Signature Diamond is our way of celebrating 40 years in business. Yes, we know; diamonds should be reserved for 60th anniversaries. But then, were it not ahead of its time, it wouldn't be a B&W speaker. Our diamond is a tweeter dome whose reproduction of high frequencies is as near perfect as it is physically possible to achieve. Encased in smoothly sculptured marble, this remarkable driver sits strikingly on the plinth-like cabinet, where it is partnered by our Kevlar® bass/midrange driver. It creates a sound so immediate, so detailed, so textured, you'll want to touch it. There's no finer 2-way speaker, to our knowledge. And, when we do eventually get round to celebrating our 60th anniversary, we could still be saying the same thing.

Kenneth Grange, architect of the Signature Diamond's sculptural simplicity, is one of the world's most accomplished product designers. Originally a draughtsman in an architect's office and briefly an exhibition designer, his career took off when Kodak asked him to design the Instamatic camera. Many of his designs became familiar items, such as his food mixers for Kenwood, razors for Wilkinson Sword, pens for Parker and British Rail's InterCity 125. Since designing the ultra-distinctive DM6 in 1976, Kenneth has designed numerous speakers for B&W, of which the latest is the Signature Diamond.

Is sound equipment furniture or is it a tool?

Sound and sound systems occupy an interesting position in the landscape of the home, I think. Many years ago, with marvellous good luck, I was introduced to John Bowers, who had started B&W; and he was one of the world's great enthusiasts. He loved music and he was absolutely barmy about quality.

At that time, there was quite a solid tradition of how speakers looked. They were boxes, packed with increasingly complex electronics. The box was the dominating form. And the box is not an unusual thing in the living room. We have boxes with drinks in, we have boxes with videos and games

in and so on. So the box, or cabinet, is a natural part of furniture. And I think it poses the first big question about whether hi-fi is a piece of equipment or whether it is a piece of furniture. That is the designer's dilemma and the manufacturer's dilemma.

There's also the question of who chooses. Most men think they dominate in choosing the sound system. But the rest of the family still has quite a profound effect on just how far you are allowed to intrude your peculiar interest into their living room. So that has been an influence on how far equipment becomes furniture. Then, as homes have got bigger, as even whole rooms have been dedicated to one person's hobby, so you see the change in the design of the equipment towards being overtly sound-driven as opposed to furniture-driven.

So, from your point of view, has it always been important to make it furniture rather than very visibly function-led, or do you find a way of doing both at the same time?

When I met him, John Bowers was feeling his way towards asserting the importance of the sound system and giving the man who was going to pay this lot of money for this thing in his one little corner in the home where his hobby could take root. Things were moving towards being less like furniture and more like equipment.

But at the same time, like all designers, I wanted to be able to live with my own designs and I could begin to see the possibility of forms that were generous enough and had enough stature to be furniture, but with an uncommonness that marked them out as specialist functional pieces of equipment.

One of the things that has happened is the change in the scale of sound equipment. At one time cabinets were very big indeed. And then they became much smaller and now people are beginning to think of them almost as a work of art or a beautiful object. How has your thinking developed about how the cabinet is presented?

One of the most rewarding parts of my life has been to work with companies that have enough stature and enough scope to touch different sorts of environments. And in those environments, to come across different attitudes and different expectations on the part of the consumer. And a company like B&W, in the time that I have worked for it, has moved from being highly specialised and expensive towards covering a much larger spectrum of users. That, in turn, has meant different influences upon the product's nature and its personality.

And it's been marvellous to see more dramatic and perhaps even eccentric things coming into the landscape. Like Nautilus. It's as wacky as hell, really. But it did redefine sound quality.

B&W is celebrating its 40th anniversary and invited you to make a new design for the occasion – the Signature Diamond. What was your thinking when you started on this, given that it is a celebratory item as well as a functioning item?

I've always been interested in the fact that B&W probably makes the best loudspeakers in the world. I know the degree of care and passion that goes into every component of a product. And it's all driven by performance. No holds barred. And no amount of commercial pushing and shoving will stop those engineers always wanting to make it better. That's the most admirable quality in any company.

But I am aware that there has been a sea change in the make up of the modern home, of the home that you and I perhaps aspire to own. And that produces an opportunity for a company like B&W. It is an opportunity for the firm to put another marker in the ground. And I would be really happy if the world's best architects understood that sound quality can at last be matched by an object that they would regard as a sufficiently decent work of art to go into one of their high art environments.

Tell us a bit about the shape of the Signature Diamond.

