

About the dCS Tour

The SoundStage! Network team performed a tour of the dCS factory on December 5, 2011. dCS stands for Data Conversion systems and was founded in 1987 in Cambridge, UK, the same city they remain in today. Their current factory, which they moved to in June 2010, is an 8000-square-foot facility on the edge of the city. dCS employs approximately 20 people who build the company's products entirely in the UK. For more information about dCS, visit www.dcsLtd.co.uk.

dCS began in 1987 with a group of engineers who specialized in analog-to-digital (A/D) and digital-to-analog (D/A) conversion systems. dCS stands for Data Conversion Systems. The original company focused on consulting, primarily for military applications, and developed state-of-the-art A/D and D/A technology applicable to other industries.



In 1988 the company branched out in the pro audio industry, eventually producing A/D and D/A converters, upsamplers, and master clocks. The 955 DAC and 995 master clock shown above are two such products. One of the hallmarks of dCS's technology has always been the Ring DAC, a patented DAC technology that still forms the heart of dCS DAC and player products today. dCS's pro products were considered world class, and they allowed the company to gain tremendous popularity in the pro industry and grow.



dCS's popularity on the pro side caught the interest of consumers, some of whom were buying pro products. In 1996 dCS produced their first consumer product, the Elgar D/A converter, which sold that year in the UK for £9499. The Elgar was the start of what became their Classic series, which featured a scalable platform that allowed for ongoing upgrades. The Elgar eventually became the Elgar Plus and remained on the market until 2007. A scalable, upgradeable platform is another dCS hallmark, and it has been incorporated into subsequent product designs.



dCS followed up the Elgar with the lower-priced Delius D/A converter, which was based on the Elgar's platform. The Delius was released in 1999 and sold at the time for £6499. dCS was also one of the pioneers of upsampling technology, producing in 1999 the Purcell upsampler, which sold back then for £4999.



In 2001 dCS produced their first "disc spinner," the Verdi, which supported CD and SACD and sold for £7499. The Verdi was upgraded to Verdi La Scala in 2003 and Verdi Encore in 2005, and it remained in their line until 2007.



dCS was the first company to produce a separate consumer master-clock component: the Verona, which debuted in 2004 and stayed in the line until 2007. Its price upon release was £3999. The final product to be created in the Classic series was the P8i upsampling CD/SACD player (above), which was released in May 2005 and sold at the time for £6495.



The current product range includes four series. The Debussy USB D/A converter is the company's lowest-priced DAC, retailing for £7929. The next models up are the Puccini upsampling CD/SACD transport and Puccini USB system clock. Above Puccini is Paganini, consisting of an upsampling

CD/SACD transport, D/A converter, D/D upsampler (with USB input), and master clock. The current top of the line is called Scarlatti, which, like Paganini, consists of a CD/SACD transport, D/A converter, D/D upsampler (with USB input), and master clock. An entire Scarlatti system retails for £45,877. dCS products are certainly not cheap, but their performance is widely considered to be state of the art in every price category they compete in.

In the years dCS has been in business, they've been pushing the envelope and have laid claim to a number of achievements, including producing several "world's firsts." dCS was the first in the world to create a 24-bit audio A/D and D/A converter; a commercial PCM-to-DSD converter; 24-bit/96kHz A/D, D/A, and D/D converters; and 24-bit/192kHz A/D, D/A, and D/D converters. dCS is also the first, and perhaps only, high-end-audio manufacturer to have a patented DAC technology, the dCS Ring DAC.



dCS defines themselves by taking a no-compromise approach to the best-measuring products that produce superior sound and that also have a sterling reputation for quality and reliability. All of their products are designed, made, and tested in their 8000-square-foot facility in Cambridge, UK, with the majority of parts for these products, including all casework, also produced in the UK.

