

Crystal Cable Arabesque Mini Loudspeakers

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Thinking outside the box. Some designers do it, others don't. Gabi and Edwin van der Kley, the husband-and-wife duo behind the Dutch sister companies Crystal Cable and Siltech, have coupled a solidly engineering-based design approach with a questioning spirit that leads them beyond the status quo. Whether it's a novel amalgam of silver and gold conductors, or a cable-design philosophy based on the principle of thinner is better, the van der Kleys favor elegant solutions. Known principally for the cable offerings of their two companies, Edwin has also explored what's possible in electronic design in a limited series of Siltech preamplifiers and amplifiers.

In 2008, with its glass-cabineted Arabesque, Crystal Cable introduced to the world Gabi's ideal full-range loudspeaker: elegant in appearance, exceptional in sound. Besides its transparent enclosure, the most obvious characteristic of the floorstanding, mirror-imaged Arabesques is their unorthodox shape in cross-section, which gave them their name. (From *Merriam-Webster's Collegiate Dictionary, 11th Edition*: "arabesque: an ornament or style that employs flower, foliage, or fruit and sometimes animal and figural outlines to produce an intricate pattern of interlaced lines.")



The original Arabesque (\$65,000 USD per pair) was reviewed in *Ultra Audio* in 2009, was designated a Select Component, and then received the SoundStage! Network's top honor: Product of the Year.

The van der Kleys have now distilled the Arabesque's essence into the stand-mounted, two-way, all-aluminum Arabesque Mini (\$25,000/pair with dedicated stands). Its published specifications include: an in-room, near-wall frequency response of 45Hz-40kHz, -3dB; an efficiency of 86dB/2.83V/m; a benign nominal impedance of 8 ohms; distortion of less than 0.5% from 120Hz to 20kHz, and of under 1% below 120Hz; and a solid yet manageable net weight of 40 pounds, without stands. The Mini showed great promise at the 2011 Rocky Mountain Audio Fest, driven by a Devialet D-Premier integrated amplifier, so SoundStage! Network publisher Doug Schneider arranged for review samples to be sent my way. I'm glad he did.

A lot of boxes

I received a call from Crystal Cable's US distributor, Audio Plus Services, a few days in advance of the arrival of the Arabesque Minis, to let me know that they were on the way. I couldn't believe it when I was told that I would receive seven boxes. But when they arrived, everything began to make sense.

Each Mini is shipped in its own heavy-duty cardboard box, bagged and centrally positioned and secured with polystyrene foam. It was a good thing that there was a gap of several inches between each speaker and its box -- it prevented any damage that might have resulted from the several impact holes made in the boxes during shipping.

Like the Arabesque, each Arabesque Mini is a mirror-image twin of its mate. Unlike its big sister, however, the Mini is neither transparent nor even translucent. Rather, it's constructed of solid aluminum panels that are beveled top and bottom, and produced for Crystal Cable in California,



by Neal Feay. The review pair arrived in a smart, black-anodized finish (a whitish finish is also available). While the Mini's overall dimensions seem nearly cubical (13"H x 12.5"W x 11.5"D), the speaker itself is anything but. Due to its unique shape, it appears smaller from every angle, and much smaller when viewed from the open side (instead of from the wraparound "tail" end). The primary, front-facing panel is only wide enough (6.5") to serve as the baffle on which the two drivers are mounted, each of which is surrounded by a thin ring of bright-polished metal for cosmetic enhancement. On one rear-facing panel is a single pair of binding posts (the Mini can't be biwired), a proprietary connector for use with Crystal Cable's own speaker cables, and a switch that can boost or cut the treble. In addition to its shape, the Mini's other external identifier is a vertical slot (for "friction port loading") running vertically along the terminating edge of the speaker's "tail."

In the other five boxes were the stands. The first contained the two granite bases, and the remaining four held four sets of Plexiglas risers of differing diameters, and polished cups that serve as decorative interfaces where the risers meet the base and speaker, and that visually match the silver rings around the drivers on the front baffle. Why four sets of risers for only two stands? Two sets are short and two long, to allow the listener a choice in tailoring the speaker to optimal ear height, depending on his or her usual sitting position. That the Minis "float" on their stands helps minimize the visual impact of what are already compact speakers. Each of the four risers has a graduated diameter, and the resultant mass mirrors the Crystal design team's assault on resonances within the speakers themselves.