There have been a lot of changes in the potential for manufacture in recent years. Glass, for example, has shown that it can be formed and shaped. We don't remark especially on some of the extraordinary shapes of glass used in motorcars. It has seeped into common understanding. And, I think, in other territories, we are beginning to see that the traditional cabinet need no longer be made of flat surfaces.

Much more frequently we are beginning to see bent wood, formed wood and shaped structures as part and parcel of the bigger object in the home. A lot of furniture is still very geometric. But you begin to see other things that inhabit space that have more character and, I think, are a proper reflection of the potential of manufacturing today. So it suited me nicely to come to B&W with a proposal for a shape that acoustically I knew would satisfy my chums in the laboratory, but was also a statement of extraordinary excellence in manufacture. And it comes about because it is now possible to fabricate a cabinet that is very shapely, which has hardly been possible until the last five to ten years.

What materials have you actually chosen for the Signature Diamond?

The cabinet itself is made of formed plywood, and that is a wonderful thing to see. If all the users in the world could go to the factories to see things made, it would be the greatest treat, you know. You don't need to go to Disneyland, go to the cabinet makers.

So, the cabinet is oval in plan. And it therefore stands rather distinctly as an object in space. And the speaker, which has to be relatively flat-fronted, penetrates it. I'm always nervous about calling anything I do 'sculptured'. But it is, in a degree, a piece of sculpture. And the crowning treat is the tweeter. I've made it really quite a large and important piece of the overall design and it's using real, live, good old-fashioned marble, which is a fantastic material in acoustic terms. Absolutely inert and wonderfully solid. And it's a good example of technology because they can now be made all perfectly the same by the use of computer-controlled marble-cutting. It is a pretty complicated shape and it's a free shape, but absolutely repeatable, every single one comes out absolutely the same. So the acoustic quality is absolutely consistent between one and the next. But the marble is quite distinctive. If you have a pair of these in your home, you have two pieces of marble that are unlike two pieces of marble anywhere else in the universe.

We've got a tradition of celebrating in style at B&W. On the occasion of our 25th anniversary, we replaced all of the copper wiring in our top-of-the-range loudspeaker with high-grade silver. It wasn't just fitting; it made functional sense by better preserving the signal through the system. We followed this with the Signature 30, a full, three-way speaker that took the performance potential of silver to its limit. Both were designed by Kenneth Grange and engineered by our resident sage of sound, Dr John Dibb. So, when it came to our 40th anniversary celebration, they were the first to be invited. And, in the Signature Diamond, they brought something rather special to the party.

Silver Signature

Signature 30

Signature Diamond

Dr John Dibb began his working career in the aerospace industry, but a strong interest in music and music reproduction led him to the audio industry. John is currently celebrating his 20th year at B&W. During that time, John has been responsible for the acoustic design of many of B&W's key products, notably the Silver Signature and Signature 30 models that celebrated the company's 25th and 30th anniversaries. During our 40th year, the Signature Diamond has given John the opportunity once again to work in close collaboration with industrial designer Kenneth Grange to create a milestone product that brings together the highest levels of aesthetic and acoustic design.

Signature Diamond follows in a long history of Signature products. Can you tell us a little bit about this history of these and what marks them out from an engineering perspective?

As B&W approached it's silver anniversary, we felt that something special was needed as a celebration. Silver was widely regarded to be superior to copper as a conductor, but our investigations revealed that in order to benefit from this, the whole system, from amplifier to voice coils needed to be hard wired in silver. Since there was no suitable wire available, we had to design and produce our own, at great cost, along with completely new drive units which set a new standard. But the acoustic results fully justified the expense and I remember one review ending in the words 'go out and buy some now, if you can still find any'.

Five years on, the Signature 30, a much larger full-range floor standing system, married newer technology and finishes to many of the design features of the Silver Signature.

Our latest anniversary product, the Signature Diamond, benefits from 10 more years of experience. The simple curved lines of Kenneth Grange's new design are also immensely stiff, and acoustically ideal. Using a new and unique Kevlar bass-mid driver with a diamond tweeter and silver/gold foil crossover components, we have created a full-range 2-way system capable of enormous resolution and accuracy.

