

EV Electro-Voice

RTS

DYNACORD

TELEX

**Bosch
Communications Systems**

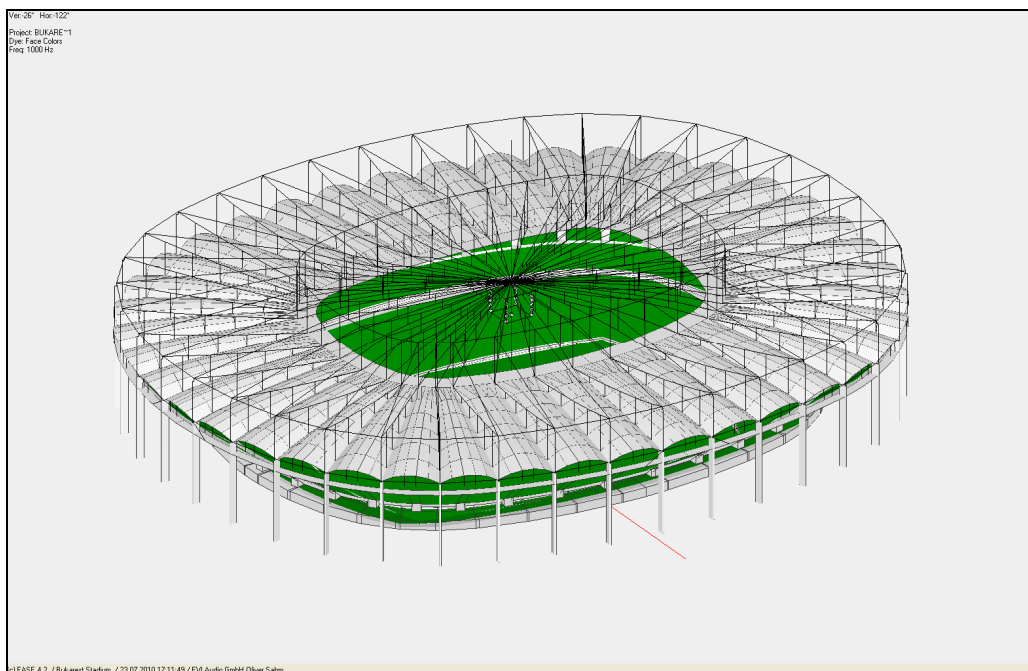
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16.08.2010

