

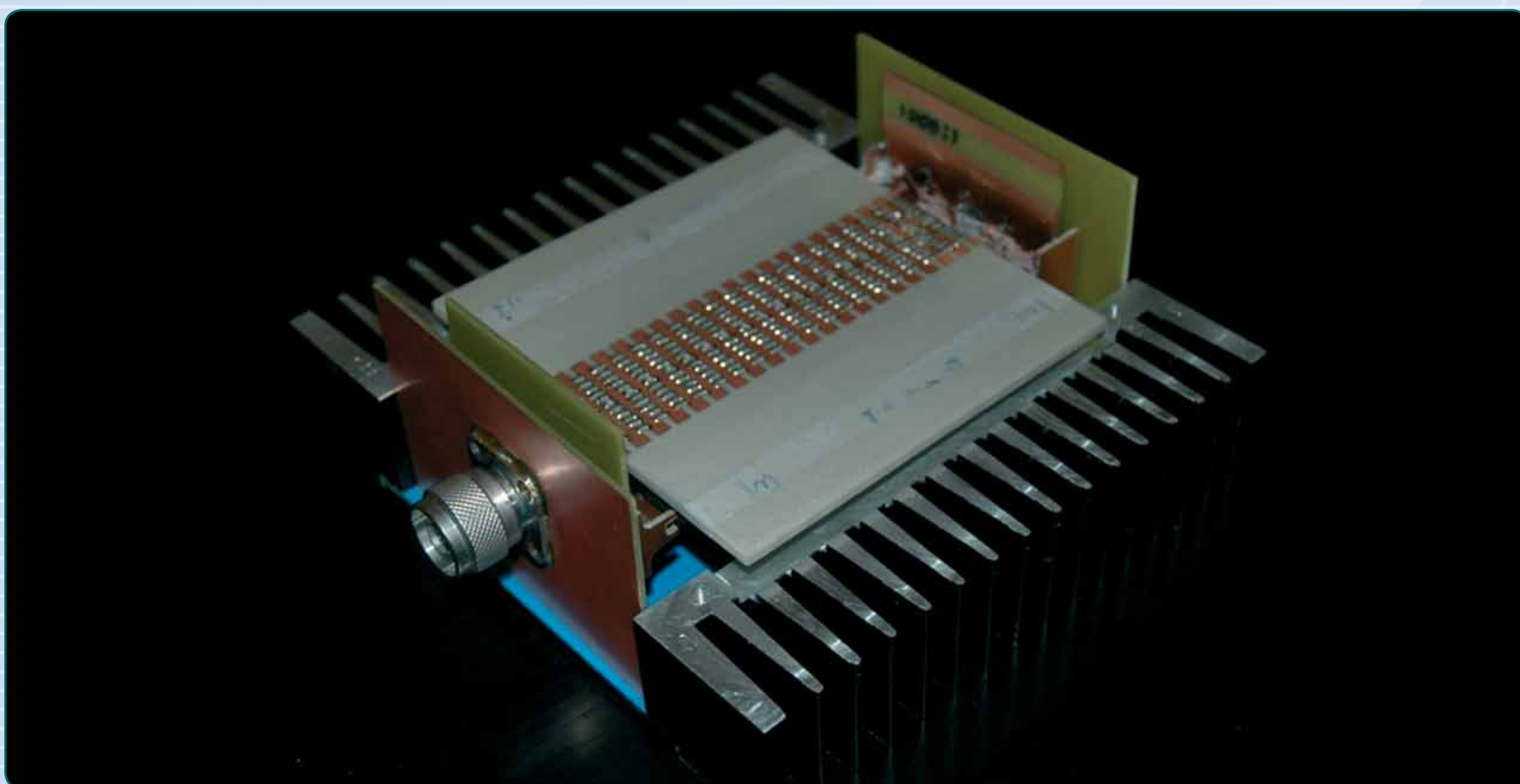
Next generation of power and energy measuring techniques

The need for the project

Europe faces potential energy shortages as fossil fuel supplies diminish and nuclear power facilities age, but there is also pressure to reduce greenhouse gas emissions and a commercial demand for an electricity supply of the highest quality - free from momentary voltage interruptions and interference.

These challenges are a catalyst for new technologies that require a new generation of power and energy measurements, made directly at generation and distribution sites and involving the accurate measurement and analysis of complex wave shapes.

This project aimed to develop new instruments, algorithms and methodologies to make these required measurements to support an EU regulatory framework that oversees the market for electrical goods and power generation.