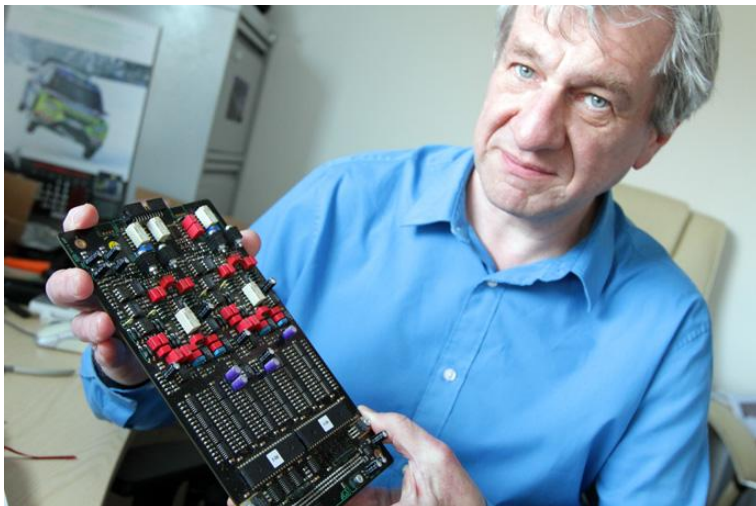
dCS's slogan, "Only the Music," reflects their current corporation mission. They may have begun as a group of military consultants that branched out into pro audio, but now they're strictly focused on two-channel high-end audio for consumers.

Design and Engineering

A group of engineers started dCS, so it's not surprising to learn that the core of dCS still lies within the engineering lab. The engineers' mandate is to create products that can not only produce superb measurements but also be considered state of the art and deliver the highest level of musical reproduction. As a result, every aspect of the design is done in-house.



Chris Hales's title is Director of Product Development, so he oversees everything dCS produces. Chris has been with dCS since 1998, and he's exceedingly proud of the company's product quality, innovation, and constant pursuit to advance all aspects of design. They've chosen a unique path for the development of their products that most other companies don't follow -- most of dCS's products are based on what they call the "control board" (in front). The control board is to dCS products what a motherboard is to computers -- it controls all the core functions, which, in the case of a high-end audio product, include all digital signal processing such as re-clocking and upsampling, among many other functions. The Debussy, Puccini, Paganini, and Scarlatti products all use the same board. The advantage of this approach is that product development is quicker and less prone to bugs and defects because the control board is so well tested and extremely well understood by the engineers. The disadvantage is that the board is very complex and quite costly, meaning the parts cost of a dCS product will always be fairly high.



Chris holds up what the engineers like to call the "analog board." The truth is that it has digital and analog sections. The bottom part of the board contains dCS's famous Ring DAC, which uses discrete components and features a 5-bit architecture that runs at 2.82 to 3.07MHz. This patented DAC is the company's main claim to fame. The top portion of the board is the balanced analog stage, which runs in pure class A and feeds the balanced and single-ended outputs. As with the control board, Debussy, Puccini, Paganini, and Scarlatti products all use the same analog board.



Andy McHarg's title is Technical Director -- he's considered dCS's digital guru. Andy performs many tasks such as overseeing all the software development for their products, so we had a question for him: What exactly does upsampling mean? Suffice it to say that the detailed answer is too long to repeat here. I'll just say that it's not what most people probably expect it to be. He's also the clever guy behind dCS's recent announcement that they figured out a way to stream DSD music data over any DAC that supports a 24-bit/176.4kHz PCM connection. DSD is the underlying data format for Sony's SACD, and the dCS's technology to stream it across a 24-bit/176.4kHz connection is entirely software based. What's more, dCS made it open source, so other companies can implement it if they like. The implementation of this technology might help give DSD a second wind.



Is there a saying, "A product is only as good as it looks"? If so, Ray Wing might have said it first. Ray's title is Head of Design, and he's the person behind the look and construction of every dCS since the Verdi. He's also most recently responsible for the elegant-looking Debussy DAC. He has some new ideas in store, but it's too early to share them. According to the folks at dCS, something very special is coming from Ray and the rest of the engineering team.



