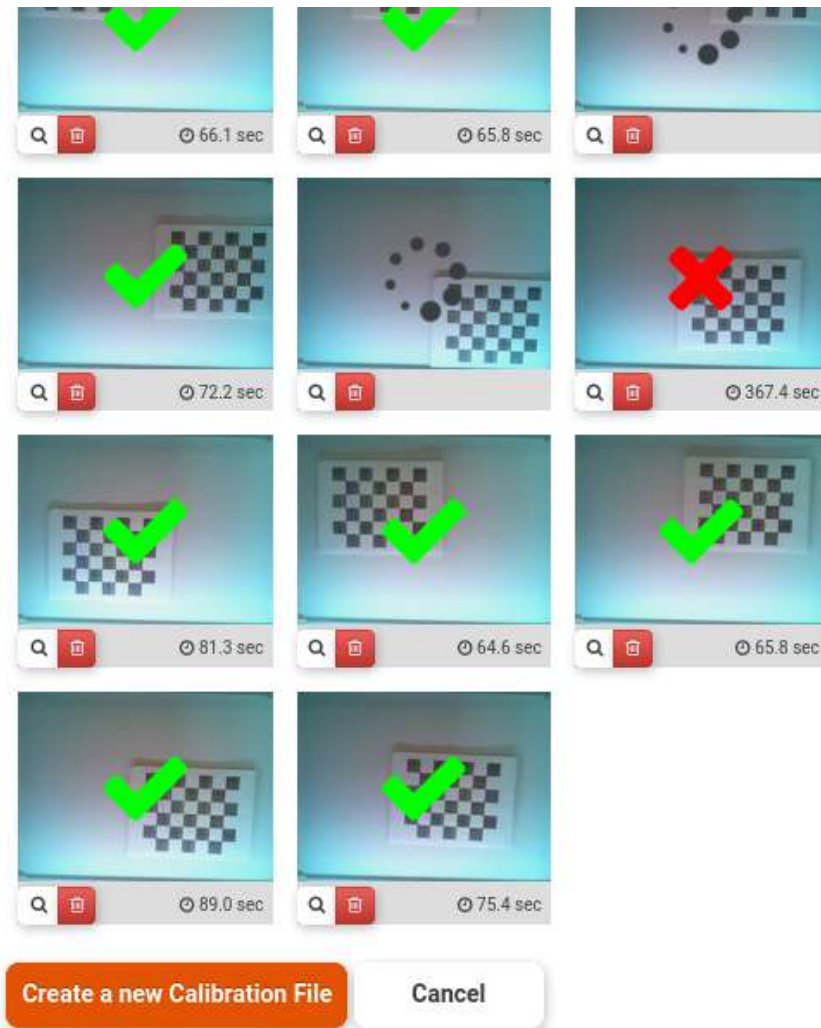


When one of the pictures shows a green check mark, it means that the chessboard was detected. To double check if it is correct, you should see a coloured pattern with circles at each intersection between white and black squares. To magnify the image, press the zoom button on the desired picture.



You can cancel the procedure at any time by pressing the corresponding button, or by going anywhere else in the settings or the work area. **Your progress will not be saved until you have created your first calibration result.**

**6.** When you have at least 9 pictures **with a detected chessboard**, you will have the possibility to run the calibration with the given result. The lights will blink then stay green when the calibration is done.



Each new calibration will overwrite your previous one. You will always be able to revert back to the factory calibration of the lens

**Tip: If it's taking too long to detect the chess-board, try the following:**

We have laid a white foam board on top of the work area. This will greatly increase the speed at which our system is able to identify the calibration checker-pattern, but it is **not strictly necessary!**



**7.** You can now test if the quality of your lens calibration is sufficient by following the steps described in [the first part of this tutorial](#).

