Service Life Estimation for Solar Thermal Collectors and Components
The project SpeedColl2 researches the service life and the sustainability of solar thermal collectors, components and materials. The focus is on the influence of different climates and export markets.

SpeedColl2 continues the work of the previous project SpeedColl which exposed solar thermal collectors and their components in extreme climatic conditions and accelerated tests in the laboratory to study their behaviour over time. In addition, models for ageing processes were developed and significant knowledge regarding degradation due to climatic and operational influences has been gained.

SpeedColl2 is a complementary addition to this research. The objective of the project is the estimation of service life for solar thermal collectors and components through definition of suitable testing methods. Furthermore, the sustainability of products will be analysed by means of ecological footprint analysis (LCA) under consideration of their service life.

„The German Federal Ministry for Economic Affairs and Energy (BMWi) sees the durability of solar thermal collectors – next to the further system cost reduction – as funding priority, especially in connection to aspects of building integration. The research in SpeedColl2 is an important prerequisite for the quality assurance of this technology, thus fulfilling the users’ expectation.“

Dr. Peter Donat, former project supervisor at PTJ
Freiburg, Germany
Central European reference test site with moderate temperatures, humidity, UV radiation as well as snow and wind loads.

Stuttgart, Germany
Central European reference test site with moderate temperatures, humidity, UV radiation as well as snow and wind loads.

Zugspitze, Germany
Alpine test site with a cold-moderate mountain climate with big variations in temperature, high UV-loads as well as high snow and wind loads.
**Negev, Israel**
Desert test site with high temperatures, big variations in temperature and high global and UV radiation.

**Gran Canaria, Spain**
Maritime test site to examine the influence of sun, wind and salinity on the corrosiveness of solar collectors, especially on the absorber coating.

**Kochi, India**
Tropical test site to examine the influence of high humidity, temperatures, global and UV radiation.

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**Work Packages**

- Exposition at Outdoor Test Sites
  - Determination of Loads and Degradation Mechanisms
    - Modelling of Stress Factors Separate/in Combination
    - Accelerated Ageing with Stress Factors Separate/in Combination
- Prediction of Ageing Behaviour
- Development of Test Methods
Climatic Loads for Thermal Flat Plate Collectors
The stress profiles developed in SC2 allow conclusions about the effects of combined stress factors on the tested samples.

Adhesive Materials in Solar Thermal Collectors
The adhesive properties of silicones were determined by the use of small test specimens. The material combinations aluminium raw, aluminium powder coated, aluminium anodized and solar glass were selected. Results are published on the SC2 homepage.

Absorber Surface Durability
The comparison between the absorber surface durability standard testing ISO 22975-3 and the actual measured thermal stresses at the extremetest sites is summarised in Info Sheet No.3.

Possible Damages and Weak Points
In the failure mode and effects analysis (FMEA) potential damages were assessed on the basis of the three categories “probability of occurrence”, “severity” and “probability of detection”.

Full texts available for download at www.speedcoll2.de
Determination of Corrosive Stress on Metals

The corrosivity of the exposure location is deduced from the corrosion rate for aluminium (Al), copper (Cu), steel (Fe) and zinc (Zn).

Quiz

I. Which exposition site shows the highest absorber temperatures?
   A: Gran Canaria, Spain
   B: Negev desert, Israel
   C: Kochi, India
   D: Zugspitze, Germany

II. At which exposition site do you find the highest corrosion rates?
   A: Gran Canaria, Spain
   B: Freiburg, Germany
   C: Negev desert, Israel
   D: Zugspitze, Germany

III. Which material shows the lowest corrosion rate in maritime climate?
   A: Iron
   B: Copper
   C: Zinc
   D: Aluminum

IV. If all data measured in SpeedColl and SpeedColl2 were printed, how high would the paper stack be (font size 10 pt, single-faced)?
   A: ~ 10 meters
   B: ~ 20 meters
   C: ~ 100 meters
   D: ~ 200 meters
Contact

Project coordination at Fraunhofer Institute for Solar Energy Systems ISE:

Dr. Karl-Anders Weiß (Coordinator)
Fraunhofer-Institute for Solar Energy Systems ISE
Group Service Life Analysis
Heidenhofstr. 2
79110 Freiburg
Germany
Phone: +49 (0) 761/4588-5030
Fax: +49 (0) 761/4588-9030
Email: contact@speedcoll2.de
www.ise.fraunhofer.de

Contact at University of Stuttgart:

Dr. Ing. Stephan Fischer
University of Stuttgart
Institute of Thermodynamics and Thermal Engineering (ITW)
Research and Testing Centre for Thermal Solar Systems (TZS)
Pfaffenwaldring 6
70550 Stuttgart
Germany
Phone: +49 (0) 711 685 63231
Fax: +49 (0) 711 685 63242
Email: fischer@itw.uni-stuttgart.de
www.itw.uni-stuttgart.de

SpeedColl2 is open to new partners – if you would like to cooperate, please contact us.