cspservices
concentrating solar power services

Qscan

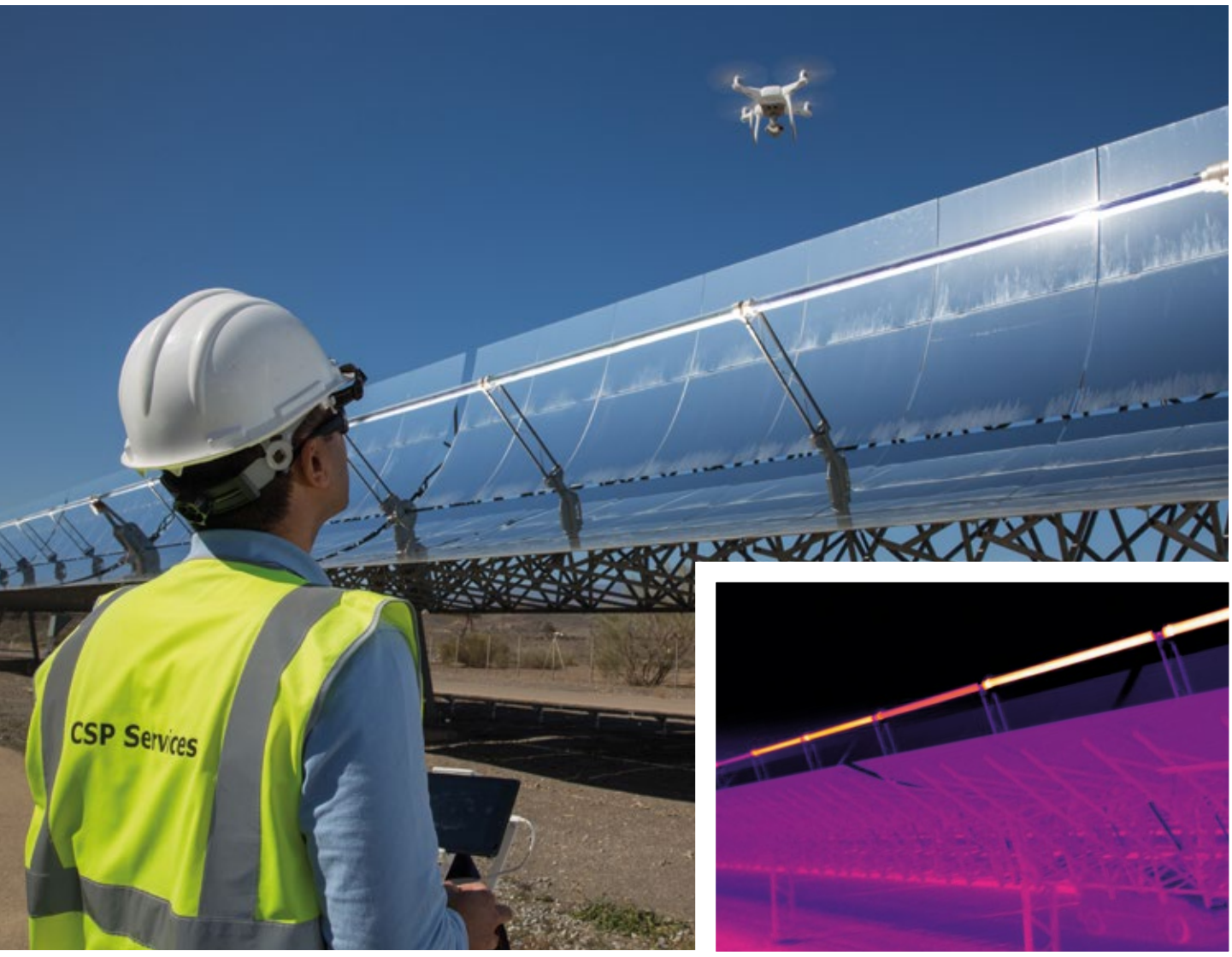
Your solution for optimization of solar field performance & maintenance strategies

QScan – Increase your profit, reduce your risk

CSP Services is a global leader in performance assessments of Concentrating Solar Power (CSP) plants. With **QScan** we introduce a completely new service to the CSP market. It combines our vast experience with state-of-the-art drone technology, advanced digital image analysis and big data management for the quickest possible inspection of your solar field.