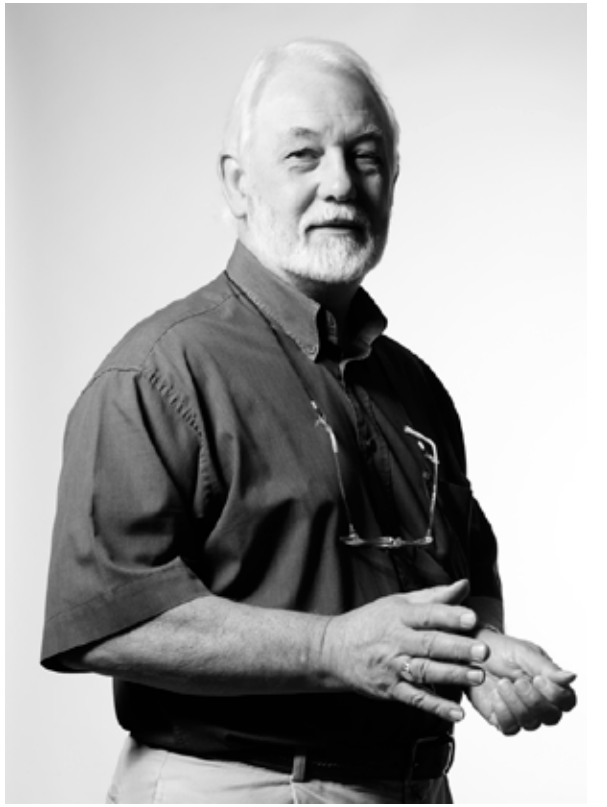
The cabinet of the Signature Diamond is of course highly distinctive. How does this contribute to its overall performance?

All cabinets resonate to some extent, and the resultant unwanted acoustic radiation distorts and colours the sound. The level of coloration is directly related to the stiffness and damping of the enclosure walls.

Adding curvature to the panels increases the stiffness enormously – think of corrugated iron.

We were thus delighted with Kenneth Grange's design for the Signature Diamond, as the whole cabinet is curved.

With the addition of matrix bracing, which effectively divides the panels into smaller areas, any small remaining resonances have been virtually eliminated.



One of the other primary causes of distortion is diffraction, where discontinuities such as sharp corners disrupt the sound field, and can have a major effect on the stereo image.

With no flat areas or sharp edges around either of the drivers, the system is virtually free of diffraction artefacts, endowing it with superb stereo imaging.

and you have a driver with mid-range distortion which rivals that of our dedicated mid drivers.
As the name suggests, this system employs a diamond dome tweeter, which, within the audible spectrum, behaves as closely to the computed 'perfect' dome as makes no difference. But with high frequency vibrations of only a few microns being audible, the design of the tweeter housing is even more critical than that of the bass cabinet.

Here, it is enclosed in an acoustically 'dead', optimally shaped heavy marble block, physically isolated from the cabinet.

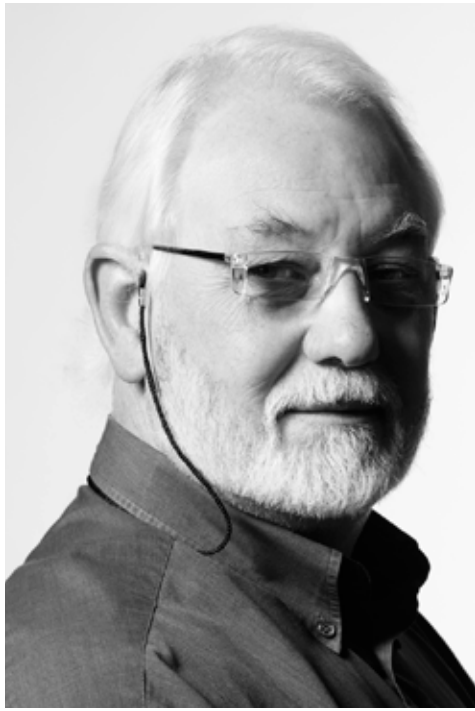
The amazing thing is that, despite covering only the last three octaves of a ten octave spectrum, the improvements in dynamics, resolution and openness seem to extend right down into the bass frequencies.

Tell us about the drive units you designed for the Signature Diamond.

