



Quality Control for Solar Concentrator Structures



System

QFoto is a robust 3D measurement system for the **inline geometric quality control** of **solar concentrator structures** using close-range digital photogrammetry.

The system inspects the position and orientation of mirror support elements, the position of receiver supports, and other relevant reference points. The automated measurement and analysis software is highly flexible and customizable. With its highresolution, self-calibrating camera, the system guarantees **high measurement accuracy** even under changing temperatures. **QFoto** works with retroreflective measurement targets and adapters. They are **available for all concentrator types** and **module dimensions**.

After each measurement, an **automatically generated evaluation report** summarizes the results for all coordinates and mirror tilt angles, mirror support angles, and distances. The report also includes measurement **accuracy checks**. The quality assessment evaluates the entire module and indicates pass/fail with a signal light. **QFoto** also provides a **statistical quality analysis** over the production period.

Key Benefits

QFoto has been working reliably in concentrator assembly lines around the world. By 2024, **QFoto** has verified the concentrator quality of more than 30 CSP plants, totaling 2.8 GW of electrical power and more than 25 million m^2 of aperture area.



Features

Measurement:

- Application for Parabolic Trough, Heliostat and Dish structures
- Camera installed on a rotating arm above structure or hand guided in semi-automatic system
- Automatic or semi-automatic and non-contact 3D measurement
- · Correction of cantilever and receiver support tilt
- · Measurement time per module: 5 minutes
- · Set-up time per module: 10-20 minutes
- In-situ camera calibration up to 55 °C

Evaluation:

- · Module rotation axis or optical axis as reference
- · Calculation of mirror panel tilt angles
- Calculation of mirror support slope angles
- · Computation of deviations from nominal values
- · Compensation of thermal expansion of the object



Quality report:

- Comparison of assembly deviations with permitted tolerances
- Final pass/fail signal via signal light
- · Statistical output of process stability

Uncertainty:

- · Less than 0.5 mm for 3D coordinates
- Less than 0.2 mrad for mirror tilt angles
- · Less than 2 mrad for mirror support slope angles



Typical QFoto Measurement Report (EuroTrough)



Cologne CSP Services GmbH Friedrich-Ebert-Ufer 30 51143 Cologne, Germany

Phone +49 2203 959 0030

Almería CSP Services España, S.L. Paseo de Almería, 73 04001 Almería, Spain

Phone +34 950 85 25 63

Find us online

www.cspservices.de info@cspservices.de

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