FalCon CamFolder – Camera Calibration QM FAQ

- ***Why do I need camera calibration?***

Depending on the kind of lens the range of its distortion errors can be up to several 10 mm. F-mount-lenses show generally less distortion than C-mount lenses. Short focal length causes often problems due to higher radial distortion.

A not adjusted principal point (= optical axis in the picture) has bad influences during 2D parallax correction.

FalCon CamFolder is a tool to check and to compensate possible errors due to lens distortion. It subsumes all geometric effects of camera body, adapter and lens.

- ***Which hardware and software tools help to fulfill the standards?***

Principle:

Take few snapshots of a **pre-measured test panel** and evaluate them by **FalCon CamFolder** distortion parameters and numerical values characterizing the quality of the camera/lens.

The AICON **test panels** come with a calibration log acc. to German standard **VDI/VDE 2634**.

Supply an **appropriate image set** as basis of the calibration:
Provide a suitable test panel (with posts), follow the hints for setup and illumination, record several tilted and rotated positions and shift the panel to accumulate “points” within the complete image field (see manuals for scheme with 7plus images).

The standards **ISO 8721 Rev. < 2010 / SAE J211/2 Rev. 1995** describe the requirements to optical measurements mainly by the **Distortion Index**. This one-value index for the lens quality is a result of evaluating the well-known “5-ring test panel”. Add this value in your quality management report! (Please note that we recommend to use this panel rather than the simplified “1-ring-cross panel” defined in SAE Rev. 2001.)

The current standard **ISO 8721** (Rev. 2010) requires details from the calibration data set: focal length and distortion accuracy. These values are also provided by FalCon CamFolder.

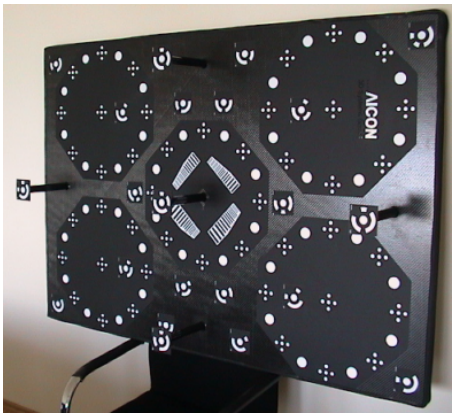
While quality assessment asks for the special indices, we also recommend to note the **overall residual error** before and after application of rectification. These values give a direct feedback of expectable accuracy.

- ***Which certificates and QM procedures help for quality assurance?***

- ***How to manage within ISO/IEC 1702, the standard used by testing and calibration laboratories?***

Here come some advices:

- Keep the panel – if not used – always its transportation box.
  Do not leave the panel outside its case unattended or overnight.
  (There should be no dust on the panel. If so it is a feedback that the panel was a long period outside of the box...)
- Keep the panel always in a room with controlled temperature and humidity.
  Minimize the span of time of unavoidable hot environment, e.g. imaging under crash illumination.
- It should be used only by qualified staff.
- It is a sensitive measurement device: Note this by a reminder on the box!
- Put a log sheet in the box, where the operators sign every use; thus you get a good feedback of numbers of use within a year. Of course every special event or accident needs to be logged.



- ***What about the camera recalibration interval?***

The period highly depends on the number and type of usage:
+ camera and lens are always kept as a fixed unit
+ bodies lenses are changed arbitrarily
+ camera is fixed mounted
+ camera suffers on-board high-g accelerations

Hint:
Start with a quality approval time of one year (see settings in **FalCon CamFolder**) and then adjust it later according to your needs.

- ***What about the test panel recalibration interval?***

Some customers who have photogrammetric systems recalibrate the panel e. g. every 2 years. Some customers do it only after a recognized damage/accident.

We would recommend to apply recalibration depending on number of uses, visible damages, accidents and your own check procedure.

The standard recalibration period can be defined as more than 2 years, if the panel is handled well and if a yearly test procedure ensures the stability of the panel; else the period needs to be shortened.

Possible (user specific) check procedure:

a) Use a static photographic camera with quite high resolution and fixed (short) focal length.

b) Perform a camera calibration under best conditions (: test panel fills the full image...). (Note to enter the exact pixel size in µm: get it from the data sheet of the camera.)

c) Repeat this calibration (once!) taking the images by a second operator (: to get slightly different images...).

d) Check the results: Are both calibrations quite the same with respect to residual errors?

e) Repeat these steps e. g. every half year (just one calibration only) to see if you can recognize any deviations: The overall residual error should remain constant and no particular marker should show significant higher errors.
Example: A post marker is damaged by few millimeters. You will get a remarkable error at this point.

f) Log the results and add a screenshot of the overlay graphics showing the residual errors of all points.

g) Note: You should keep the camera used for these checks always constant!