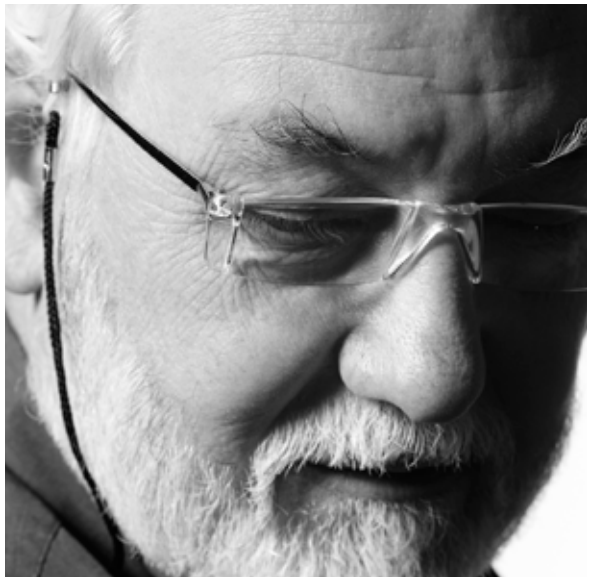
Of course, there is no point in having low coloration and diffraction in the cabinet if the drive units do not perform at least as well, and in the Signature we have taken our already excellent drivers and refined them that bit further.

The 7" Kevlar bass-mid driver now sports a unique phasing plug machined from solid brass, and internally profiled to eliminate the effects of dynamic turbulence, which can result from large cone movements. Combine this with computer optimised motor design,

B&W often talks about the fact that its loudspeakers are 'tuned by ear'. Can you explain what that means?



Satisfactory coverage of the full audible spectrum requires at least two drive units, covering the low, mid and high frequency bands. It is necessary to filter out the high and low frequencies respectively, in order that the two drivers combine in the correct manner. This filter is known as the crossover, and it is just as critical to the overall sound as any other element in the system. Experience has shown that the simpler we can make the crossover filter, the better the sound, and the better the drivers, the simpler the crossover required. In the Signature Diamond we have one inductor, one capacitor and one resistor – as uncomplicated a format as it gets, although the final selection of components is far from straightforward.



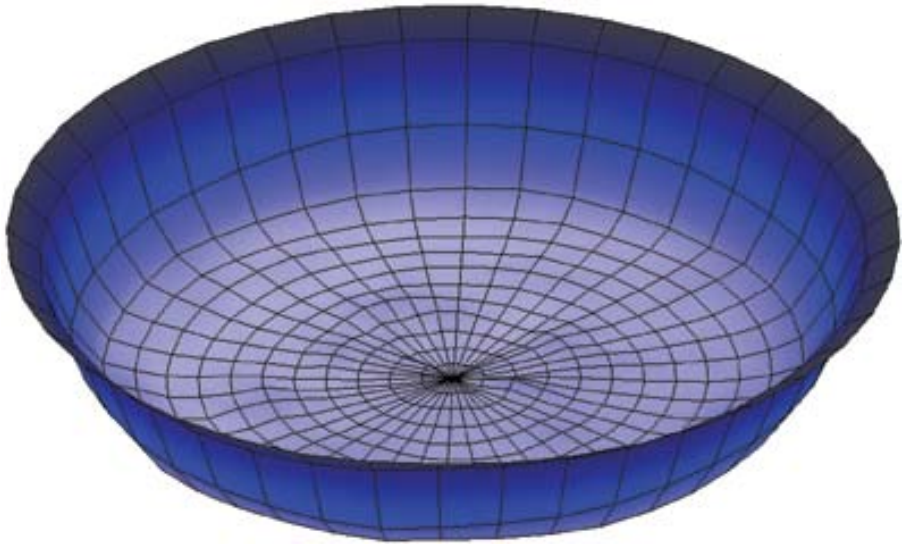
With a system of high resolving capability, it is often the case that filter components which appear to measure identically, can sound different. It's simply that our ears/brains have superior resolution and sensitivity.

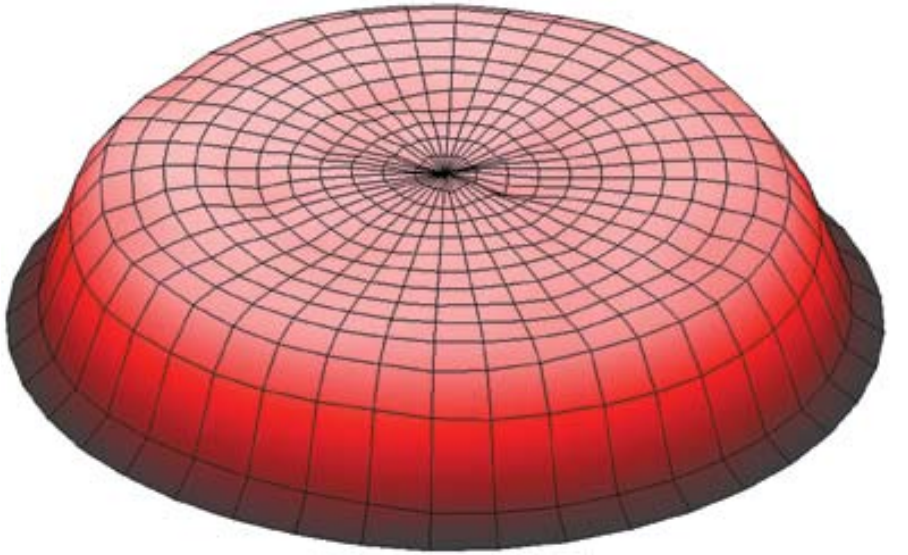
So the final selection of components must, of necessity, be done by listening – and not just in one room with one type of equipment – in as many rooms as possible, and with appropriate ancillary tools.

