Implementing TQ™ Processing

At Fulcrum Acoustic, we believe that a loudspeaker manufacturer should understand the challenges facing its customers, and do everything it can to help them meet those challenges. Among other things, this means recognizing that numerous digital signal processors (DSP) are available, and that the best processor for a given application is determined by factors beyond the requirements of the loudspeakers. We have committed to supporting a broad range of processing platforms at a very high level to ensure that Fulcrum Acoustic loudspeakers are easy to work with and so our customers can achieve the best results possible.

What form does this support take? In short, we confirm that the signal processor settings used with our loudspeakers are precisely correct. Since each manufacturer implements its DSP filters differently, we have assembled an extensive collection of processors. The settings for each individual loudspeaker and processor are entered and adjusted by measuring and carefully matching the complex transfer functions to our reference measurements. The settings are then published on the Fulcrum Acoustic website (www.fulcrum-acoustic.com) in the most convenient format supported by each processor model (e.g., custom blocks, plugins, macros, super-modules, etc.). Note that to verify the settings a sample of the processor is required. If we do not have a particular processor on hand, we will work with the customer and/or the DSP manufacturer to acquire a unit for measurement.

Processor Capabilities

The settings we provide for each processor model make maximum use of its capabilities. However, not all processors are created equal – some are capable of providing the most advanced form of TQ processing; some are not. To simplify the differences between various processors, we have defined two classes of processor settings, called “Level 1” and “Level 2”.

Level 2 settings can be implemented on most professional audio DSP platforms. They use the standard complement of Infinite Impulse Response (IIR) high-pass, low-pass, and parametric filters – plus delay. With this combination of filters, Fulcrum Acoustic loudspeakers are tuned for: natural-sounding spectral balance; a pleasing aesthetic balance between highly transient sources (such as percussion instruments) and less transient sources (such as human voice); uncolored vocals; and excellent intelligibility. A Fulcrum Acoustic loudspeaker tuned to Level 2 is a high-precision tool, capable of producing high quality speech and music and suitable for a wide variety of professional applications.

Level 1 settings are appropriate for processors that can provide additional processing power, and a very specific type of filter – a fully addressable, fairly large Finite Impulse Response (FIR) filter. With this filter we can implement more detailed frequency response adjustments; and more importantly, we can implement the precise temporal (time domain) filters that are responsible for the most remarkable TQ benefits. Fulcrum Acoustic loudspeakers tuned to Level 1 provide a crisper stereo image, greater soundstage depth, more separation between the components of a complex mix, increased resistance to feedback, improved arrayability, more seamless transitions between distributed loudspeakers, and a less fatiguing listening experience at very high SPLs.

Which Level Is Appropriate For My Application?

The relative value of Level 1 processing varies depending on the demands of the application. For example, in a small church with a single pair of loudspeakers where speech as the primary program, the differences between Level 1 and Level 2 might be relatively subtle. In this situation, the precise directional control and consistent clarity of Fulcrum Acoustic loudspeakers is more important to the final result than the Level 1 benefits listed above. Either processing level is capable of providing excellent intelligibility and natural-sounding speech.

In more complex systems, Level 1 processing becomes increasingly beneficial. Specifically, we strongly recommend its use in the following situations:

- ***Arrays*** Level 1 normalizes the phase response so that different loudspeaker models can be combined effectively. Even single-model arrays combine more seamlessly with Level 1.
- ***Distributed Systems*** Transitions between adjacent loudspeakers are crisper.
- ***Live Music*** Mixing is easier due to improved separation between sources.
- ***Foreground Music*** The subtle high fidelity details brought out by Level 1 become important when music is the focal point of a venue.
- ***Cinema*** Stereo imaging and soundstage depth are more realistic. It is as if the performers are in the room with you, which enhances the sense of envelopment.
- ***High SPL*** In rock and roll venues, nightclubs, or other loud environments, the reduced ear fatigue and effortless character provided by Level 1 processing will be noticeable and appreciated.