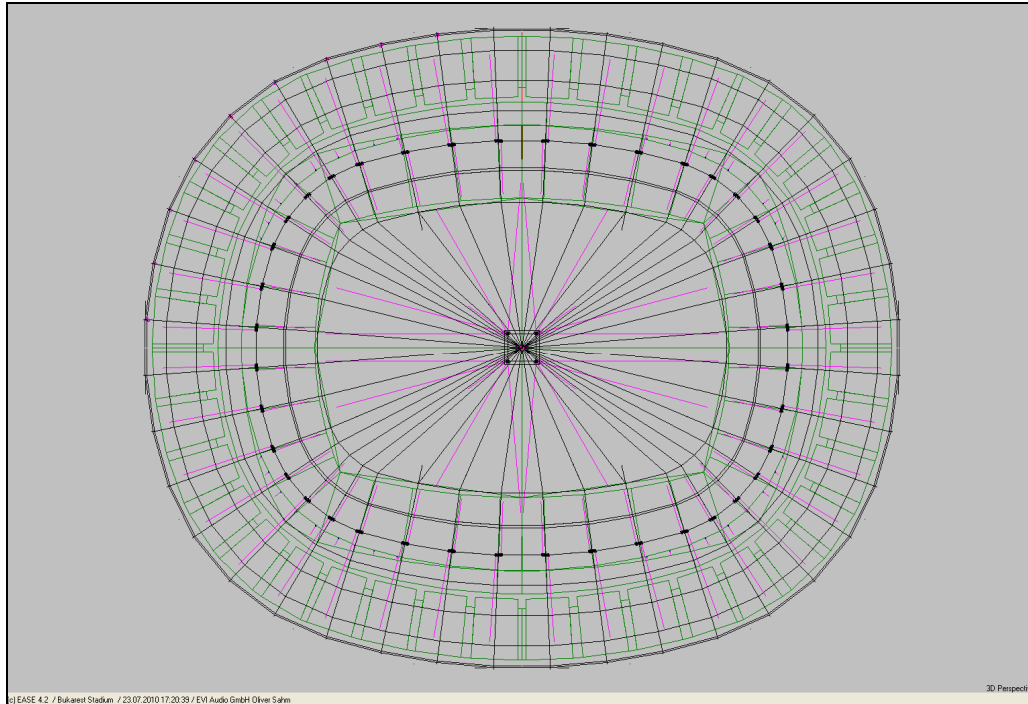
National stadium Bucharest

Main bowl sound system

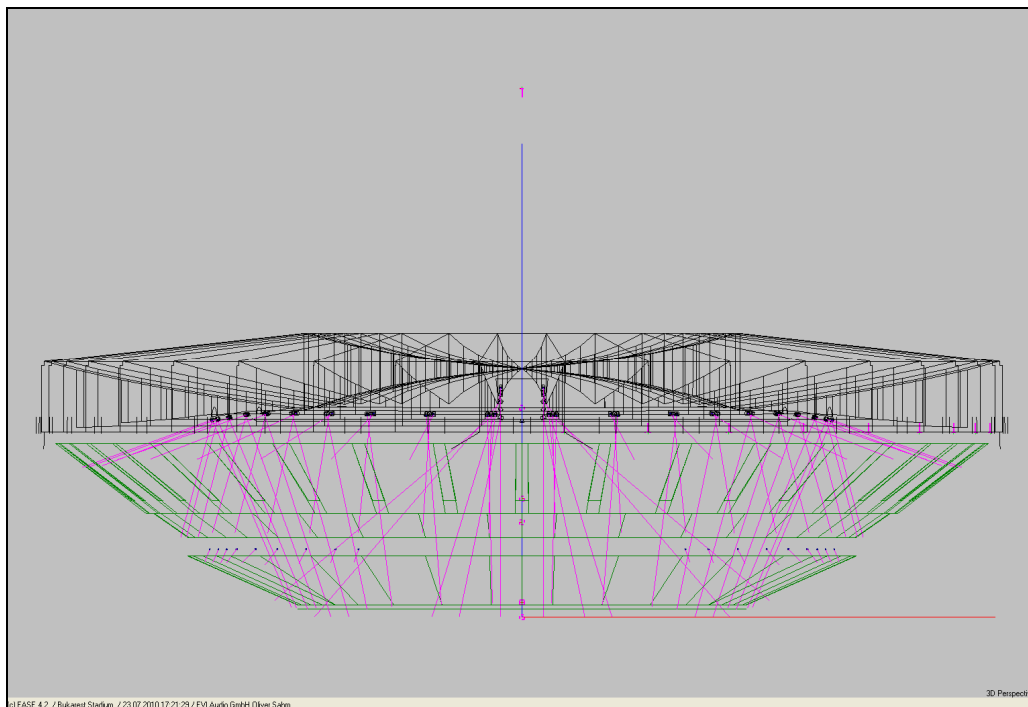


The stadium Bucharest was rebuild as 3D computer model in the software EASE.