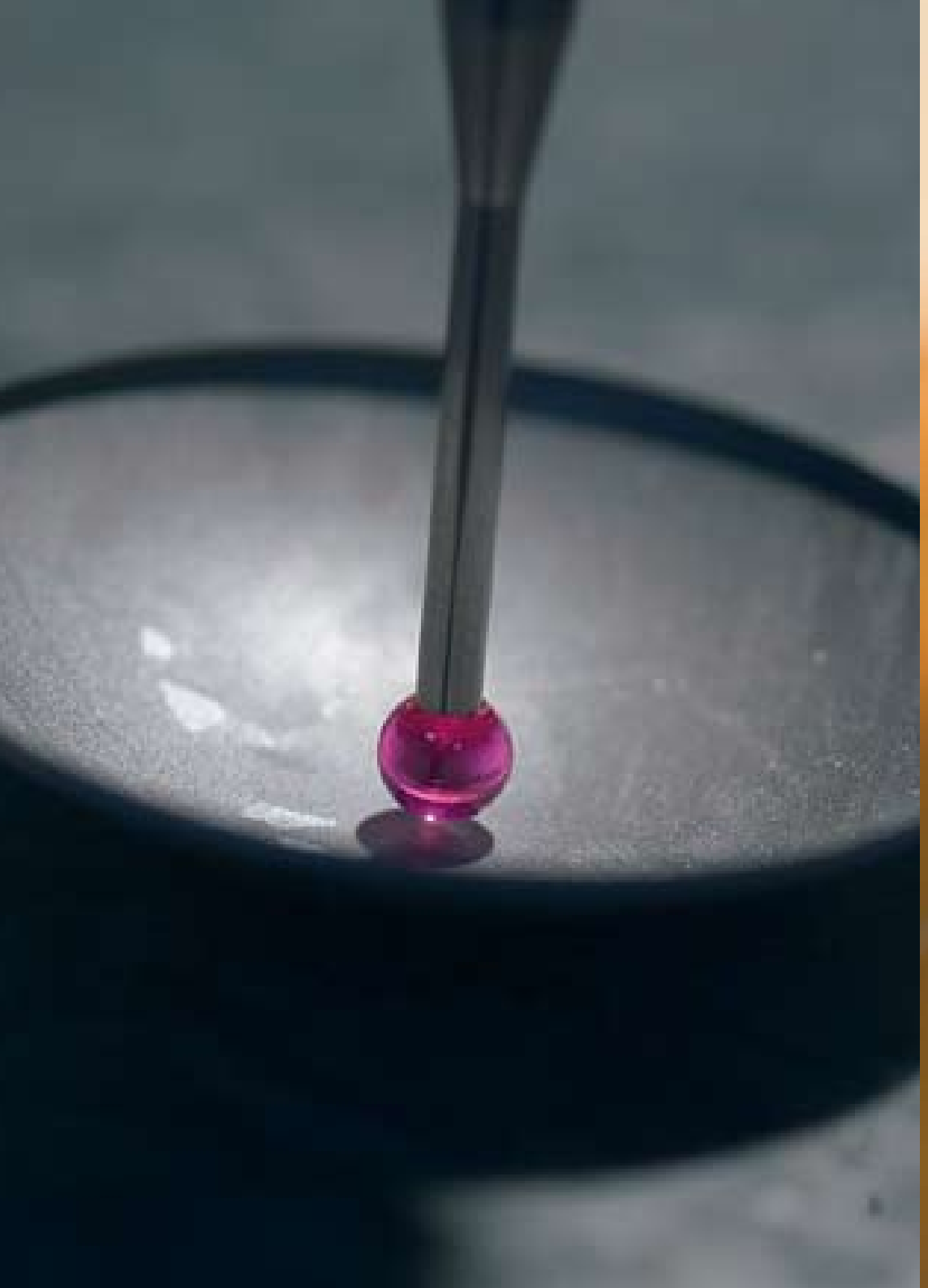
That's why B&W has always dedicated a large portion of a loudspeaker's development time to listening, irrespective of the price.

