



dB Broadcast - undertaking product development in a rapidly changing technology environment



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A veteran user of Zuken's desktop PCB design software, CADSTAR, dB Broadcast's products division has been trusting CADSTAR to support product development in a rapidly changing technology environment for three decades. The company designs off-the-shelf products for the broadcast industry, supporting its parent company in the growing 'Video over IP' market.

dB Broadcast is engaged in many aspects of broadcasting and its services include consultancy and broadcast system design and installation, from complete turnkey TV and radio studio projects to playout, transmission systems and outside broadcast vehicles.

The company also designs and manufactures products for the broadcast industry. These include signal and power switching units, signal modulators and demodulators, and monitoring receivers. Most products take the form of cards for racks, and all PCB design work is performed in-house. Others are standalone units for which dB Broadcast does the electrical and mechanical designs.

The company has a small range of products and needs to be nimble and lean. Accordingly, at the top of dB Broadcast's

PCB tool requirements are factors such as ease of use, reliability and support.

Nigel Hoyland, dB Broadcast's Development Director, explains: "Compared to larger companies, we have a relatively small design team and only design a few new PCBs per year. We therefore rely on the ease-of-use CADSTAR affords. We can go for a period of time without using the tool, safe in the knowledge that it will perform when needed and that we have access to great technical support if required."

Early days for PCB

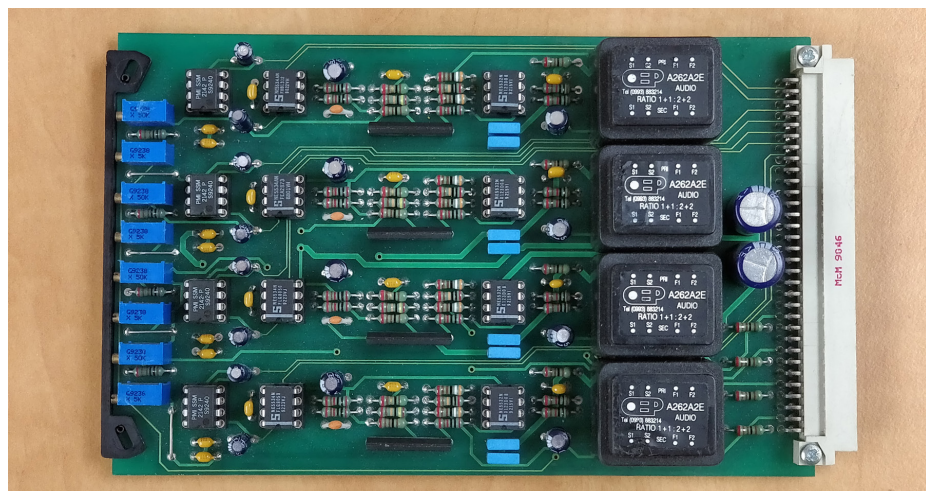
Virtually since Day One dB Broadcast has used Zuken's CADSTAR, which in the late 1980s / early 1990s was REDCAD from Rascal-Redac and comprised REDLOG for schematic capture and REDBOARD for

Results

- Four or five PCB designs per year for product revisions and new product introductions.
- CADSTAR helps dB Broadcast to keep on top of signal integrity issues for PCBs carrying mains voltages and sensitive small-signal electronics.
- Track impedance is easily managed for high frequency digital and RF signals.



Established in 1989, dB Broadcast is an independent UK-based system integrator of broadcast systems and has been recognised in a Sunday Times Tech Track 100 listing as one of the fastest growing technology companies in the UK.



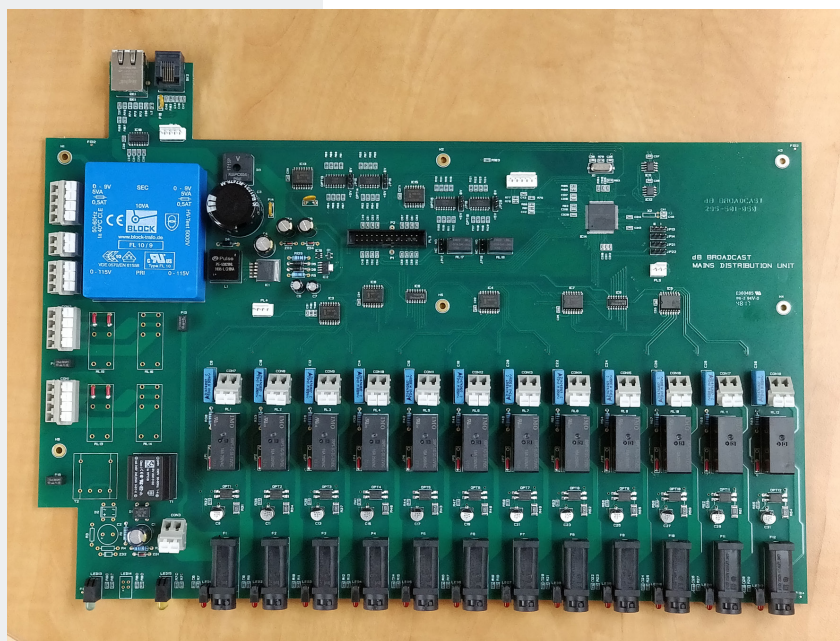
An early Eurocard board from the 1990s comprising analogue components and audio transformers.

layout.