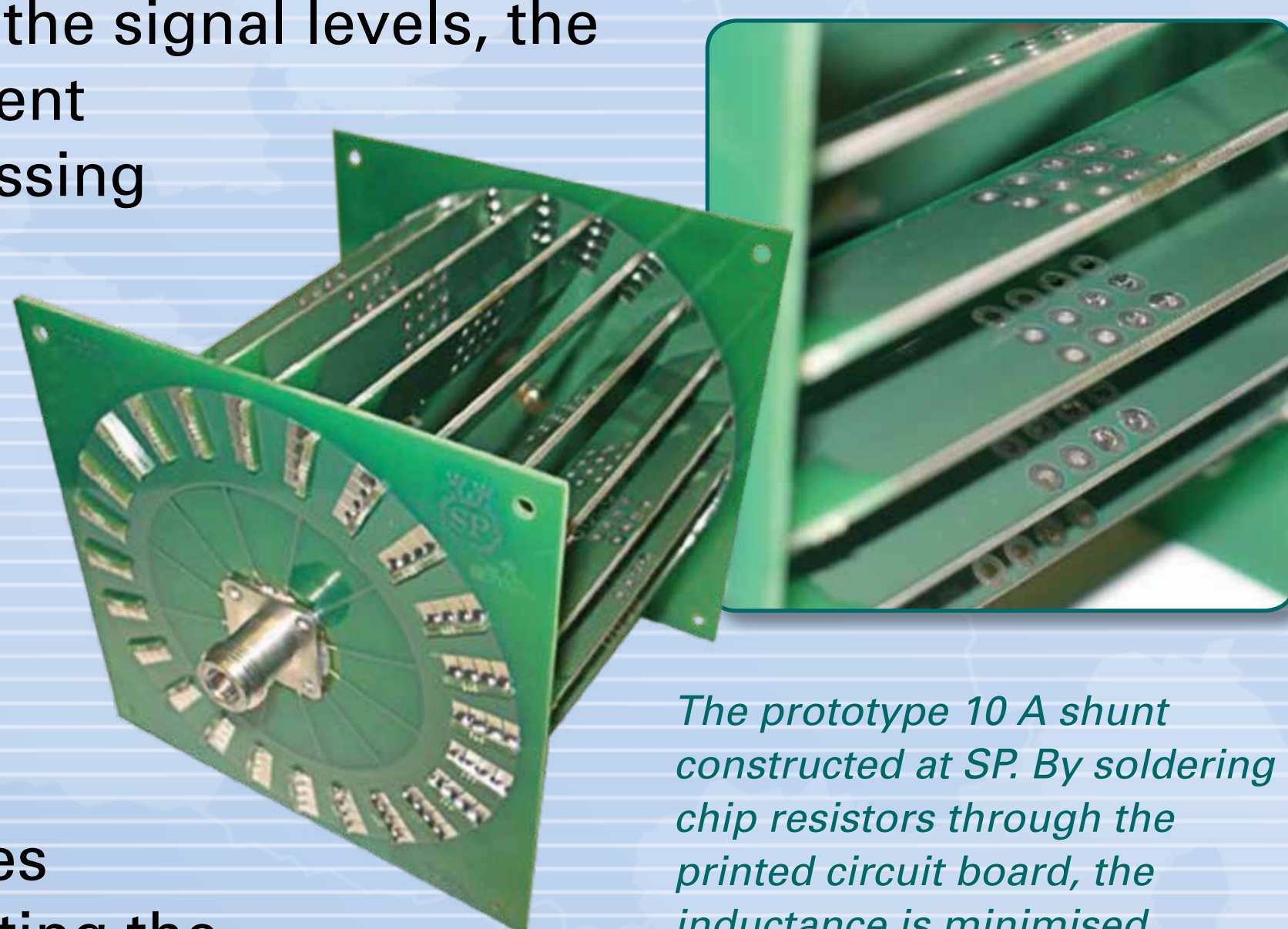


The JV Precision 1 kV Voltage Divider.

Technical achievements

The high current and high voltage levels that are prevalent at electricity distribution/generation sites were accurately transformed to lower measurable levels. This entailed the development and characterisation of lab-use and portable transducers to cover a wide range of currents and voltages up to 33 kV. These transducers can be connected to the electricity system without interrupting the supply.

Having transformed the signal levels, the electrical measurement and computer processing of the AC waveforms was made possible by digitising the signals using six channel analogue to digital converters that operated at high data output rates continuously converting the waveform with known fidelity.



The prototype 10 A shunt constructed at SP. By soldering chip resistors through the printed circuit board, the inductance is minimised. The chip resistors are newly developed with very low temperature coefficients.

The resulting data was processed using algorithms, producing the complex range of power quality metrics used by industry. The waveforms of interest are continuously changing as the electricity demand changes - this required the development of new waveform transforms to analyse these complex waveforms.



Precision High Current Shunts.

Regulation for electrical appliances

Reduced errors in conformance testing to help protect the multi billion euro electrical goods industry. This will also help to protect the electricity network from exposure to sub-standard equipment.

Calibration services

New services to calibrate instruments were developed using the technology, protocol methodology and guidelines developed in the project. The new services will be offered to end-users by project partners.

Validated power measurements

Made seven successful on-site tests in the UK, Finland, Italy and Sweden. The on-site tests included medium voltage networks (33 kV), high current measurements (kA), power loss measurements in network transformers and power quality at distribution substations.



Joint Research Project (JRP) Short Name: Power & Energy • JRP-Coordinator: Paul Wright (NPL) • JRP-Partners: BEV (Austria), BRML (Romania), CEM (Spain), CMI (Czech Republic), EJPD (Switzerland), INRIM (Italy), JV (Norway), LNE (France), MIKES (Finland), NPL (UK), PTB (Germany), SIQ (Slovenia), SMU (Slovakia), SP (Sweden), Trescal (Denmark), VSL (Netherlands)