

# Arena Sound System Design Issues

## Introduction

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This document serves to introduce the key sound and acoustics issues to be addressed in arena renovations.

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### Space Programming

In considering the sound system requirements the following spaces should be addressed:

- the arena
- club boxes
- reception and conference rooms
- public concourses, ticketing, exits and entrances
- dressing rooms
- service and backstage areas
- bars and restaurants
- bus/truck docks

### Function Programming

Prior to undertaking a sound system design the potential uses of the arena should be defined. These may include:

- hockey
- figure skating
- free (public) skating
- concerts
- trade shows
- receptions/banquets/political rallies
- basketball
- curling

The sound system and acoustic needs of some of these events are unique and can be costly. Hence, it is important to determine in the early stages which functions should be accommodated.

### Sound System Design Issues

The sound system designer should address the following issues:

- acoustics - namely the reverberation time of the arena - will the system be suitable for concerts and other critical listening applications? Note that, as a rule of thumb for 5000 seat arenas, reverberation times in excess of 2 seconds make good sound system performance difficult.
- loudness expected - will the system be required make announcements over crowd noise?
- system bandwidth - will the systems be required to reproduce music faithfully, such as for figure skating events?
- user access points - what are the necessary positions for paging microphones and input points for music/program inputs?
- arena site lines versus loudspeaker placement - does the loudspeaker system compromise site lines to score boards or lighting follow spots?
- interface to broadcast audio visual systems sports software/hardware - will the facility be regularly used by the local cable company or press and will it be necessary to feed or take feeds from other systems?
- assistive listening - the Canadian Building Code requires that rooms over 400 people have equipment to assist the hearing impaired.
- EVAC and telephone inputs for paging - will these be required?
- central versus distributed loudspeaker systems - this topic is address in the following two paragraphs.

Central loudspeaker systems generally consist of a single cluster located over centre ice which covers the entire arena.

Alternatively, split clusters located approximately over the blue line can also be used. In order for central and split clusters to be effective in the seating areas, it is necessary that the reverberation time be adequately short and that the loudspeakers used in the clusters are what are referred to as "large format" horns. Large format horns are very directional and have the ability to throw sound a great distance in a focused way. The advantage to central and split clusters is that they are less costly than distributed systems. An example of a split cluster system which works well is the Waterloo Recreational Centre. The arena portion of this system cost approximately \$50,000.00. The arena seats approximately 4,500 people. Where high glass is installed at the boards, centre clusters do not cover the first 3 to 5 rows.

The other common approach is a distributed system consisting of a number of smaller speakers located around the perimeter of the ice typically above the boards. One speaker can be located facing the audience and if desired another speaker can be located facing the ice. A recent example of such a system is the Barrie Molson's Arena where 28 loudspeakers are used in 14 clusters around the perimeter of the ice. This system has been well received. The cost of this was approximately \$65,000.00. There are 5,000 seats in the area. Distributed systems are often preferred where the reverberation time in the room is excessive.

They tend to be more expensive because there are more units and more locations where the equipment must be mounted. They can alleviate site line problems to the centre score board.

### **Related System Design Issues**

Other issues pertaining to sound and which should be considered in an arena include:

- technical power provision and distribution for installed sound
- technical power "disconnects" for touring sound (and lighting)
- central equipment location and cooling
- control room - may include DJ equipment
- electronic cheer leading equipment
- media (press) feeds and distribution
- arena lighting (zoning for concerts) and signage control
- distributed television messaging systems
- touring sound audio and lighting rigging and loads
- drapes for zoning and acoustical needs
- loading docks and mobile truck hook-up locations

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