Diamond

Why diamond? Well, although a pair of our tweeter domes would make eye-catching earrings, we weren't so interested in diamond's cosmetic qualities. Diamond is the hardest natural material known to man. It can slice through stone and metal, and grind glass. And it gets closest to the properties of the hypothetical ideal material for a tweeter dome, which are infinite stiffness and zero mass. When we ran computer simulations of the performance of aluminium and diamond domes, the latter's perfect piston-like behaviour continued far further up the frequency scale. All we had to do was make one. For that, we went to the world's leading industrial diamond producer, whose chemical vapour deposition technique involves crystallising a 'carbon frost' into the shape of the dome at temperatures in excess of 2000 C. When we heard it, it matched all our predictions. Nice earrings, perfect tweeter domes.







Tube loaded tweeter

The perfect loudspeaker would be one that is acoustically invisible, with all components matching ideal behaviour. With diamond, we've got as close as we can to a tweeter dome of infinite stiffness. And, to complement it, we've simulated a tweeter housing of infinite depth. The tapering tube that sits behind the dome serves as an acoustic black hole, or a horn in reverse, soaking up the unwanted sound energy that radiates from the rear of the tweeter, and preventing it from polluting the diamond dome's flawless high frequencies. Which means that any difference between the sound you hear and the one that was recorded is infinitely small.

Kevlar®

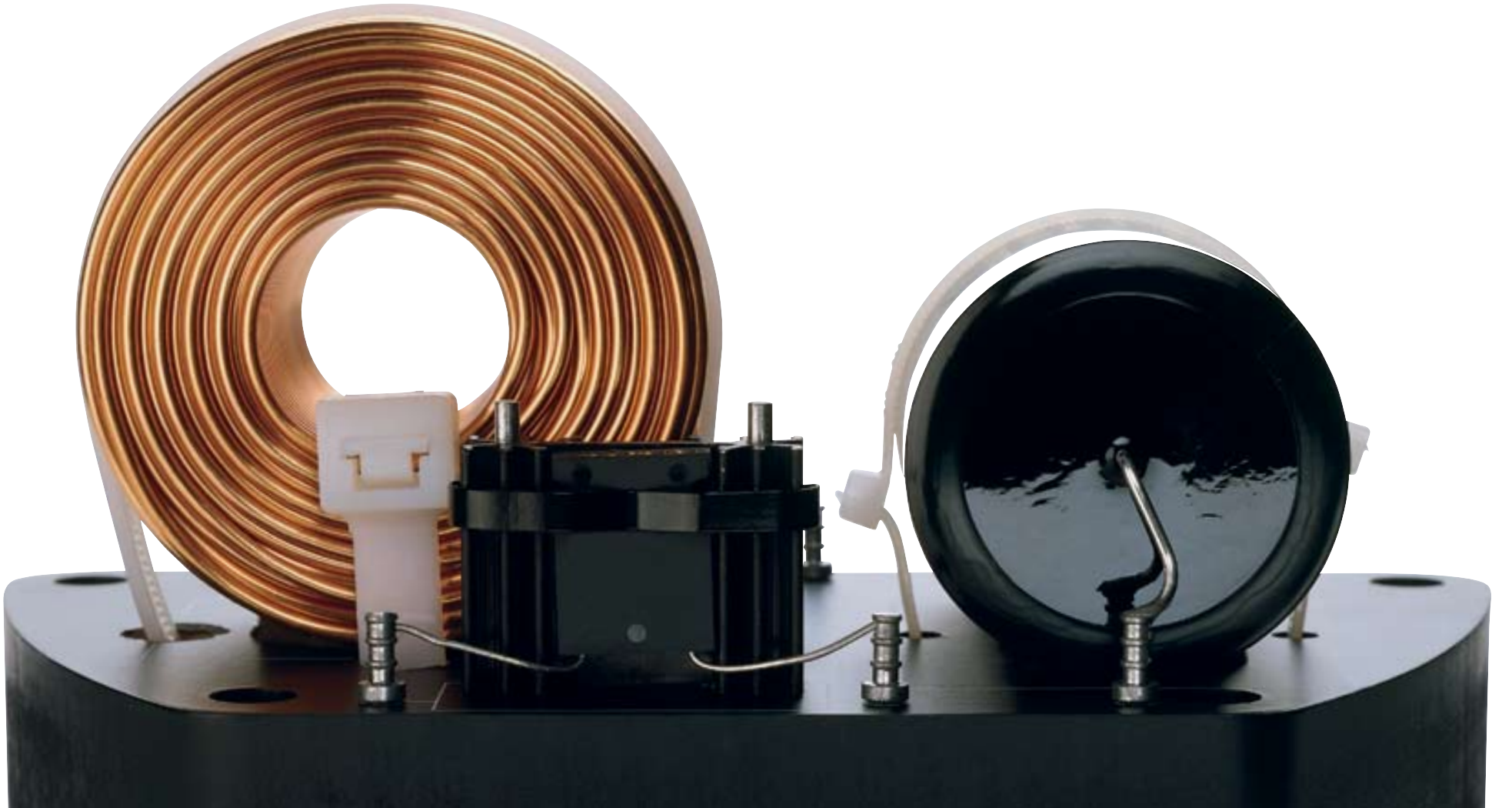
As any 40 year old knows, there are some things from your youth that simply can't be bettered. Our golden oldie is the Kevlar® bass/midrange cone. We pioneered the use of Kevlar® cones in the mid-1970s and have been refining their treatment and geometries ever since. As resistant to cone 'break-up' as it is to gunfire, this woven fabric – originally developed for bulletproof vests – disperses concentric standing waves through its square weave, which minimises sound coloration.

