Carina® GeoTH

The distributed sensing-based geothermal monitoring solution

Carina® GeoTH is a permanently installed integrated fibre optic sensing-based solution that offers reliable, long-term geothermal reservoir monitoring.

It is a cost-effective solution that maximizes operational efficiency and safety. It also helps operators comply with legal requirements.

The solution integrates ULTRA HD acoustic, temperature, and strain data to optimise geothermal monitoring and energy production, to provide reliable long-term reservoir monitoring.

Carina GeoTH is applicable to high temperature hydrothermal and enhanced geothermal fields. It delivers accurate information on reservoir stimulation, reservoir temperature evolution and sustainability, reservoir deformation due to change in pressure and temperature, and fracture networks including flow distribution. Importantly, it also provides real-time monitoring of induced seismicity.

Carina GeoTH accelerates the energy transition by enabling the utilisation of the Earth's natural heat in an economical and sustainable manner to offer affordable and clean energy.

Geothermal applications

- Induced seismicity
- Temperature monitoring
- Deformation and subsidence monitoring
- Flow profiling/allocation in production and injection wells
- Reservoir time-lapse imaging/ tomography using active & passive seismic surveys
- Microseismicity monitoring
- Cross-hole hydraulic characterization
- Well-integrity assessment
- Monitoring of cement curing processes

Why choose Carina GeoTH?

Silixa's market leading distributed sensing systems, the underlying core technologies, provide unmatched quality data that form the basis of the integrated monitoring solution that can fulfil the demand for geothermal monitoring requirements, enhancing safety and efficiency.

The sensing element, a single fibre optic cable, either installed in shallow heat exchanger wells or cemented behind casing to the reservoir depth, can provide simultaneous and continuous measurements including temperature, seismic, microseismic, flow distribution, and strain.

What is distributed sensing?

Distributed sensing is a technology that enables continuous, real-time measurements along the entire length of a fibre optic cable.

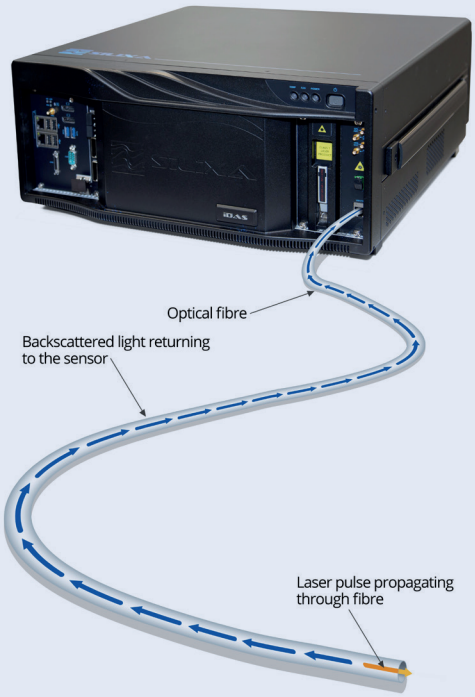
Unlike traditional sensors that rely on discrete sensors measuring at pre-determined points, distributed sensing does not rely upon manufactured sensors but utilises the optical fibre.

The optical fibre is the sensing element without any additional transducers in the optical path.

The interrogator operates according to a radar-style process: it sends a series of pulses into the fibre and records the return of the naturally occurring scattered signal against time. In doing this, the distributed sensor measures at all points along the fibre.

As the fibre is the sensor, it is also a cost-effective method that can be easily deployed even in the harshest and most unusual environments.

Optical fibre: the sensing element



The optical fibre is made of pure glass (silica) as thin as a human hair. It consists of two parts: the inner core and the outer cladding. Cladding is a glass layer made up of lower refractive index glass to maintain the guidance of light within the core. Both parts are encapsulated by single or multiple layers of primary polymer coatings for protection and ease of handling.

There are two main types of optical fibres according to communication application standards. These are the singlemode, intended for long haul communications, and multimode for short-haul communications. Multimode fibres have a larger core (45 to 50 microns) than single-mode fibres (8–10 microns), allowing more light modes to propagate.

The typical diameter of an optical fibre is 125 microns that increases to 250 microns if we include the thickness of standard acrylate coating. Multimode fibres are usually used for temperature sensing, whilst singlemode fibres are mostly used for distributed acoustic sensing or distributed strain sensing.

Although Silixa's temperature and acoustic sensors can be used with either single mode or multimode fibre, the performance of the temperature system is optimised when it is used with multimode. The performance of the acoustic sensor is optimised with single mode fibre.

Fibre-optic cables can contain many fibres, which can be either a single type or a combination of both. The cable construction depends on the installation, operation and application conditions.

Types of distributed sensing

Distributed sensing is usually used for acquiring:

- acoustic data - Distributed Acoustic Sensing (DAS)
- temperature data - Distributed Temperature Sensing (DTS)
- strain data - Distributed Strain Sensing (DSS)

Contact us

www.silixa.com
enquiries@silixa.com