



Design Background - Philosophy **for BlackEye, BlackArrow, BlackHawk and BlackFire loudspeaker**

Speakers in general: every speaker concept, no matter which is always a compromise: there is no perfect speaker and there will never be. We at Ayon Audio have a long tradition of speaker manufacturing (with higher efficiency of 91 to 95 dB in particular) and therefore our target is to build the "best possible" conventional speaker also for lovers of tube amplifiers making the least compromise.

"A music reproduction redefining space, emotion and time - pure listening pleasure"

Meanwhile 12 years passed since we presented the first generation of our Ayon speakers incorporating some pioneering technological highlights e.g. the principle of airflow-current, the special multilayer wood cabinet - mainly derived from instrument manufacture - or the almost unique oval shape of the cabinet. Some of these significant Ayon features were several times copied more or less or applied further for their design by some well-respected manufacturers, paradoxically not Asian but European companies.

In the last couple of years we held many discussions and interviews with highly interested and knowledgeable music lovers about how a modern loudspeaker should look like ideally or which properties should be paid most attention to.

It was our primary goal to create a line of speakers fulfilling completely all our requirements in design and tonal reproduction.

- easy to drive, especially for every tube amplifier, no difficult loads and oscillating "jumping" impedance curves, balanced phasing and maximum 3D-reproduction at both low and high volume levels.

Especially most lovers of tube and class-A amplifiers, but not only these, face increasing difficulties to find their "optimum" speaker, although the options became unmanageable.

Although there is a huge selection of loudspeakers the manufacturing industry seems to increasingly ignore the admittedly "small" group of music lovers; their only objective is to compete with slimmer and cheaper cabinets (almost no increase in volume despite showily multi-chassis installation) and yawn-boring uniform designs to secure market shares at any price. All basic parameters and calculations for good sound are completely neglected.

Sometimes the information about efficiency is bizarre or combined with very low impedance values and achieved only with power consuming (compensating) crossovers.

This is exactly the contrary of what you can expect of a modern and pioneering "passive" loudspeaker design, i.e.: higher impedance values (ideally 8 ohms linear to a large extent over the whole frequency range), one tweeter, one mid-range chassis, and one chassis for the bass-range.

But we already have the first hurdle to take: which chassis are suitable and where do I find them? Therefore we decided to break new ground based upon our past in loudspeaker manufacture. The advantage is that we could take all our experiences with us and could further refine many well-trying designs.

When we started to realize a new concept with the requirements mentioned above three years ago, we had to trawl many chassis manufacturers and almost none was interested in adapting his chassis according to our specification (too expensive, too time consuming, almost not feasible, not interesting because not profitable, busy with mass-production etc.). After a long hamming and hawing we could convince one or the other manufacturer to optimize our desired chassis “electrically and magnetically” and to adopt it to our indicated parameters. This step was important; now we could design our cabinets, optimize their shape, calculate their optimal volume, their resonance gradient and the stiffness to achieve an optimal vibration behavior. Furthermore we could set aside inner damping or implement it only very moderately respectively in order to avoid losing additional efficiency and also not to soften the so important acoustic resonance behavior of our multi-layer special-wood cabinet (instrument class). Thus the pulse fidelity of the original signal is significantly improved.

Can you imagine a softened musical instrument? or a violin or a guitar made of MDF or plastic compound, or aluminum, or stone, etc? I think that this already answers many questions concerning the selection of material for the cabinet.



Also in the new Ayon concept we also wanted to use organic and natural nature materials as much as possible to the greatest extent possible.

E.g. one bass-chassis for the BlackEye, BlackArrow, BlackHawk and BlackFire.

Every additional chassis will halve the impedance value, the cross-over becomes more complex and must be equipped with additional corrective components; the oscillation of two or three chassis never can be as synchronically precise as one chassis; compared to one chassis the volume of the cabinet should be double; the acoustic centre drifts further apart.