Flowport

As you may have gathered, we look far and wide for inspiration. When we came to developing a low-noise port, we needed to find a way of allowing air to oscillate more smoothly in and out of the speaker. It was turbulence in this movement of air that was causing bass to lose its tightness and timing, especially at high volumes. The answer came in the shape of a golf ball. Or, more accurately, the dimples on a golf ball, which generate tiny eddy currents in flight and allow the ball to slide through the air. We tried it on our port and, hey presto, the bass was as taut as Tiger's tee shots.

Crossover

The whole point of advances such as diamond domes and mechanically matched driver surrounds is to ensure that the audio signal is delivered as faithfully as possible. Of course, the point is lost if the signal itself is contaminated. The chances of that happening are increased if the crossover – the speaker's electrical processor, which divides the signal between the tweeter and bass/midrange driver – is complicated. Some speakers try to mask shortcomings in their mechanical design with complex electronic trickery. Shortcomings being short in supply on the Signature Diamond, our speaker is able to utilise the simplest possible first-order crossover. A small nucleus of hand-picked components, each one auditioned by ear for its accuracy and acoustic character, provides a signal path that simply couldn't be any purer.



Matrix

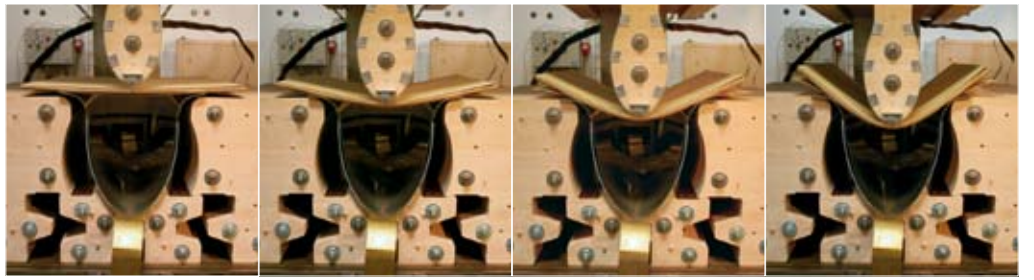
So, the vital organs – drive units, port, crossover – are in place. What's needed is a body: a cabinet capable of holding its precious, powerful cargo in utter stillness, sturdy enough to absorb every vibration. A cabinet with continuous curved walls, sculptural though it is, is also stronger than a box. Internal pressures are dissipated around its surface, and don't stress out edges and corners. Those pressures are then absorbed by our Matrix system of interlocking internal panels, which brace the structure like the ribs in a ship's hull. No vibration, no rattle, even when the rest of the house is reverberating.