QScan is an industrially proven, extended version of the award-winning QFly technology, licensed from the German Aerospace Center (DLR). We offer two services that can be adapted according to your needs.

- Shape Assessment analyses collector tracking, alignment and geometry
- Thermal Assessment checks receiver state and thermal losses in the solar field



Key benefits of QScan

Quick survey
of solar field conditions with immense time savings compared to traditional ground measurements

Short payback time
ensured by low costs for service compared to potential of increased income

Minimized interference with solar field operation
through non-contact optical measurement and automated flight routes

Higher revenues
through improved plant performance, availability and reliability

Increased lifetime
by optimized plant operation and predictive maintenance

Regular solar field monitoring
in an easy and operator-independent way

Maintenance optimization
enabled by full coverage of optical and thermal solar field data

Independent third-party assessment
to supervise subcontractors, perform acceptance tests and technical evaluations in case of warranty claims and disputes

Root cause analysis
of underperformance with detailed solar field data

Concise report
presents comprehensive numerical and graphical results and shows opportunities for improvements

QScan - Optimize plant performance and lifetime

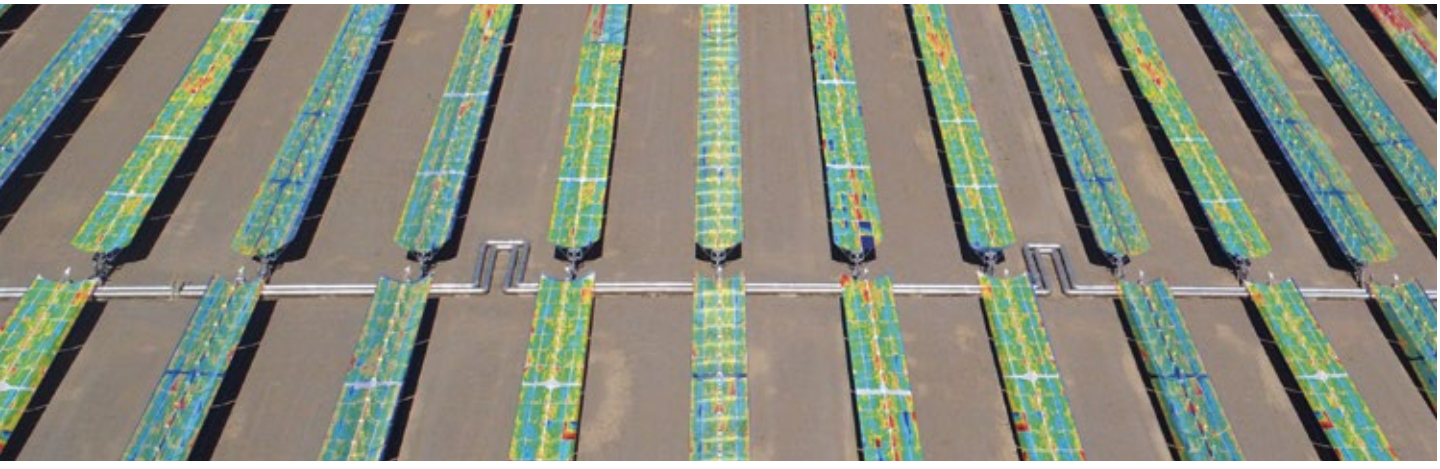
The exceptional know-how of CSP Services in optical and thermal measurements combined with advanced digital image analysis, big data processing and 3D modeling is applied in our versatile **QScan** software for a precise and comprehensive data analysis.

