

ACOUSTICAL ENHANCEMENT AND MODERN THEATRE AND MULTI-PURPOSE HALL DESIGN

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1. INTRODUCTION

Lack of money and politics causing this lack of money have been the major reasons behind the fact that we have seen the development of so called Multi-Purpose Halls in our cities and villages. Usually there is only money for one dedicated building for the performing arts.

Presenting our towns with one single hall, ranging from a couple of hundred seats to approximately 1500 seats, to be "optimised" for speech (Congresses and Drama) but also used for a wide range of musical performances. - From classical, pure acoustical music to high sound pressure levels pop and rock performances. Will form a compromise that will not easily work in reality if you just want to accomplish that architecturally.... This is often proved in practice, also in much larger halls.

Often reasons for the failure are:

1. Because of the multipurpose character a hall can have a too long reverberation time to create good intelligibility on the other hand, for many kinds of music the musicians cannot come to their full performance because the reverberation time is too short
2. Some architects, not fully understanding how acoustics work, contributed in their own way to the problem.
3. Shape and position of walls not supporting the propagation of sound waves
4. Materials used in the interior decoration if the hall create unwanted coloration and reflections.
5. Underestimation of the role and function of the acoustical consultant/designer.

A substantial problem?

In the UK alone we have over 2000 theatres (mostly multi purpose designs) spread over 180+ cities (London not included) with frequently poor acoustics.

Is good acoustics worth the investment?

Running such multi- purpose theatres or cultural centres efficiently and profitable it is essential a wide variety of performances are offered. More performances for a wide range of audiences are the key to commercial success of a hall in the smaller cities and more rural or remote areas. Today theatres in many cases have to make money.

2. ACOUSTICAL ENHANCEMENT

Since the 1950's we have seen attempts to offer acoustical enhancement by electronical means. From a tape based system from Philips to the Helmholtz resonating system from Mr. Jaffe. All by itself in theory nice designs but in practice not very well sounding. Sometimes these systems turned out to be impossible to tune which also contributed to a bad reputation for this kind of applications.

Enhancement, sometimes pure amplification of classical, other pure “acoustical” or unplugged music often created a very bad and negative atmosphere among the “music lovers”.

The results were so bad that even today we hear from the “golden ears” in our society that they are very much against electro acoustical enhancement.

We also have seen very costly and labour intensive mechanical solutions from a movable ceiling to changeable wall panels to make the hall’s acoustical response variable.

3. WHAT HAPPENED IN PRACTICE

To stay away from “amplification” and the related bad taste effects we have seen the development of Halls with mechanical, architectural solutions. These are principle effective measures and in some cases with astonishing results. But always very expensive to build and often difficult to handle, generally very heavy and time consuming to apply. In some cases we have seen even very expensive, great sounding mechanical shells being abandoned after a while. For the lack of money and also because politics are taking care of staff reductions at theatres. Unions are against lifting heavy weights. Storage and building up these acoustical cause problems.

Reasons for theatres to re-consider electro-acoustical solutions, a tendency that is getting stronger. It’s very easy to change the acoustics with the push of a button instead of many hours of labour.

Our approach to electro-acoustical enhancement, based upon fundamental research from the Delft University of Technology follows the principle of natural acoustics.

With a sound propagation and decay that behaves identical to sound in those halls that are considered to have good to great acoustics.

Once well installed en carefully tuned even the most negative “golden ears’ were able to appreciate the way we enhanced the acoustics of a given hall. An important factor is our co-operation with the acoustical designer who creates to correct and good basic natural acoustics. Often hall are optimised for speech with an RT60 time of around 1 second. But we have also been successful in smaller but also in much larger halls (2500 seats +) with other acoustic properties. Some famous conductors are very happy with what we have done to their halls.

4. WHAT WE THINK IS NEEDED FOR A GOOD ENHANCEMENT SYSTEM.

Since 1988 ACS systems in close co-operation with several acoustical consultants, have been active installing systems in cultural venues and houses of worship. The co-operation with the acoustical consultant ensured a perfect match between natural and enhanced acoustics.

Acoustic Control Systems (ACS) is a Dutch manufacturer of a system for acoustical enhancement.

An Acoustic Control System (ACS) significantly differs from all other systems on the market:

- It closely follows the way acoustics are developing naturally
- Specific approaches for early reflections, reverberation and the acoustical environment on stage
- Use of one or more matrices built of at least 18 discrete channels
- Microphone array technology (18+ mikes)

5. EXPLANATION AND PRACTICAL EXAMPLES

Some recent projects:

The Lensic Theater, Santa Fe, NM, USA
National Arts Centre, Ottawa, On, Canada
Gala Theatre Durham, UK

Recent (ACS) Developments:

Over the last 5 to 8 years we see a very encouraging development of newly build theatres that are designed in close co-operation between architects, acoustical consultants and ACS. "Schouwburg Het Park" a new theatre in the City of Hoorn in The Netherlands and the Gale Theatre in Durham are nice examples.

Both halls were optimised for speech in such a way that a nice defined sounding hall was created.

ACS has been using Analog signal processing for obvious reasons, while trying to conserve the highest possible quality, we are moving towards digital techniques always keeping in mind that at the end the goal is to create natural sounding acoustics, no matter the technique used.