Even though Ray is a designer, his work doesn't stop at his department's door -- it extends into the production area as well. To the untrained eye this Debussy faceplate might look perfect. But to Ray's eyes the Filter and Phase holes aren't quite true. As a result, it's a production reject and the cause of the error must be thoroughly examined and, of course, remedied. Perfection is a common word at dCS.



Of course, design doesn't stop in the engineering labs. dCS recently built a new listening room for testing and evaluating their products. They have numerous loudspeakers on hand, but during our visit they had the Focal Scala Utopias set up.



The rear of the listening room showcased a full Paganini stack along with amps and a preamp from VTL.

Production and Shipping

dCS's production area is fairly large, well-lit, and spacious. Things like casework and board stuffing are the work of external vendors (all located in the UK), but every product dCS makes is assembled here, with most of the assembly done by hand.



dCS has a small team of highly skilled technicians, some having worked for the company for almost ten years, painstakingly working on each product. As a result of this low turnover rate that the company enjoys, the staff knows the products extremely well.



dCS is not a high-volume manufacturer, but all products are usually made in batches of four for improved efficiency. Each batch of products ready for assembly has all of its parts in a bin such as the one above. Different series have different-colored bins. Scarlatti happens to have grey bins. The label

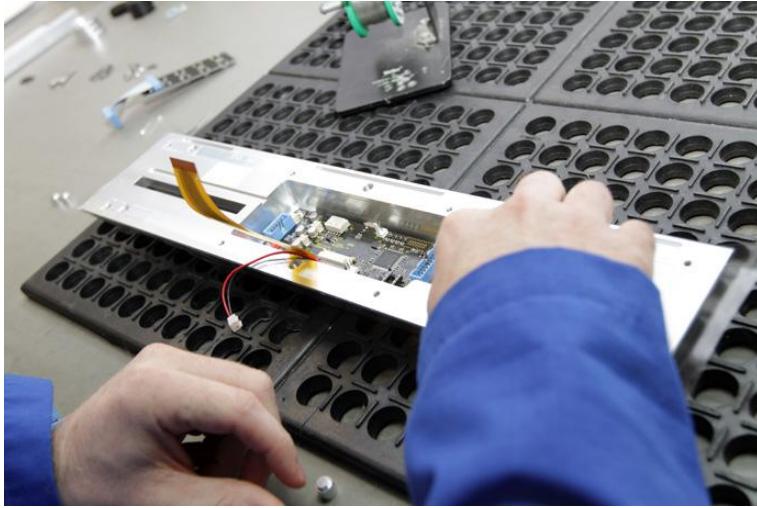
on the front identifies the exact product and quantity. "SDC S" stands for Scarlatti DAC in silver. The "4" means there are enough for four products in the bin. If there are mixed finishes in the bin, that box would be checked off so that the assembler knows.



dCS makes extremely accurate master clocks in the Puccini, Paganini, and Scarlatti series. To ensure that these clocks are as accurate as dCS says and that they stay accurate anywhere they might be used in the world, the clock crystals are placed into an "oven" and subjected to an extremely wide range of temperatures over a two-day period and then calibrated. So whether you're in Canada, Japan, Brazil, or wherever else in the world, the master clock is spot-on accurate.



Phil Menzies, who has been with dCS for about five years, begins the assembly of a Puccini U-Clock. Take note of the thick, sculpted faceplate and the gorgeous casework.



While circuit boards are populated by a UK-based supplier using machines, they are inserted into the dCS products by hand. The circuit board and faceplate shown above is for a Puccini CD/SACD player.



dCS's shipping area is adjacent to the production area. Stuart Day, the shipping manager, readies Scarlatti and Puccini products for delivery. dCS now sells to 33 countries. Their three largest markets are currently Japan, Hong Kong/China, and the United States.