Shape Assessment

Screening Mode
Quick and comprehensive overview of solar field performance

Detailed Mode
Solar field ''X-Ray'' by close-up flights to provide precise details about specific areas

Screening Mode		Detailed Mode
+	Solar Intercept	++
++	Collector Tracking	+
++	Module Alignment	+
++	Collector Torsion	+
+	Concentrator Shape	++
++	Mirror Breakage	+
++	Receiver Breakage	+
-	Receiver Alignment	++

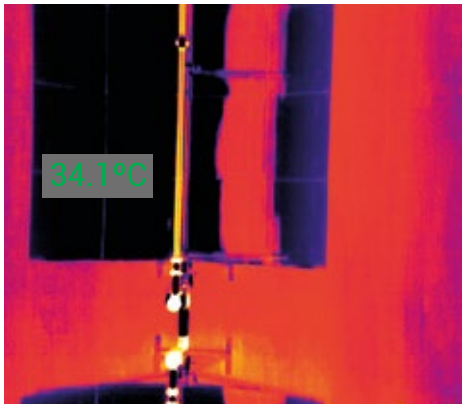


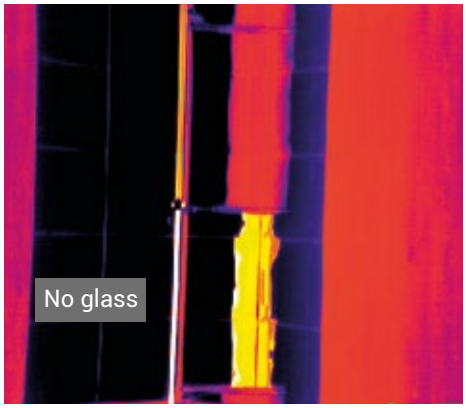
Thermal Assessment

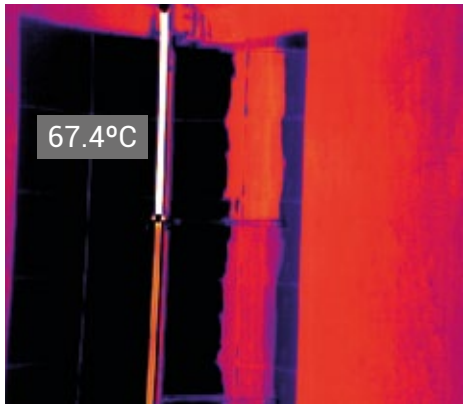
Screening Mode
Quick overall check of solar field thermal conditions

Detailed Mode
In-depth check of receivers with high-fidelity thermal imaging

+	Glass Tube Temperature	++
+	Thermal Loss	++
-	Receiver Analysis	++







Results are presented in a concise and customized report providing reliable numerical and statistical data together with a comprehensive analysis.

Our standard expert review includes guidelines and recommendations for measures. Specific action plans can be implemented in order to maximize the long term profitability of your project.

QScan – One service, many applications

QScan ensures the best installation of your solar field, detects poorly performing areas, provides an independent technical evaluation in case of disputes and supports modern condition-based and predictive maintenance strategies to avoid unscheduled outages.

Construction	Commissioning	Operation
Shape Assessment (detailed) to ensure the most efficient construction of your solar field	**Shape Assessment (screening)** for quick and precise identification of underperforming regions **Shape Assessment (detailed)** for in-depth analysis of specific collector deficits	**Shape Assessment (screening)** to optimize the solar field performance **Thermal Assessment (screening)** for a check of thermal properties **Thermal Assessment (detailed)** to identify and analyze underperforming receiver tubes

