

# SPICA.

Creep-strain monitoring by speckle image correlation analysis.



## Background

Industrial installations have a certain lifetime. Components exposed at high temperature and high pressure will show deformations due to creep. The extent of creep depends on the properties of the material and the stress temperature to which it is exposed. As both safety and operational reliability are involved here, it is important to carry out maintenance and inspections for timely anticipation of problems that may result from creep.

Monitoring creep-strain semi continuously in order to postpone in-service inspections of installations is very effective and not possible with conventional proven technologies. SPICA is a non-destructive monitoring tool for on-site, in-ser-

vice creep-strain measurements of components during operation of the installation. The strong advantage of SPICA in relation to other strain measurement techniques is the measurement of the actual and integral local strain distribution in two principal directions in stead of an integral measured value in one principal direction. Useful, because for creep assessment one is more interested in an actual strain distribution than an integral value for strain, especially near welds.

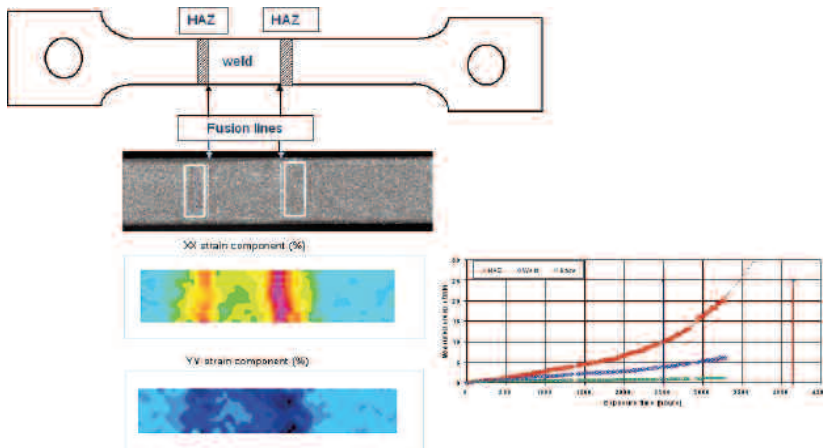
Since 2007 SPICA transducers have been installed on numerous locations at more than 10 gas and coal fired power plants, monitoring safe operations of over 4,000 MW electric power output.

## Service

A KEMA engineer will visit you to set up SPICA locations for the desired places. This involves applying a coating with a holder, which can be done at almost any spot in the steam pipe system. The digital SPICA camera is connected to the holder and linked to a computer controlled data unit for data processing. Regularly, the SPICA camera takes a shot of the selected spot of a steam pipe: the so-called 'fingerprint'. The development of this fingerprint over time gives a reliable picture of the strain and creep at the particular representative spot.



SPICA can be applied on high pressure and high temperature steam lines in any kind of industrial or power plant. With standard equipment measurements up to 650°C are possible. For higher temperatures special equipment is available. SPICA can be applied on almost any material like steel, ceramics, concrete and plastics, regardless material composition and operating conditions.



## Specification

SPICA hardware system:

- Apparatus: digital camera, replacing equipment, optical system
- PC with SPICA software for image analysis.

Necessary equipment to prepare a test location:

- Equipment for attachment of foil on component
- Equipment for attachment receptacle disk
- Surface conditioning equipment.

SPICA Software program:

- An analysis module that calculates displacements/strains
- A data base for storage of the images taken in a standard format.

## Benefits

- Cost saving because the extension of inspection intervals
- Increased plant availability/reliability
- Major contribution to safe and reliable operation
- In-service on-stream monitoring
- Non-destructive semi-continuous
- Suitable for both ordinary surfaces and welds
- Objective and unambiguous interpretation of the test results.



## Case

KEMA has enjoyed success with SPICA not only at E.ON's Maasvlakte and RoCa power plants, but also in Ireland and Japan. At the Maasvlakte power plant SPICA is used expressly for the better planning of major overhauls and for extending the intervals between the shutdown of the unit for major overhauls. In the past there have been major overhauls at Maasvlakte every two years. In part, because of SPICA, this interval has now been extended to every four years. At the two 540 MWe coal-fired units of the Maasvlakte power plant, E.ON saves 20 million Euro per unit per overhaul. 'You make money with SPICA and also have more control over your assets', is therefore the clear view of E.ON.

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