

**ROHDE & SCHWARZ**

Make ideas real



# ACTIVE NOISE CONTROL IN DAILY OPERATION

Rocket Science uses state-of-the-art active noise control and a Rohde & Schwarz oscilloscope to combat irritating noise

## AT A GLANCE

- ▶ **Customer:** Rocket Science AG ([www.rocket-science.ch](http://www.rocket-science.ch))
- ▶ **Task:** Boosting profitability and public acceptance of a 110 MW waste incineration plant by significantly reducing noise emissions
- ▶ **Challenge:** Rocket Science uses state-of-the-art active noise control and a Rohde & Schwarz oscilloscope to combat irritating noise
- ▶ **Solution/product:** The R&S®RTB2004 oscilloscope from Rohde & Schwarz



**ROCKET SCIENCE®**

### At a glance

Rocket Science is a high-tech company based in Zurich, Switzerland, which describes itself as “Swiss active noise & vibration control boutique”. The company with a team of around 10 members is a leader in the deployment of artificial intelligence (AI) to minimize or eliminate disturbances caused by noise or vibration. With the aim of creating clearly measurable added value for their customers, and with a great deal of curiosity and creativity, the Rocket Science team develops innovative solutions to overcome highly complex challenges in physics.

All these solutions have in common that they pose extremely high demands on real-time signal acquisition and processing and on seamless interaction of software and hardware. To meet these requirements, Rocket Science relies on proven T&M equipment from Rohde & Schwarz

### Discover the details

One of the key achievements of Rocket Science is the implementation of an active noise control (ANC) system at Renergia Zentralschweiz AG, which operates the newest and largest waste incineration plant in Switzerland. This plant, built in compliance with the latest environmental protection standards, is designed for sustainability throughout and was set up right next to a paper mill.

This makes it possible to put the energy released in the incineration process – up to 110 MW – to good use in the form of electricity and process heat (steam) for manufacturing paper and long-distance heating. After the plant was commissioned, it turned out that because of the noise generated by the incineration process at full power, the plant could only be operated at reduced power, with a detrimental effect on profitability. For this reason, Rocket Science was asked to apply their expertise in active noise control to suppress the irritating noise frequencies emitted by the chimney.

The system developed by Rocket Science and installed on the plant’s chimney consists of microphones, embedded computers and loudspeakers. The noise emitted in the incineration process is picked up and measured by the microphones and analyzed in real time in the computer; then appropriate noise control measures are determined using Rocket Science’s AI algorithms. This process takes place in virtually no time, so that the noise control signals can be output by the loudspeakers at the same time the noise is emitted from the chimney. The system design was optimized in extensive trials lasting over several months using a 1:12 scale model chimney. The result: Disturbing noise emissions from the plant’s chimney could be reduced down to an inaudible level – 24/7 and 365.

## Our solution

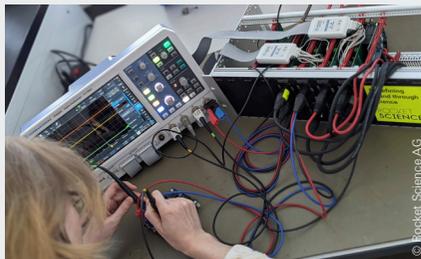
T&M equipment from Rohde & Schwarz has played an important role in the development of Rocket Science's ANC system, leading to a dramatic reduction in noise emissions.

A special benefit for Rocket Science arose from the 10-bit A/D converter specially developed by Rohde & Schwarz, which provides a resolution up to four times higher than conventional 8 bit A/D converters and shows the key signal details that were crucial to the success of the Rocket Science solution during design and debugging.

With weak signals, sometimes in the order of only a few mV, the R&S®RTB2004 displays the real signal values across the entire analysis bandwidth – even at 1 mV/div. Low-noise frontends and high-quality A/D converters ensure the required high measurement accuracy at all times.

The best-in-class memory depth is very helpful to achieve detailed analysis results with high sampling rates and long acquisition sequences. 10 Msample per channel is available, or even 20 Msample in interleaved mode.

Additional functions such as logic analyzer, protocol analyzer, waveform and pattern generator, digital voltmeter and special operating modes and functions such as frequency analysis, mask tests and long-term signal acquisition also contributed to the successful implementation of the project.



Measurement with the R&S®RTB2004.



The chimneys waste incineration plant.

## The benefit

Along with the above-mentioned functions, the R&S®RTB2004 oscilloscope from Rohde & Schwarz was specifically chosen for its features such as portability, fast booting within a few seconds, large capacitive touchscreen, the intuitive Rohde & Schwarz operating concept, and the oscilloscope's excellent price/performance ratio.

Cooperation with a reliable and straightforward partner is an especially important aspect for the team led by CEO Philippe Niquille. Rocket Science appreciates the extensive expertise of the local representative Roschi Rohde & Schwarz AG and their competent support.

“For complex acoustic issues, our customers rely on the expert solutions from Rocket Science. For T&M equipment, we rely on the expertise of Rohde & Schwarz”

Philippe Niquille, CEO Rocket Science



## THE R&S®RTB2004

The Rohde & Schwarz R&S®RTB2004 oscilloscope helped the Rocket Science engineers to:

- ▶ Display and measure the audio signal before and after digital signal processing
- ▶ Analyze the digitally coded serial audio signal and the analog audio waveform
- ▶ Understand and optimize the timing relationships
- ▶ Achieve an intuitive understanding of issues such as clipping, glitches and other anomalies in analog and digital audio circuits and eliminate these effects
- ▶ Quickly distinguish between software and codec errors during debugging
- ▶ Analyze interchip communications on the audio bus
- ▶ Identify and correct signal and power integrity problems



For further information visit  
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