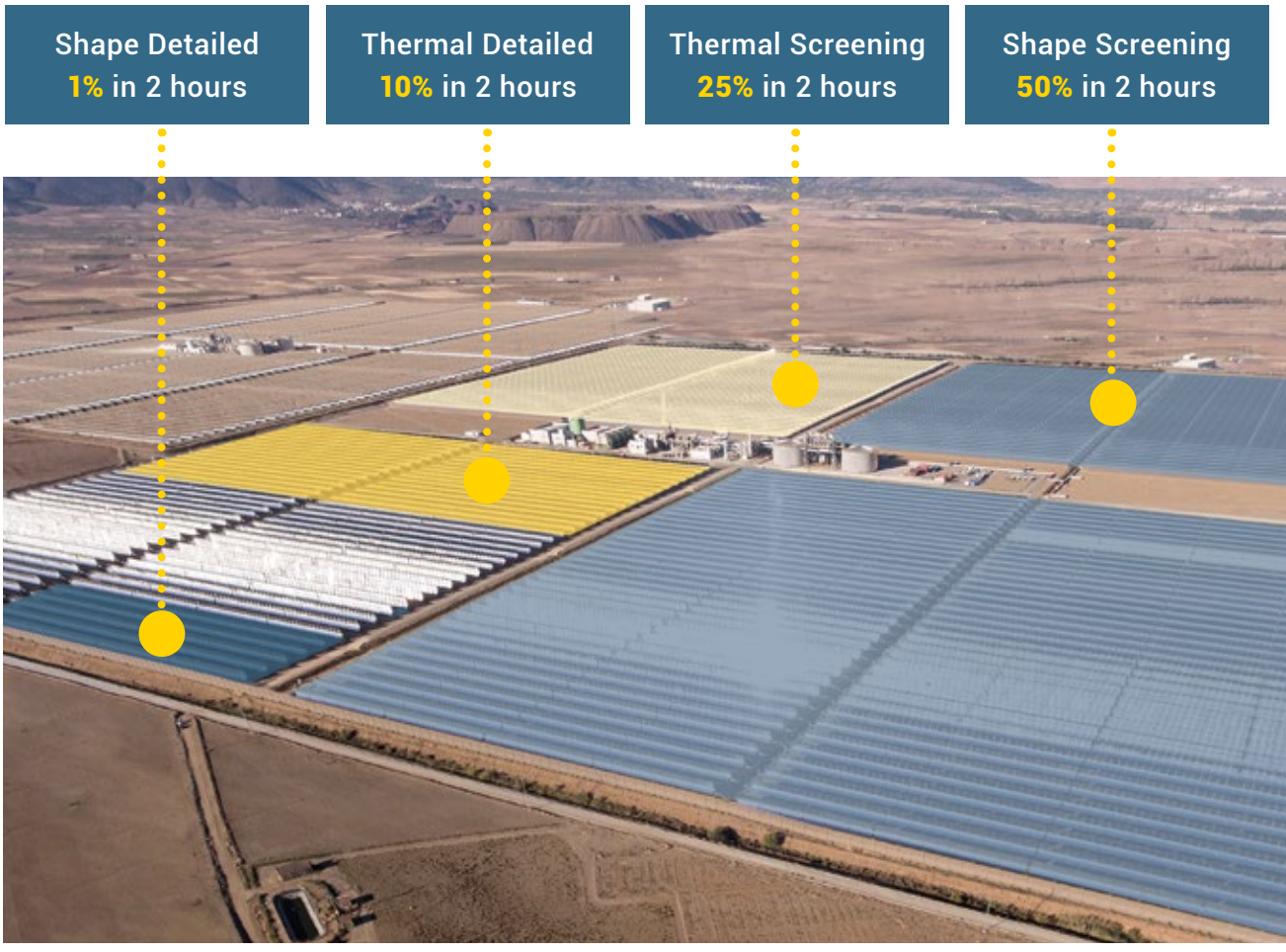
Technical Asset Evaluation

All modes can be applied for solar field performance and component evaluation as an accepted and independent third-party assessment tool

- Control of subcontractors
- Improvement of acceptance tests
- Evidence for warranty claims and disputes
- Assistance for purchasing decisions

