SPECTRUM CTO Oliver Rovini and CEO Gisela Hassler

SPECTRUM EXECUTIVES COMMENT ON COMPANY'S 30-YEAR HISTORY

By Rick Nelson, Interim Chief Editor

SPECTRUM Instrumentation was founded in 1989 by Gisela Hassler and Michael Janz with the goal of developing custom-built instrumentation. The company quickly transitioned from customization to standard product lines and introduced its first ISA card in 1991. Over the years, the company has achieved many milestones. On the occasion of the company's 30th anniversary, *EE-Evaluation Engineering* interviewed CEO Hassler and CTO Oliver Rovini.

What prompted you and Michael Janz to found SPECTRUM in 1989?

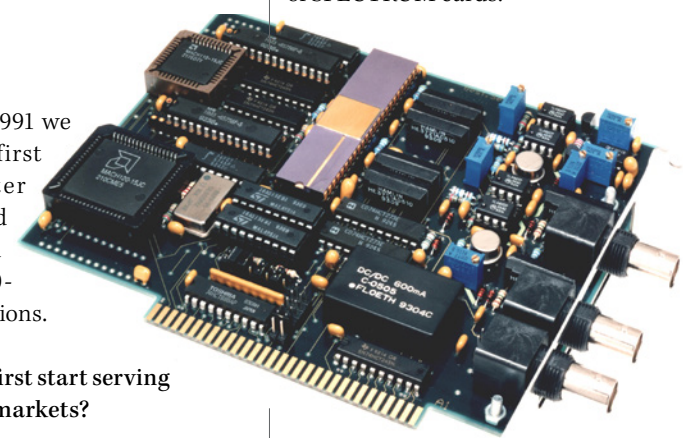
Gisela Hassler: Custom-made solutions was the reason for founding the company, but we left this path pretty soon, because constant capacity utilization was a big problem and the dependence on only a few customers was very unpleasant. That's why in 1991 we launched the first A/D converter board, named PAD52, with 8-bit and 50-MS/s specifications.

When did you first start serving international markets?

Gisela Hassler: In the beginning, we spent our—at that time—small marketing budget only on print advertisement in Germany. So it was a big surprise when the first English-speaking customers called us. This happened at the very beginning, in the early '90s, when the World Wide Web didn't exist for common use. The acceleration of our international business was driven by requests and orders from other countries. We are now represented in 39 countries through cooperating partners. In 2015, we founded SPECTRUM Instrumentation Corp. in the USA with an office near New York to serve US-customers efficiently without the time shift between Europe and America and to have this important market in our own sphere of influence.

You continued to sell your first ISA card, PAD52, until 2007. To what do you attribute the long life of that product?

Oliver Rovini: In fact, nearly all our products have a lifecycle of far more than 10 years. We're focused on long-term partnerships. It may take two or three years from the end of development until a SPECTRUM product is designed into an OEM product due to the selection process, budgeting, customer design cycles, and official approvals. Long lifecycles of our products allow the customer to sell his instrument without changes for many years. Furthermore, API-compatibility over different series allows a smooth replacement. We have customers that started with ISA cards back in 1994 and are now switching to the third generation of SPECTRUM cards.



▲ PAD52, SPECTRUM Instrumentation's first card.

Have you always manufactured your instruments in Germany, or have you outsourced your manufacturing to contract manufacturers?

Gisela Hassler: Since the beginning, we have been working with German partners as contract manufacturers—for example, for soldering or mounting of PCB components. The development, assembling,

testing, and calibration take place here at SPECTRUM.

In 2000 and 2001, what was unique about your approach to moving to modular PCI products?

Gisela Hassler: In the past, every product was developed from the scratch. This involved a new risk with every development. When Oliver Rovini took over the technical management in August 2000, he and his team of engineers directly implemented the modular design of the digitizer and AWG cards. A platform board containing the bus interface and the controller is combined with one or two analog modules that house the data-acquisition and preamplifier functions. This allowed us to launch a wide variety of products in a short period of time, and customers were able to get a product that was right for them without having to pay for overperformance—hence the slogan "Perfect fit, modular designed solutions." The modular design has been maintained since then and will continue in the future, as it has made a significant contribution to the company's success.

▲ Eight-bit digitizer card with 5-GS/s sampling rate.

The digitizerNETBOX introduced in 2013 was your first stand-alone product. Why did you choose this route instead of developing more PXI cards that could fit into an already existing PXI chassis?

Oliver Rovini: We saw an increasing demand for stand-alone products that don't need a PC or PXI host system and a bunch of plug-in cards. The digitizerNETBOX is extremely easy to use and connects to any PC or laptop. It can be carried around (weighing less than 7 kgs) and can be shared in a lab. Furthermore, customers don't need to think about available systems, power supply, cooling, system noise, size, or matching kernel drivers. The digitizerNETBOX and later the generatorNETBOX opened up new application areas that can't be easily served by PCIe or PXIe plug-in cards.

Can you cite some customers and their applications?

Gisela Hassler: At the University of Tokyo, a 12-channel digitizerNETBOX was involved in creating the strongest indoor magnetic field in the world. The main advantage of our NETBOX was the ability to be fully remote-controlled from the control room, because staying in the vicinity of the giant magnets was hazardous to health.

The University of Stuttgart uses our arbitrary waveform generators and a laser to excite individually doted nitrogen atoms in a diamond, which can then be used as a mini-compass or as Qbits for a quantum computer. To control individual atoms, an AWG must be extremely low-noise and extremely precise in design. At Caltech and at the University of San Diego, our cards are therefore used to move individual atoms through a nuclear lattice for basic research.

In England, a new concept is being used to realize a fusion reactor in only four years. To start the fusion process, a projectile is fired with extremely high energy and precision in a vacuum, monitored by our 256-channel digitizer systems.

The world's largest particle accelerator at CERN uses 140 SPECTRUM digitizer cards to control the complicated shut-down sequence of the fast-moving particle beam. At DESY in Hamburg, such cards have been monitoring the acceleration magnets of all three particle accelerators for the past 15 years.

Looking back over 30 years, what do you see as the most significant benchmarks or milestones related to performance (such as sampling rate) and form factor?

Oliver Rovini: For us the biggest milestone was for sure the development of the M4i Series in 2013, lifting the acquisition speed from 1 GS/s to 5 GS/s and the continuous streaming speed from 160 MB/s to 3.4 GB/s. The development was a major step for SPECTRUM as the clock section, timing, analog signal quality, and the new 8-lane Gen2 PCIe interface inside the FPGA all had to be done completely new from scratch. Today we have more than 50 products on this platform with a PCIe and PXIe interface and have a very reliable product series with outstanding performance that is selling very well.

What are some of the key products you are currently offering?

Oliver Rovini: There are the already-mentioned M4i.223x digitizer products with eight bits and a 5-GS/s sampling rate. The very fast rearming time, 64 ns between trigger events, and the block-average option make them an ideal match for many applications. The M4i.663x 1.25-GS/s AWG Series, which has a mixture of analog and digital (marker) outputs, is doing very well serving physical experiments like quantum research. The new small-size M2p platform, which has been released in 2018 and 2019, is a modern general-purpose digitizer and AWG platform with a sampling rate of up to 125 MS/s and has up to eight channels per card or 128 synchronous channels per system. Combining the card with the recently released digital option, one can set up a mixed-mode system with synchronous fast analog and digital input and output channels. EE