Why only one chassis for mid- or high-range?

E.g. mid-range-chassis: in principle the statements made for the bass-chassis are almost similar; however, the ear reacts much more sensitively to different mid-range runtimes and the interferences and phase distortions resulting thereof using two mid-range chassis (e.g. arrangement according to the D'Appolito-principle).

E.g. tweeter: Air Motion Transformer

The advantage is in the small and very controlled movement of each fold, accelerating the surrounding air inside each fold, which produces an almost perfect acoustical output, both in amplitude and in phase in all the radiating area of the transducer.

The advantages of this type of tweeter can be summarized in:

- Radiating surface four times the one of a tweeter or an equivalent compression driver.
- This confers an enormous dynamics and an incredible transient response, vastly superior to that of any conventional tweeter, Diamond tweeter or compression drivers.

Why not full-active?

In our opinion full-active concepts (including controlled systems) cannot fulfill the „musical“ requirements we expect from a speaker or are used to. On paper, technically and theoretically, everything looks very auspicious for this concept. But when you look into it more closely very quickly the disadvantages become obvious and from our point of view they are more important than the advantages.

- “Active amplifiers” in the majority of cases are of lower to medium quality and are fixed in the cabinet of the speaker; hence they are exposed to all different resonances of the speaker.
- The customer always depends upon or is bound to the installed amplifiers.
- The music signal first passes through a DSP and is then conditioned for the individual power amps; hereby the sensitive mid- and high-range analogue signals undergo an enormous digital influence.
- The resulting higher attenuation factor is advantageous, but at the same time the mid-/high-range music signal is being downgraded in the digital crossover and so the important properties i.e. musicality, aura, and emotion get lost.

At the first sight all sounds impressive: how super transparent, very precise and “precise as nippers” it sounds, but after some time you sit in your chair exhausted and annoyed as the real listening pleasure does not emerge.

Why semi-active ? (optional for the Ayon speakers – the Alpha amplifier)



With all our models we offer a so called additional semi-active version as an option.

This includes a separate amplifier with an integrated electronic crossover (DSP), called “Alpha”, that virtually only manages the bass-range and this way discharges the main amplifier.

Advantages:

1. The amplifier is not installed in the speaker; its elaborate aluminum chassis prevents exposure to the internal resonances of the speaker and does not reduce the inner volume of the cabinet.
2. The music signals for the essential medium-high-range is not looped in via the integrated electronic crossover but flows from the pre-amp to the main amp unaffected and directly.
3. The bass-amp and its crossover are only responsible for the low-pass (bass-range). This way the main amplifier is discharged from the power demanding bass range and therefore can reproduce the mid and high range significantly more agile. Higher and less distorted volume levels are also possible. Furthermore the power of the main amp can be reduced; Single-Ended-Triode-amps are an obvious choice.

Passive crossover

Here, the top priority is „absolute simplicity“; this sounds easy, but it is much more difficult to realize than complex crossovers which can filter away, press-iron, compensate and balance everything. These “surcharged” crossovers are very helpful to correct deficiencies of the chassis themselves or the selected configuration of the chassis (forced by wrong calculations of the cabinet or damping) or to achieve a perfect frequency response etc. However, the sound is left behind immediately: no energy dispersion, little fine dynamics and radiation, poor 3D spatial reproduction, somehow everything sounds almost leveled and dull. The loss of efficiency with these crossovers is enormous.

We proudly can prove that in some cases we offer the shortest signal path in a 3-way-concept and on top do not use few to no resistors (depending on the model) in the signal path. For example our BlackFire XS is using no any resistor in the signal path. Simplest filters perfectly adopted and graded coils, very linear impedance gradient and no correcting suction circuits.

All this was only possible, because from the first we got the chassis aligned properly, optimized the chassis to the cabinet and not vice versa; therefore almost nothing needed to be corrected additionally in the crossover.