A first visual impression of this system of speakers and stands is one of visual coherence, and the fit and finish meet the expectations one would have for any audio product costing \$25,000. The Minis are small enough to fit into nearly any room, and graceful enough to complement almost any décor. My only complaint is that the owner's manual is a bit flimsy in construction and content; the assembly instructions could use a bit more detail. But at this price, the buyer should expect the dealer to do all assembly and setup.

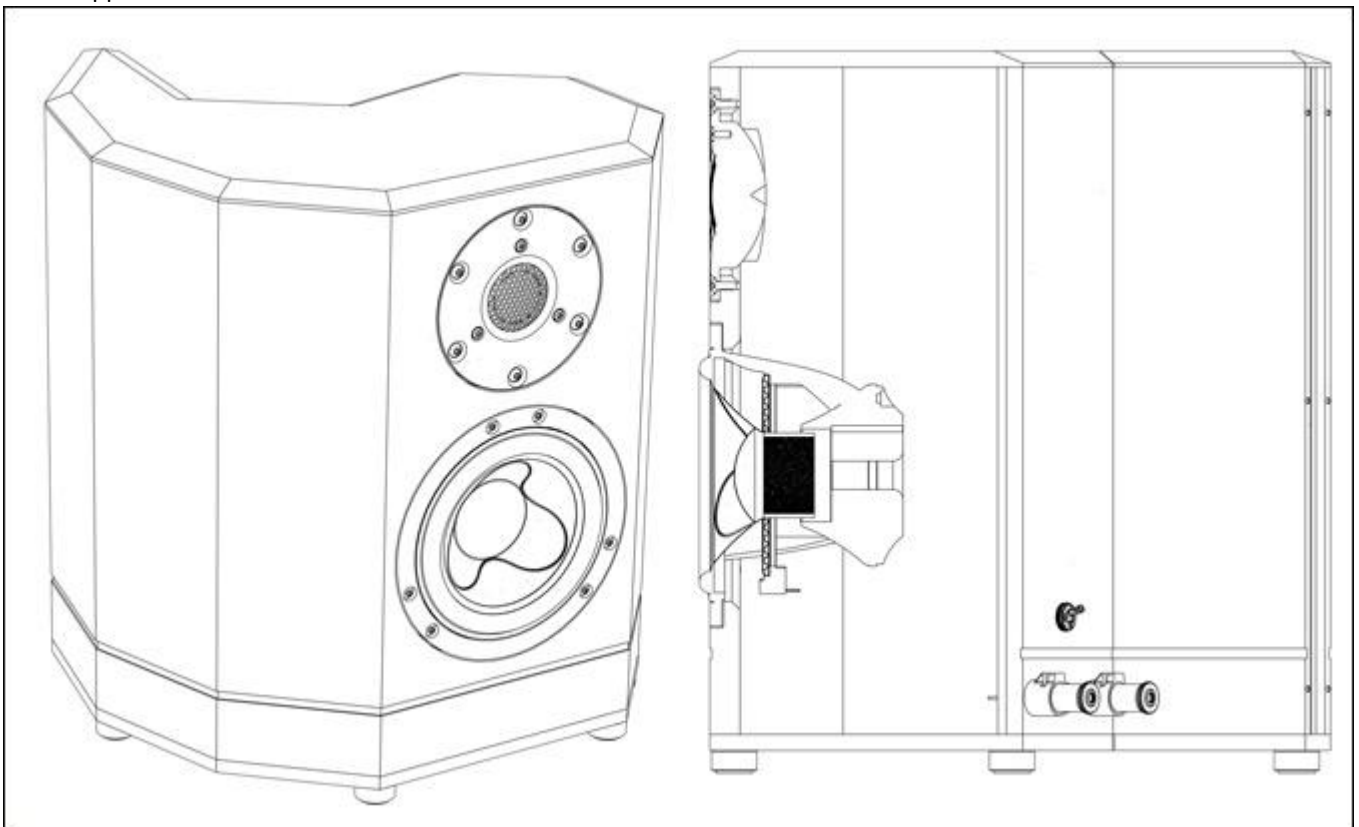
Designing a multifaceted gem

In a classic series of experiments in the 1930s, Dr. Harry Olsen mounted a small full-range driver in a series of wooden cabinets of different shape, but all of about the same size and volume. He clearly showed that the smoothest frequency response was obtained when the enclosure was a large sphere, and that one of the *worst* shapes for getting such a result was a rectangular prism -- *i.e.*, a box. So why, 80 years later, are 95% of all speaker enclosures still variations on the box? Because it's easy, and therefore cheap, to cut wood ply, MDF, Corian, and most other materials into panels from which to build rectangular boxes, then brace the heck out of them, stuff them full of batting, and spit out speaker after speaker.

Such an approach was a nonstarter for Crystal Cable. Gabi van der Kley wanted her speakers to embrace a visual style and sophistication impossible in a rectangular enclosure, that would embody the smooth frequency response Olsen achieved with a spheroid, and that would eliminate the need for damping materials that might quell the music's excitement, electricity, and essence. To achieve those goals, Edwin van der Kley turned to COMSOL Multiphysics, a powerful finite-element-analysis software package relied upon in the aerospace and auto industries. COMSOL provides a means of constructing and testing virtual prototypes that eases almost all

steps of the design process, and allows a designer to build, test, modify, and retest, ad nauseam, a multitude of shapes, volumes, and materials in myriad virtual environments. According to Edwin, Crystal-Siltech was the first high-performance audio company to license, learn to use, and apply the COMSOL suite of products -- but not the only one. At the 2012 Consumer Electronics Show, Yair Tammam, of speaker maker Magico, also confirmed the power of COMSOL Multiphysics, telling me that, from drivers to enclosures, at least 60% of his design time is now spent working in COMSOL.

