Acoustic Control Systems

… true variable acoustics

… improve acoustics, make acoustics variable, create multi-purpose halls

Why ***ACS***?

Performances such as, speech, drama, symphonic music, choir all have their specific acoustical requirements. Speech will be intelligible in a bright sounding non-reverberant room whereas some choral pieces sound best in the reverberant acoustics that can be found in some old churches.

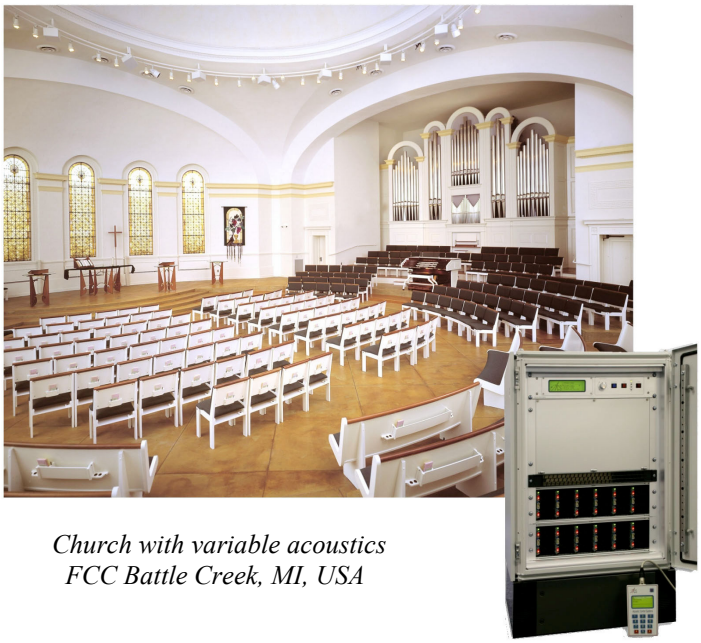
Often the acoustics of a hall are not ideal for a certain performance and/or the hall has to be used for a range of different performances.

By installing ***ACS***, acoustics can be made variable and acoustically problematic areas can be treated. All such that it is perceived as natural acoustics.

ACS is used in a broad range of installations

- *theatres, concert halls*
- *churches*
- *schools of music*
- *festivals, mobile installations*
- *etc, …*

ACS adds early reflections[1], improving clarity of sound, presence of sound sources, and spaciousness of a room. It lengthens reverberation times (RT60)[2], to make it fit the musical performance, adding brilliance and warmth.



Church with variable acoustics
FCC Battle Creek, MI, USA

ACS makes a hall an acoustical unity, stage, areas under balconies and the hall itself. Good acoustics everywhere, for performers and the full audience.

The ***ACS*** orchestra shell extension is a lightweight and easy to set up alternative for a mechanical shell. It consists of an array of loudspeakers (often hung on fly bars) surrounding the performers. The orchestra shell renders a correctly timed field of early reflections. This will improve the ensemble-playing conditions because musicians will hear each other better.

Each venue requires its own specific acoustical solution and therefore ***ACS'***-systems are tailored to fit the specific area of operation.

New York, London, Hong Kong,… ***ACS***-installations can be found around the globe.

National Arts Centre, Ottawa, ON, Canada

[1] *Sound reflected against walls ceilings etc. will reach the listener after the sound that is coming straight from the source. Sound reflections arriving within 80-100 ms after the direct sound are called early reflections.*

[2] *RT60 is the time it takes in seconds for the sound level to decrease 60 dB, after the sound source has stopped.*

ACS generates acoustics using the following principles:

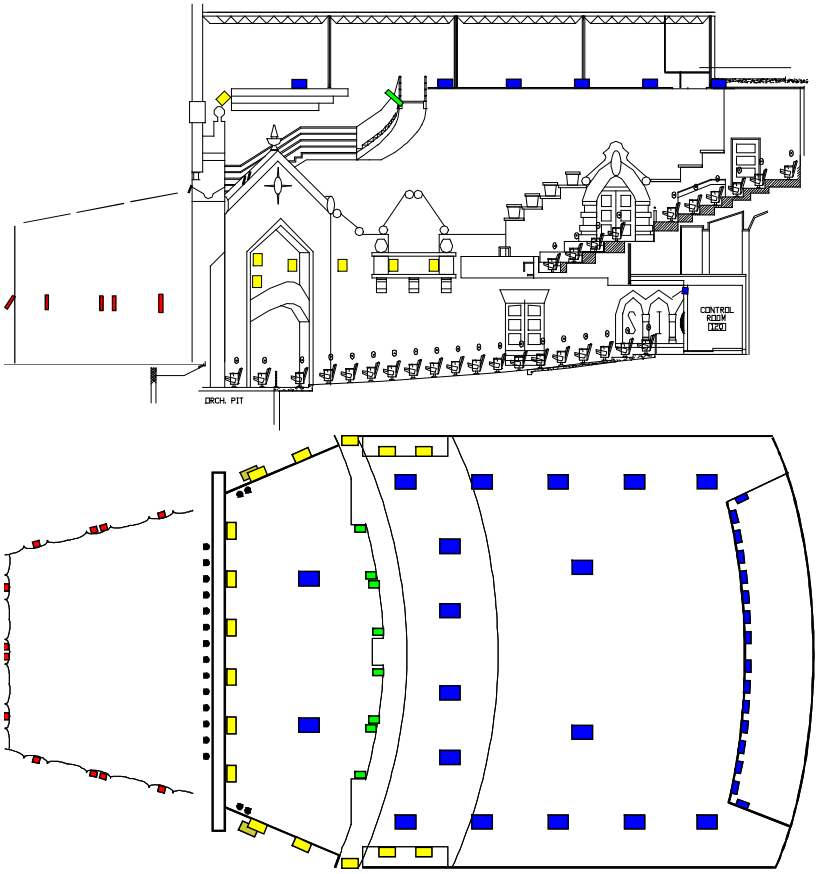
- High-resolution pick-up. Multiple microphones (typical 18 - 24) record the sound. Sound reflection patterns are generated depending on the position of the sound source within the environment.
  Pick up of sound occurs relatively close to the source, this way early reflections can be generated. This is essential for clarity and spaciousness.
- Multi-channel matrices for sound processing.
  This enables generation of variable acoustics that will be perceived as real, natural and fitting to the environment.
- Each loudspeaker in an installation gets its own, correct, signal. All loudspeakers together will built-up the required sound field.
- Extensive control functions.
  Separate control over early and later reflections (reverberation). Timing, levels, frequency spectra of levels and decay, signal mix, etc. can be adjusted.
- Sound processing with essential knowledge of how sound-waves travel within an environment. How they are being influenced by different matter, (wood stone/curtains/air) and interact with other sound-waves.

ACS installations are tuned by experienced personnel, a balanced process will ensure swift and accurate tuning.

ACS uses state of the art digital techniques. The core of the system consists of a very flexible unit containing the latest DSP's. The standard ***ACS***-unit can be equipped with 96 signal inputs and 96 outputs that all can be processed separately. Multiple units can be cascaded to form even larger systems. The processing unit can also be used for other applications as for example, *Wave Field Synthesis.*[1]

ACS' systems are developed in close co-operation with Delft University of Technology, the Netherlands, group of acoustic science and sound control.

Contact us for more information



Above an example of the implementation of ACS

Installed, as good as invisible, in "the Lensic" in Santa-Fe, NM, USA

The yellow loudspeakers are mainly used for early reflections, (a virtual forestage reflector above the proscenium opening and lateral reflections from the sidewalls)
The blue loudspeakers, divided over the hall are mainly rendering reverberation. To improve acoustics on stage, reverberation is rendered from the light-bridge with the green (foldback) loudspeakers. The red loudspeakers form the orchestra shell. The mechanical shell shown is of little weight and mainly there for visual reasons. Microphones are mainly located in the proscenium opening.

"the Lensic" has variable acoustics with an RT60 from 1 to 3 sec.

[1] Wave Field Synthesis is developed by the Delft University of Technology. Exact (virtual) sound source positions can be perceived because the propagation of sound waves is reconstructed and rendered over an array of adjacent loudspeakers.

Acoustic Control Systems B.V.

Speulderweg 31
3886LA Garderen
the Netherlands

P.O.Box 46
3886ZG Garderen
the Netherlands

Tel: *+31 (0)577-462251*
Fax: *+31 (0)577 462268*
email: *info@acs.eu*

www.acs.eu