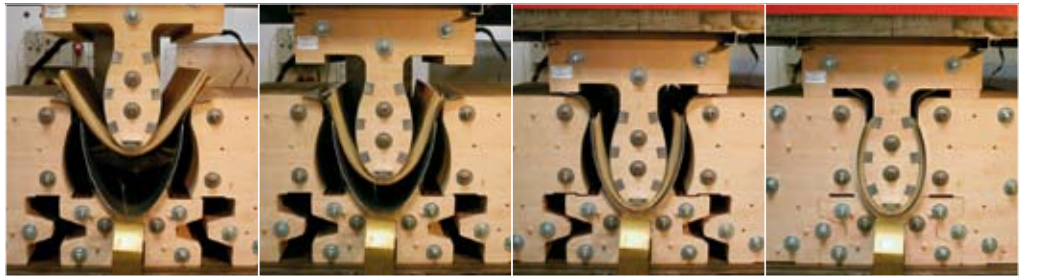
Marble

Thanks to its shockproof shell and internal skeleton, even at the highest volumes Signature Diamond stays as still as a rock. You could place a rounded pebble on top and it wouldn't roll off. Which gave us a thought… When we looked into it, marble made an outstanding housing for our tube-loaded tweeter. It was completely inert, like the Marlan® synthetic mineral that encases the midrange on our 800 Series speakers. What's more, every piece of marble is completely unique, meaning each speaker is a one-off, too. We selected two particularly handsome marbles from which to hone our housings: Grigio Carnico from Massa, near Pisa, and Belgian Black marble. When The Stones get rolling, yours stays right where it is.

Cabinet pressing

If you're looking for a show, says Kenneth Grange, "You don't need to go to Disneyland; go to the cabinet makers". Sound advice, in our opinion. The things they can do with wood at B&W's specialist plant in Agerbæk, Denmark, are breathtaking. This is high quality Scandinavian furniture-making at its best. To create the main cabinet for Signature Diamond, for example, sheets of MDF are bent into shape with effortless ease on a giant hydraulic press. In seconds, the flat sheets are transformed into a single, formidable speaker shell. After that, things slow down a little.





Lacquering

While the drive units, electronics and other components are waiting to be fitted, the cabinets finished in wood veneer can be lacquered. It's a long wait. For the white finish, the first step in the process is to apply two coats of paint, as a primer. Then, for both finishes we devote a day to polishing the cabinet to a glass-like smoothness. That's followed by another two coats of primer, and time to dry. Only then do we start applying lacquer – four coats of it, each one requiring three days to dry naturally (the heat of an oven could damage the MDF and aluminium in the structure). Finally, another day spent buffing the unit to a high shine. Only then can the final assembly take place.

Signature Diamond is available in a choice of two finishes: minimalist white or a ‘designer’ wood veneer called Wakame. Its resemblance to the edible seaweed is brought out by the gloss lacquering and polishing process, after which it looks good enough to eat.

Society of Sound So, that's it. Or is it? At B&W, the pursuit of perfect sound continues. For 40 years, we've been dedicated to creating a loudspeaker that neither adds to nor takes away from the recorded sound. In the process, we've become a world leader, developing landmark speakers like Signature Diamond. It's a passion. Thankfully, we're not alone. There are others – musicians, technicians, critics, customers – who are as dedicated as we are. And now, we're coming together to share knowledge, insights and our love of sound. You can join this global network, too, and get closer to your music. Come to www.bowers-wilkins.com to find out more and join the Society of Sound.

Signature Diamond

Technical features	Free-mounted diamond dome tweeter with Nautilus™ tube loading Kevlar® brand fibre cone bass/midrange Flowport™		
Description	2-way vented-box system		
Drive units	1x ø180mm (7in) woven Kevlar® cone bass/midrange 1x ø25mm (1in) diamond dome high-frequency		
Frequency range	-6dB at 32Hz and 33kHz		
Frequency response	40Hz – 28kHz ±3dB on reference axis		
Dispersion	Within 2dB of reference response Horizontal: over 50° arc Vertical: over 10° arc		
Sensitivity	88dB spl (2.83V, 1m)		
Harmonic distortion	2nd and 3rd harmonics (90dB, 1m) <1% 80Hz – 100kHz <0.5% 110Hz – 100kHz		
Nominal impedance	8Ω (minimum 4.6Ω)		
Crossover frequency	3.8kHz		
Recommended amplifier power	50W – 120W into 8Ω on unclipped programme		
Max. recommended cable impedance	0.1Ω		
Dimensions	Height: 930mm (36.6in) (not including detachable feet) Width: 230mm (9.1in) Depth: 375mm (14.8in)		
Net weight	25kg (55lb)		
Finishes	Cabinet:	White	Wakame
	Tweeter:	Grigio Carnico marble	Belgian Black marble
	Grille:	Black cloth	Black cloth