Hoyland recalls: "It was very much an analogue world thirty or so years ago, and terrestrial broadcasts were achieved exclusively through AM and FM transmission and reception techniques."

Hoyland adds that, by today's standards, the boards were not particularly complex. They were double-sided, plated through-hole technology PCBs that typically carried fewer than 100 components, including op-amps configured as filters and amplifiers, transformers and numerous passives.

Increase in board layer counts and



The PCB deployed in the Cardinal iMDU is mixed signal and mixed technology. It has circa 450 components including a processor, ethernet chips and electro-mechanical relays (for switching mains voltage).

switch to digital

The switch to digital and mixed-signal boards came about in the 1990s and board layer counts increased to facilitate connectivity between components with increasing pin counts. One of the early products to carry digital components (including a microprocessor and an FPGA) was the B082, from dB Broadcast's Hawkeye range. The B082 was an Asynchronous Serial Interface (ASI) monitor and switch, used for handling compressed video streams.

As the digital age progressed boards began carrying devices to enable product integration through network connectivity, e.g. Ethernet. Digital also enabled boards to handle more video bandwidth and the B082 was soon followed by a Synchronous Digital Interface

(SDI) card. Following the same form-factor as the ASI card, the SDI handled uncompressed video and was used by several TV studios that needed to work with the highest quality signals.

"We've traditionally done about four or five PCB designs per year," says Nigel Hoyland, Development Director at dB Broadcast. "These have typically been required for just two or three new product introductions. The maximum number of layers a PCB we typically deal with doesn't exceed six." A typical example of a dB Broadcast PCB is shown opposite.

Complexity comes with accommodating more mixed-signal designs

Board real estate restrictions have seldom been an issue for dB Broadcast. Its products tend to follow industry standard card sizes and for standalone units the company is in control of the mechanical aspects too. Component counts have increased but this is more than compensated for by shrinking device sizes and the use of SMDs. "Where complexity has increased most is with respect to accommodating more mixed-signal," comments Hoyland.

A point in case is the Cardinal range of intelligent Mains Distribution Units, which is one of dB Broadcast's highest volume products; at up to 1,000 units per annum (produced in batches of 100 to 300). A Cardinal unit provides 12 separate mains outputs, a Simple Network Management Protocol (SNMP) interface and email messaging facility. Initial configuration tends to be via a serial interface and, once set up, control is via a secure internet connection (web page).

"The mix of mains voltage channels alongside sensitive digital circuitry presented a few PCB routing challenges, which CADSTAR took in its stride," recalls Hoyland. "The tool has also supported us well during a series of updates to the Cardinal iMDU, one of which was to increase the number of I/O."

On a general note, ensuring signal integrity, through best-practice EMC, is essential for most of dB Broadcast's products. They tend to be located near transmitters, and high field strength, high frequency radiated emissions are the order of the day.

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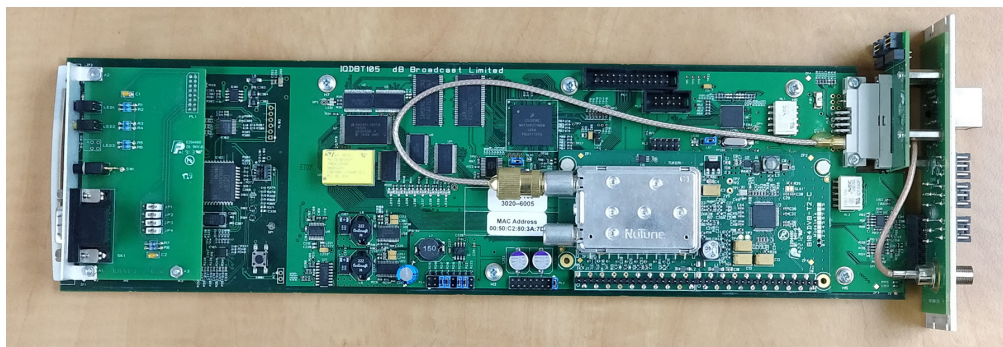
Another product for which CADSTAR was heavily relied on was MERlin, a self-contained receiver for continuous off-air demodulation and monitoring of DVB-T and DVB-T2 signals. The unit monitors input RF modulation parameters and signal performance metrics.

"MERlin has a single PCB," says Hoyland. "It uses a dedicated DVB chipset and has components on both sides of the board. We're bringing frequencies of up to 1GHz onto the board plus we have some relatively high-speed digital signals on the board, including ASI data streams at 270Mb/s and Ethernet at 100Mb/s. CADSTAR performed well during component placement and on all routing tasks. Indeed, most challenges associated with the board were related to its manufacture."

Another board that handled high frequencies was a bespoke/custom RF detector unit for controlling TV transmitters. "For this project, track impedance and hitting the 75-ohm sweet spot was critical. Again, CADSTAR performed well and Quadra Solutions (Zuken's representative for CADSTAR in the UK) simulated the design to give us additional confidence."

Future – more 'Video over IP'

Today, dB Broadcast's products division is actively engaged in designing new MDU products and is on-hand to support the parent company as it pushes further into the 'Video over IP' arena. Here, dB Broadcast already has an enviable reputation for its system-level integration expertise.



A Hawkeye IQDBT105 module, designed with CADSTAR