Advantages of our crossover are: linear frequency response, excellent impulse behavior, optimum time behavior, and an easy to drive impedance.

The philosophy for our crossovers is to achieve the following results with as few as possible but high-grade components:

- linear frequency response on and outside of the axis
- linearization of resonances
- inaudible phase distortions
- lowest distortion level over the whole frequency range
- non-critical impedance gradient with a minimum of 4 ohms

Remark:

Some speaker manufacturers gloat about using only the most expensive and „best“ components in their crossovers. Using so called “best” and “outrageously expensive” components is one point, but reveals only little or nothing about the final sound reproduction; on the contrary, in many cases some specific properties of the sound picture are highlighted leading to an annoying or inhomogeneous reproduction.

It is decisive to find the “correct” MIX of the right values of the components and their appropriate quality at the right position of the crossover and to consolidate them; this requires sensible fine-tuning and long intensive listening.

Efficiency and horns:

There are many daring horn constructions, regarding their technical base and their design; at the first glance they offer a superb efficiency, but from 60 Hz downwards in the bass it is over with the good efficiency; their bass-diaphragm is always mounted rigidly and in most cases the chassis has a huge magnet which is difficult to drive. Sufficiently deep bass can almost not be realized. The mid-range horn, however, must be coupled “high” (frequency range) or it has the dimensions of one square meter (10.8 sq ft). These designs are everything but suitable for living rooms and in total they look like barn doors. Furthermore, what is the good of an efficiency of 105 dB and more, when there is practically almost no deep bass, when the huge magnet of the bass-chassis is exasperating almost every tube amplifier, when you need to keep at least 6 m (20 ft.) hearing distance; their precise

directional characteristic and listening at normal volume level will hardly give little cause for joy. You should always keep in mind that it is difficult to produce really good horn speakers and only a few moderate horns fulfill high-end standards.

It also is a misbelief that e.g. 7 watts are sufficient for such horn speakers; no 7 watts amplifier has the ability to provide enough current and control for their huge bass chassis magnets, regardless of the efficiency level.

Tweeter:

The moved mass of our applied tweeters e.g. is not equivalent to a tenth of the mass of a 25 mm dome tweeter. The surface, however, is many times higher than the surface of conventional tweeters and this in turn leads to a significantly higher efficiency and least distortions as a result thereof. The AMT tweeter reveals details and an airiness in our speaker concept that you probably never heard on your recordings in such an authenticity.

Mid-range:

In the mid-range a low mass, linearity, efficiency, and high flexibility are of tremendous importance to convert the resulting speed. In many listening trials and test series paper or paper compound turned out to be the optimum material for the mid-range. Neutrality, smooth transparency and dynamics are not exceeded by any other material. Probably approximate results can only be achieved with special metal alloys (ceramics), but with an inferior efficiency and very high effort for the crossover to soften its crack resonances.

Optimal efficiency of the new Ayon design:

In the course of our long-time experience (especially for our actual new design) it turned out that the optimal efficiency for tube amps should lay between 90 dB and 95 dB at 8 ohms (for a typical 4 ohm speaker approx. +3 dB for single-ended tube amps operation must be added, hence 93-98 dB). In this range there is the optimal synergy of best sound quality, perfect coupling of tube amplifiers and maximum compatibility of chassis. Even 7 watt-amplifiers are not confronted with irresolvable problems.

Ayon's Ideal sounds:

Some of the cornerstones of our sound are: excellent and expansive spatial reproduction, neutrality, resolution power, and dynamics. The sound impression is powerful, warm, and three-dimensional with outstanding attention to micro details. The bass-range is clearly structured (but not rumbling unnecessarily deep), bouncy and breezing, mid-range is exceptionally smooth and natural, high-range makes finest details audible without a trace of sharpness. The tuning is very homogeneous and coherent reaching best broadband chassis quality, but without their disadvantages in bandwidth, details and discoloring of the sound.