LISTENING AND DYNAMICS – SOME MUSICAL CHALLENGES WITH LOUDSPEAKER MONITORS

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1 INTRODUCTION

In small and medium stages, touring musicians often find that stage acoustics are simplified. As a consequence, acoustical internal listening is suboptimal, and a monitor speaker system is frequently necessary. This solves some problems in the given situation, both for the technical staff and the musicians, but this solution may sometimes come with a musical cost.

When musicians perform with monitor sound, new sound sources are introduced, and there is a risk that the dynamic span of the music will suffer. As discussed in earlier papers, this is especially the case for ensembles performing music where very low sound levels are frequently used for musical and communicative effect. Typical examples will be found in modern electroacoustic music, in various forms of improvised music, and in chamber music.

Stage acoustics for amplified music, especially on small stages, will often be handled with excessive absorption. A highly absorptive stage area will often be a desired solution for amplified concerts with pop/rock bands. In such events, an acoustically dry stage eases the sound engineer's task of controlling sound levels from various instruments and amplifiers.

This approach may, however, in certain other situations create some challenges for the musicians. In the following, we will focus on sound levels and dynamic range. These aspects are considered with a perspective on the performers' and the sound technicians' musical and technical challenges in such situations.

2 AUDIBLE COMMUNICATION ON SMALL STAGES

2.1 Sound levels

If most surfaces close to a small stage are absorptive, one distinct result of this will be that the general sound level is reduced locally. This is generally a desired effect, for several reasons. To name a few: Stage sound levels will generally be reduced to a (more) acceptable level, input signals to microphones become clearer, and the loudspeaker system will have an increased influence relative to the direct sound from stage, making it easier for the sound technician to control the sound distribution to the audience zones, and the balance within the ensemble.

However, for some musicians and sound engineers, the lack of reflections – and, as a consequence, the reduced contact with the sound from the other performers – will be compensated using monitor speakers. This will increase the general sound level on stage, which often will reduce the positive effect mentioned above.

2.2 Internal listening on stage

When reflections from stage surfaces are eliminated, the direct sound will be the only source for acoustical sound distribution on stage. When instruments, amplifiers and other equipment are

included on stage, sight lines may very well be cut off, resulting in a reduction of auditive contact between musicians.

These challenges are often solved by using monitor systems. The traditional solution is monitor speaker systems (wedges).

In these days, in-ear monitor systems (ear plugs with balance adjusted individually for each performer) are increasingly frequent in use. Such systems, however, are mainly used in concert productions on large stages, and will not be discussed here.

2.3 Lack of internal listening compensated with monitor loudspeakers

The purpose of the monitor speaker system is to ensure that each performer receives sufficient auditive information to perform with confidence and sufficient precision – in any musical sense. The gains are obvious – the performers on stage get to hear essential information that otherwise would be unavailable.

Using such systems, there is a risk that sound levels on stage increase to an undesired level. Due to the excessive loudness of pop/rock concerts, one may assume that these problems only occur there. Monitor speakers may, however, cause undesired effects also for ensembles generating far lower sound levels than a typical rock band. This is mainly due to their effect on the dynamic range of the music.

The principal goal using a monitor system for an acoustic band should, in our view, be to create a sound environment that compensates for the lack of stage reflections that a proper acoustically designed stage would have provided.

3 MUSICAL CHALLENGES

3.1 Auditive communication in general

In a previous paper (REF), an effort to describe the needs for auditive contact between musical performers, depending on musical genre, was presented:

Symphonic ensembles:	Orchestra musicians need audible indicators. Precise perception of musical time is very important. Timbral information is essential within instrument groups. In general, performers tend to delegate responsibility for the total result to the conductor.
Pop/rock bands, stage productions	Musical content and delivery is to a large extent pre-planned. Precise perception of musical time is critically important in the internal listening. Responsibility for balance and overall ensemble sound is delegated to the sound engineer.
Chamber music ensembles	Each musician is in part responsible for balance, time and timbre. Hence, the ideal situation will be that the performers perceive the ensemble's sound as a whole, with relatively high proximity to the ensemble sound in the auditorium.

Small jazz ensembles	The basic internal listening needs tend to be quite similar to the chamber music ensembles. However, the sound levels are typically much higher, which makes it more challenging to achieve sufficiently good listening conditions.
Choirs	Pitch information is critically important. Therefore, reflection support is required internally between all performers on stage. Precise intonation is challenging in a stage environment lacking reflection support.

3.2 The dynamic problem

In an ideal situation, listening conditions on stage are sufficiently good, so that no monitor systems are necessary. This is, however, not always the case. In the following, we look at typical dynamic challenges for a small ensemble performing improvised music. A description of what may be the most severe musical problem is given In (REF):

> *(…) some experienced jazz musicians and some similarly experienced sound technicians will agree that a monitor speaker system – unless used with skill and extreme carefulness – will have a tendency reduce a jazz ensemble's dynamic range significantly.*
>
> *In a situation with a, say, 3-6 piece band with too much return from the monitoring system, the band sound that the performers hear is no longer the sound and timbre of the ensemble; it is the sound and timbre of the ensemble plus amplification. One needs to be very aware of the musical challenges this creates. If sufficient care is not taken, one will probably end up in a situation where the performers have lost contact with the ensemble's "zero level", meaning the lowest dynamic level within their expression range. A typical consequence is that the lowest dynamic level gradually increases. Several of the readers will have experienced such gigs as a listener. When a genre depending on (also) dynamic variation is performed in a situation where the lowest dynamic level available appears to be a strong* mezzoforte*, there is a danger that the music will appear monotonous, and the music in general becomes much less interesting than it could have been under more suitable conditions.*

4 HOW TO DEAL WITH SUCH MATTERS - TECHNICALLY

A typical arena where these challenges are commonplace, will be on stage in a small to medium-sized music club. So, how should the monitoring system be used to address the problems discussed above?

- An overall initial goal should, in our view, be that the monitor system should compensate for the stage acoustics that are missing. This may appear somewhat vague, and the approach requires some skill and mental capacity on the technician’s side, but we have met quite a few people who are able to do this. The idea is that the monitor speakers produce a sound illuding what you will typically receive from the reflection patterns on an acoustically well-functioning small stage. From our experience, this approach works well, and is relatively easy to implement, for chamber music ensembles.
- With this in mind, wedges placed on the stage front will essentially be oriented in the wrong direction - from front pointing towards the musician.

- After initial level settings are reached, one should be very careful with individual adjustments of monitor levels for single instruments.
- Variable absorption should always be available.

5 HOW TO DEAL WITH SUCH MATTERS - MUSICALLY

In any stage environment, the musical ensemble may consider the following:

- Optimize placement on stage for internal listening.
- Start the sound check with no monitor speakers on. Observe carefully sound levels and internal listening, both with the loud and quiet musical examples.
- In general, variable absorbers (if available) should be tried out before activating the monitors.
- If it turns out that monitor speakers must be used, start with a setting for reflection compensation described in the previous section.
- When adjusting balance, ask for lower levels when possible.

6 CONCLUSION

In the music demonstration, we will try to illustrate some of the issues shown above.

It is clear that in many cases, a certain amount of monitoring is absolutely essential. However, in our opinion, the monitoring for acoustic ensembles should considered as an acoustic enhancement system, more than a traditional wedge-based monitoring system. Hence the direction of the reflections (=monitor sound), should be similar to the reflection directions that a proper stage enclosure would provide.

7 REFERENCES

1. S. Folkvord, Listening and dynamics – Some challenges with a highly absorptive stage enviroment, Procedings of the Institute of Acoustics, Vol. 45, Pt. 2. 2023, Athens