Multiple unique design elements are on full display in the Arabesque Mini. The driver complement consists of Scan-Speak's superfast, 1" beryllium-dome tweeter, which now appears in many six-figure statement speakers; as well as a high-end, long-throw, Scan-Speak Illuminator 6" midrange-woofer. A maximal effort has been made to prevent the creation of resonances: Not one of the side and back panels is parallel to any other, and every panel is of a different width. The same methodology was applied to the stands: Each of the four vertical supports has a different diameter.



When I asked Edwin if the Mini's panels varied in thickness as well as in width, he confirmed that they do. The top, bottom, and side panels range from 8 to 10mm thick, and the front panel is 15mm. Each panel also has a unique mass, and thus a unique resonant frequency. Inside, four pairs of heavy, stainless-steel frames maintain tension on all panels to further stiffen the cabinet. The top and bottom panels are secured to this frame. "There are in total about 200 parts inside each cabinet," Edwin concluded. *Not* found inside the Mini is any fiber batting, stuffing, or other damping material. Other than the frames, the monocrystal internal wiring (by Crystal Cable, naturally), and the crossover board (with audiophile-grade silver-oil capacitors and big air-coil inductors), the speaker is an empty vessel.

The result is an enclosure designed to minimize any resonant nodes, a shape that eliminates internal and external reflections, and some of the most advanced drivers now available.

The allure of a Mini

Just as some audiophiles love horn-loaded speaker systems (such as those made by Cessaro Horn Acoustics or Avantgarde Acoustic), while others prefer full-range single-driver systems (*e.g.*, those made by Feastrex), and still others go for planar models (for example, the legendary Quad electrostats), another vocal subset likes stand-mounted two-ways. Such minimonitors may not plumb the lower depths or fill vast spaces with extreme output levels, but what they do well they can do very well indeed: their small cabinets, minimal baffles, and

single-frequency crossovers make it possible for them to soundstage and image like nobody's business. I wanted to know how the Arabesque Mini would stand up among them.

Facing a queue of components to review in my small reference system, I first paired the Arabesque Minis with my wife's Ayre Acoustics AX-7e integrated amplifier for several weeks. But while offering up a detailed, refined sound, the Crystals failed to open up and shine. Not that I was expending *too* much effort in critically listening to them in this backup system, but it was clear to me that the Ayre's 60Wpc were struggling against the Mini's 86dB efficiency. Suspecting that I was only scratching the surface and needed to pull out the big guns to give the Crystals a fair shake, I hooked them up to Ayre's MX-R monoblocks, each of which puts out 300W into 8 ohms.