QScan - Minimum interference with plant operation

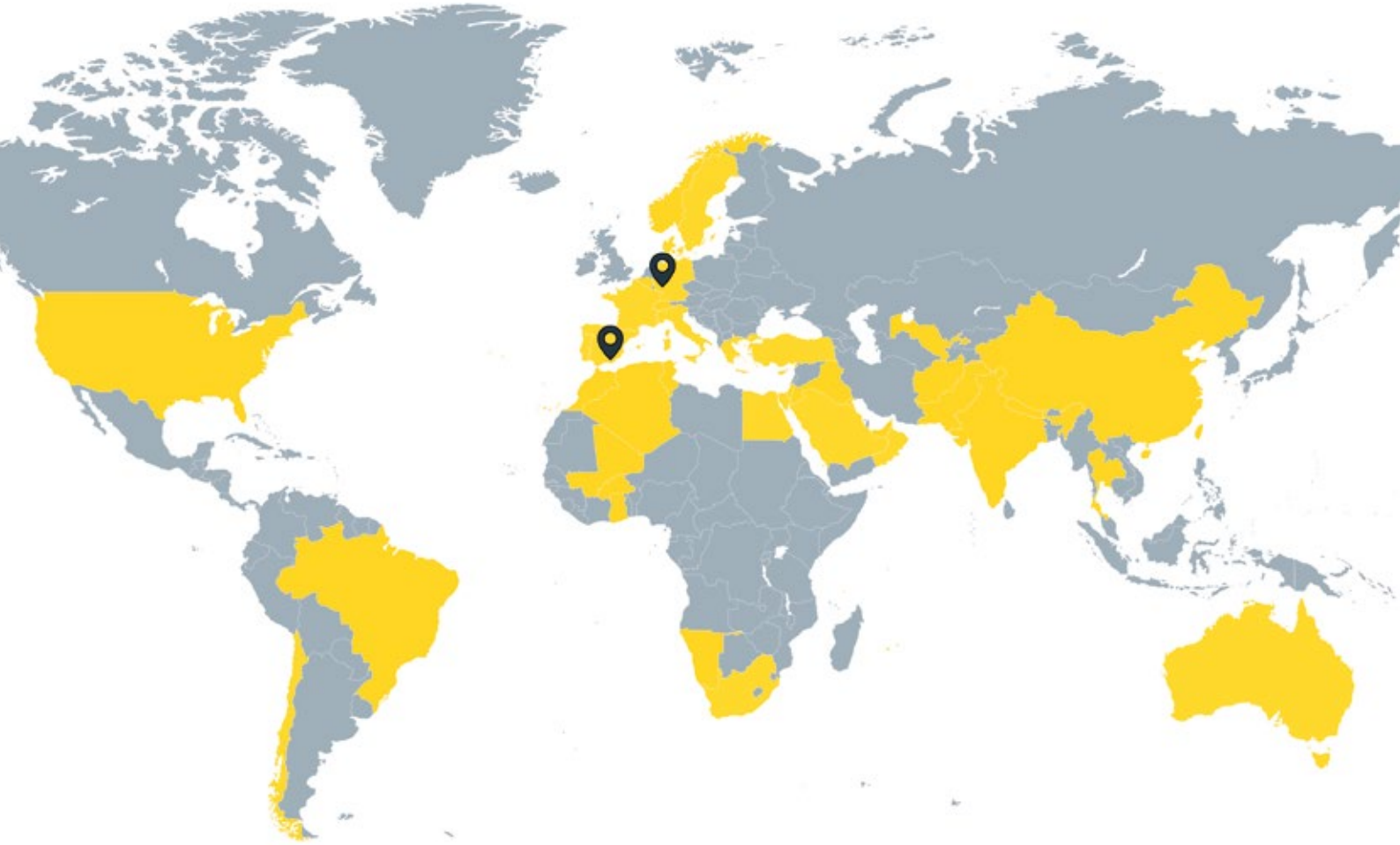
QScan´s customized flight paths are designed and optimized for acquiring high resolution images from all relevant angles. The aerial assessment is much quicker than regular ground measurements. It can be performed during regular plant operation guaranteeing a minimized interference at significantly reduced costs.



Typical 50MW parabolic trough solar field with 7 hours thermal storage

CSP Services is world leader in optical and geometrical performance assessments of CSP solar fields with a proven track record of more than 500 successful projects. This results in a contribution to more than 90% of all globally installed CSP solar fields since the company's foundation in 2007.

Using the synergies between our different services we are able to secure the highest quality standards of your CSP plants from the first day of planning, through implementation and commissioning up to operation and maintenance.



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