Testing and Quality Control

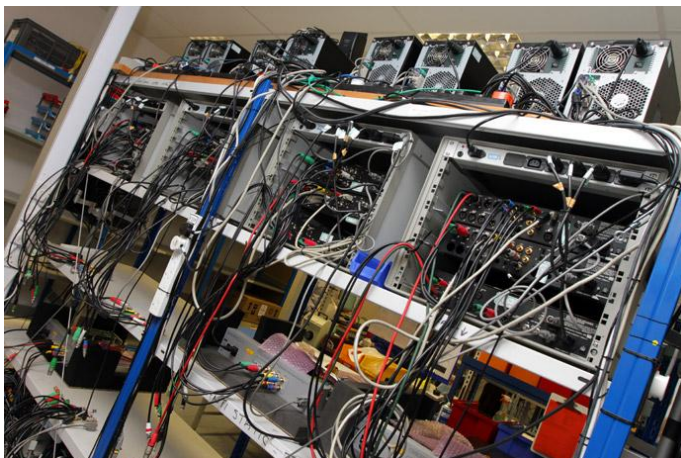
dCS makes high-quality, very expensive products that are widely considered to be state of the art. The company backs that up with testing and quality-control procedures that are second to none to ensure that every consumer gets a product that meets or exceeds manufacturer specifications and exacting tolerances.



Component parts first undergo what dCS calls a soak test. For a 48-hour period, parts are turned on and off in 15-minute intervals to stress the components to weed out early component failure. Raveen Bawa, dCS's export sales manager, shows the documentation that accompanies all of the components. These documents remain on-site as records of each product's history should it ever be returned for repair or upgrade.



Partially assembled products then undergo the rigorous and complex Autotest procedure that dCS created. dCS has built eight computer-run Autotest stations that are hooked up . . .

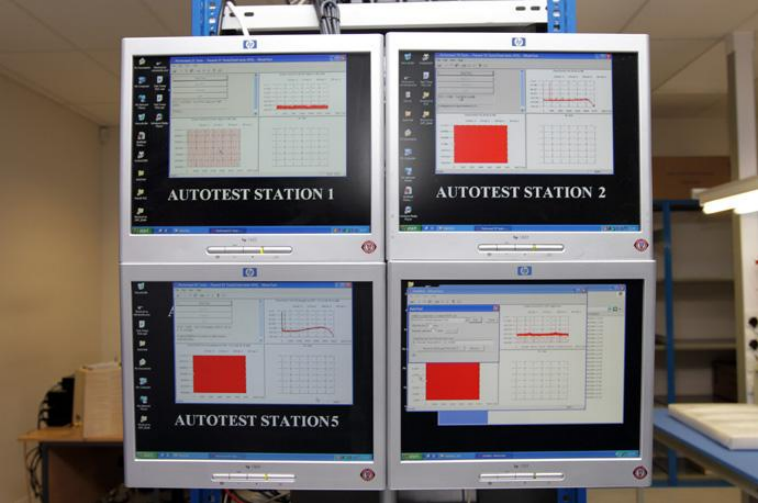


. . . to every input and output on the assembled products to test every feature available. As new

products are developed and new features are added to existing products, the Autotest stations must also be upgraded to ensure thorough testing.



In this photo, a Debus DAC is undergoing Autotesting that will take approximately 3-4 hours to complete. Because the Autotest is . . .



. . . computer automated, all results are automatically logged and kept on-site permanently in the dCS product databases.



The next level of testing is what dCS calls the Bench Test, this time performed by a skilled technician to ensure every product specification is met. Of course, all of these results are logged and kept at dCS for future reference.



Despite the several levels of testing that each product has already undergone, every finished product is still listened to through every input and output. This sound test is actually the second-to-last test.

The final test, which we weren't able to photograph during our visit, involves having the final product inspected by the assembler, product manager, and a member of the managerial staff to ensure that what's about to be boxed up and shipped is flawless. This is done for every product dCS makes. According to Raveen Bawa, when customers around the world buy a dCS product, they are expecting the very best. As a result, dCS spares no expense to ensure that what's delivered is perfect.