I then played Anat Cohen's sublime *Poetica* (CD, Anzic 1301), and the Mini's full potential was immediately evident. One of the things I adore about this album is its concurrent senses of tender humanity and exuberant joyfulness, and it proved a superb match for these speakers' strengths. The Mini showcased the vibrancy in Cohen's clarinet -- her nimble fingering and superlative technique came alive. The first track, "Agada Yapanit (A Japanese Tale)," tells an expressive and intimate story. Through the Minis the narrative unfolded simply, conjuring a lyrical journey that flowed along the Japanese countryside in a rhythmic current all its own. Cohen's manipulations of her reed and embouchure were on full display as she modified her instrument's tonal colorations. She and her ensemble (piano, bass, drums, string quartet) tightly delivered a musical landscape that I returned to again and again during the Minis' stay here.

In a nod to the Arabesque's home continent, I turned to budding Danish pop diva Nanna Oland Fabricus, aka Oh Land. Her 2011 studio album, *Oh Land* (CD, Epic 551892), is chock full of infectious tracks. Sidestepping the loudness wars, this mash-up of lead vocals, backing choir, synthesizers, percussion, drums, and string arrangements provides a perfect backdrop for examining a small speaker's ability to resolve individual elements while presenting a unified tapestry of sound. The album's first international single, "Sun of a Gun," is a contagious little chestnut -- a perfect pop confection that found a willing accomplice in the Arabesque Mini, driving beat and all. Yet it was the haunting fantasy of "Wolf & I" that best displayed this small speaker's ability to conjure the artist's vision. I could envision the monitors themselves singing "I held the love of one and I was his" to their appreciative owner. The Mini was able to sort out and reproduce all the individual sound elements of Oh Land's music without homogenizing any particular aspect. Complex music? No problem.

While the Arabesque Mini was a responsive, eminently dynamic speaker for jazz and classical music, ultimately I don't think it will rock out or satisfy the dance hall -- not that I'd normally expect any minimonitor to do so. The simple fact is that in-room response below about 45Hz should not be expected. Nor could it comfortably drive sound-pressure levels well past 100dB. I often torture equipment with the title track of Donald Fagen's *Morph the Cat* (CD, Reprise 49975-2). Most so-called full-range speakers give up the ghost with this track, so a two-way stand-mount has almost no chance. Sure enough: while "Morph the Cat" was never less than enjoyable through the Arabesque Minis, the low-end power and verve it demands just weren't available.

Given Gabi van der Kley's formal training as a pianist, one thing I did expect from the Mini was a facility with her favorite instrument. I wasn't disappointed. Listening to Ola Gjeilo's "North Country II," from the *2L-TWBAS 2012 Sampler* (24/176.4 FLAC, 2L and SoundStageRecordings.com) was sheer delight. This track has been a favorite ever since I first heard the 16/44.1 version from a 2L CD sampler, but the 24/176.4 version was a revelation through the Mini. Talk about resolution, tonal density, microdynamics, and timbral continuity! Through the Arabesque Minis I heard it all, and was able to close my eyes and delight in every moment. The realistic reproduction of Gjeilo's piano, its interplay with the horn, and the natural overtones and decay of both, left nothing to be desired. Other favorite piano-centric recordings, from Ahmad Jamal to Thelonious Monk to Jason Moran, confirmed the impressions the Crystals had made on me with the Gjeilo track.





Bringing it all together

Crystal Cable's three core principles are technical proficiency, fanatical attention to musicality, and elegant, attractive visual design. My time with the Arabesque Mini proved to me that Gabi van der Kley continues to succeed in imbuing her products with all three. Content to maximize the inherent strengths of a compact two-way speaker, Crystal Cable exudes confidence in its Arabesque Mini. They've neither tried to squeeze a full-range speaker into a small cabinet, nor pretended to fill large spaces with unrealistic SPLs. Instead, they focused their attention on superb musicality, and the composure and coherence such a focus requires. Mission accomplished. The Arabesque Mini is a beautiful success.

... Peter Roth