Performance Testing

Precision Solar Solutions

We have extensive experience in evaluating and optimising the optical quality of a wide range of solar concentrators. We provide expert knowledge and measurement services to customers worldwide.

Our specialised measurement techniques, innovative software tools and expert knowledge have proven invaluable in optimising prototype collector designs and ensuring quality assurance for large-scale solar field assemblies.

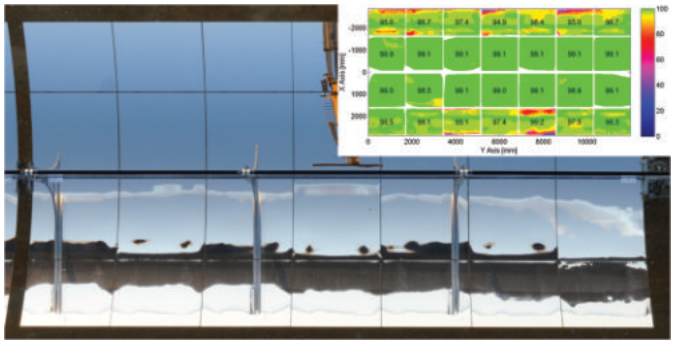
Precise concentrator shape is critical for achieving high optical efficiencies in various solar concentrators, such as parabolic troughs, heliostats, dishes, and Fresnel systems. This is particularly challenging for large and lightweight structures. Factors like module orientation, receiver position, and collector torsion significantly impact the final efficiency of the concentrator.

Our measurement and consultancy services cover all aspects of quality control in design, manufacture, and assembly. We offer on-site measurement and monitoring, data analysis and interpretation, technical reviews, performance modeling, and specification and qualification of components.

Key Benefits

We recommend conducting measurements at each development stage of an ongoing project. On-site measurements typically last from one to several days.

Enhance your solar concentrator projects with our expertise to ensure the highest optical quality and efficiency.



Deflectometric shape measurement of parabolic trough

Offered Measurement Services

3D Shape and Deformation Measurement
3D point measurements of assembly jigs and concentrators using close range **digital photogrammetry (PG)**. Results include point and angle deviations from design and deformation at different elevation angles.

Large-Scale 3D Measurement
3D point measurements of distributed structures in the solar field usi´ng **Tachymetry (TAC)**. Results are point deviations, e.g. of foundations, pylon location or pylon orientation.

High Resolution Concentrator Shape Measurement
Slope analysis using image recognition in photos based on **Deflectometry (DEF)** for parabolic troughs, dishes and heliostats. Results are high resolution maps of slope deviation, focus deviation and intercept factor.

Local Intercept Measurement
The **Camera Target Method (CTM)** uses image recognition in photos of a flux target placed in the focal line. Results are local intercept factors along the collector and images illustrating the beam paths around the receiver tube.

Torsion Measurement
Measurements using high resolution inclinometers to check collector balance, bearing friction and **module torsional stiffness (TM)**.

Receiver Alignment Measurement
Relative distance measurements to the concentrator edge to determine the **lateral receiver deviation from the focal line** in parabolic troughs **(RAM)**. Can be performed at different elevation angles to detect receiver movement.

Module Alignment Measurement
Measurements in parabolic trough collectors to determine the **angular misalignment between neighbouring modules (MAM)**.

Thermal Efficiency Measurement
Quasi-static or dynamic **performance measurements using clamp-on or embedded temperature** and flow sensors and high-precision DNI monitoring **(TEM)**. Results are performance characteristics of test collectors, loops or commercial solar fields.

Measured Characteristics	Jigs	Prototypes	Working Loop	Operating Field
Geometric accuracy	PG	PG	PG/TAC	PG/TAC
Concentrator shape	-	DEF	DEF	DEF
Deformation analysis	-	PG	PG	PG
Torsion due to unbalancing	-	TM/PG	TM	TM
Torsional stiffness	-	TM	TM	IM
Receiver alignment	-	PG/RAM	RAM	RAM
Module alignment	-	MAM	MAM	MAM
Local intercept	-	DEF	DEF/CTM	DEF/CTM
Module intercept	-	DEF	DEF	DEF
Thermal efficiency	-	-	TEM	TEM

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