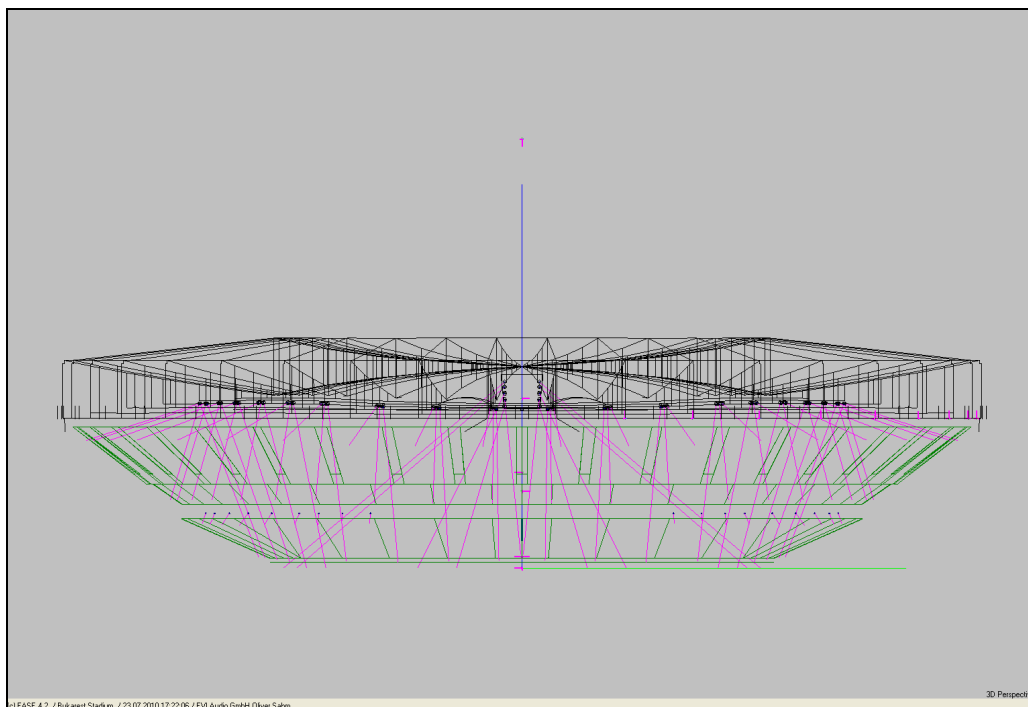
Seite 2 von 15



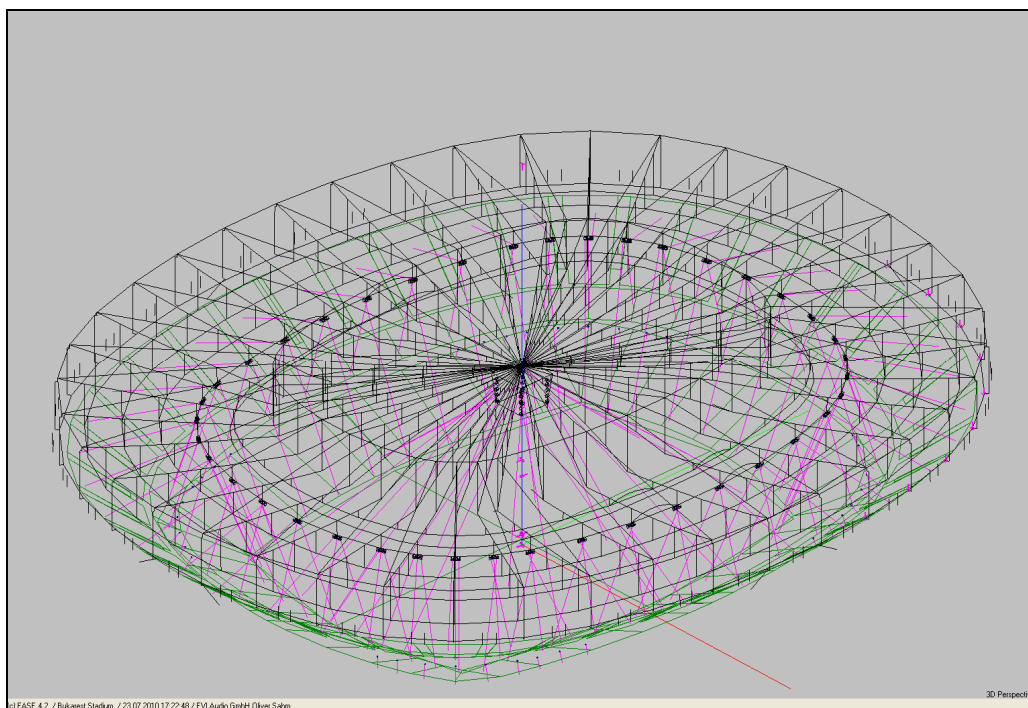
Groundview



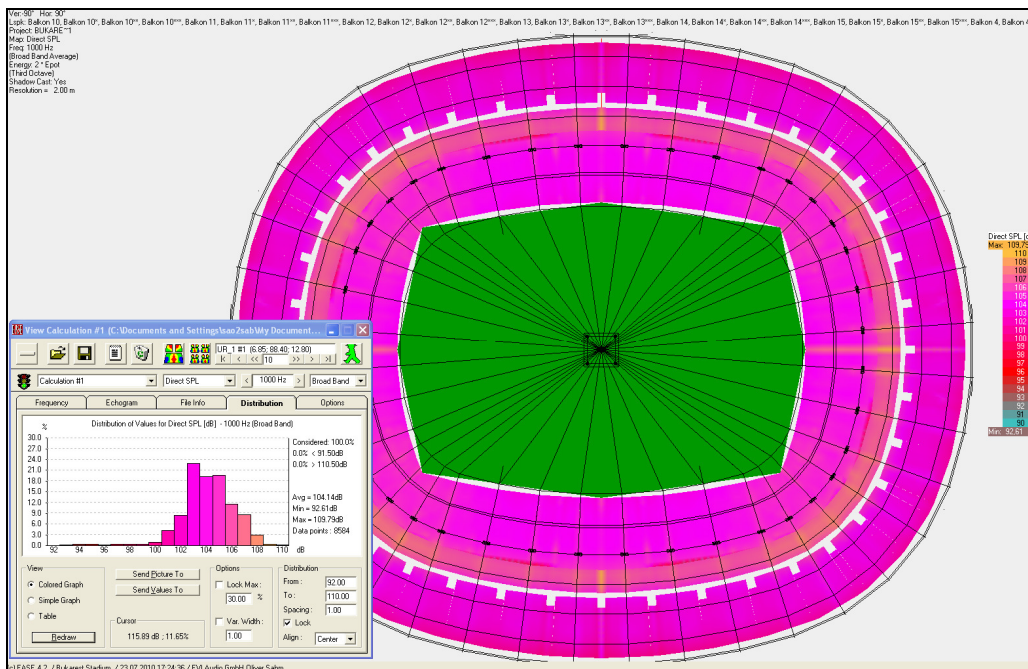
Cross section



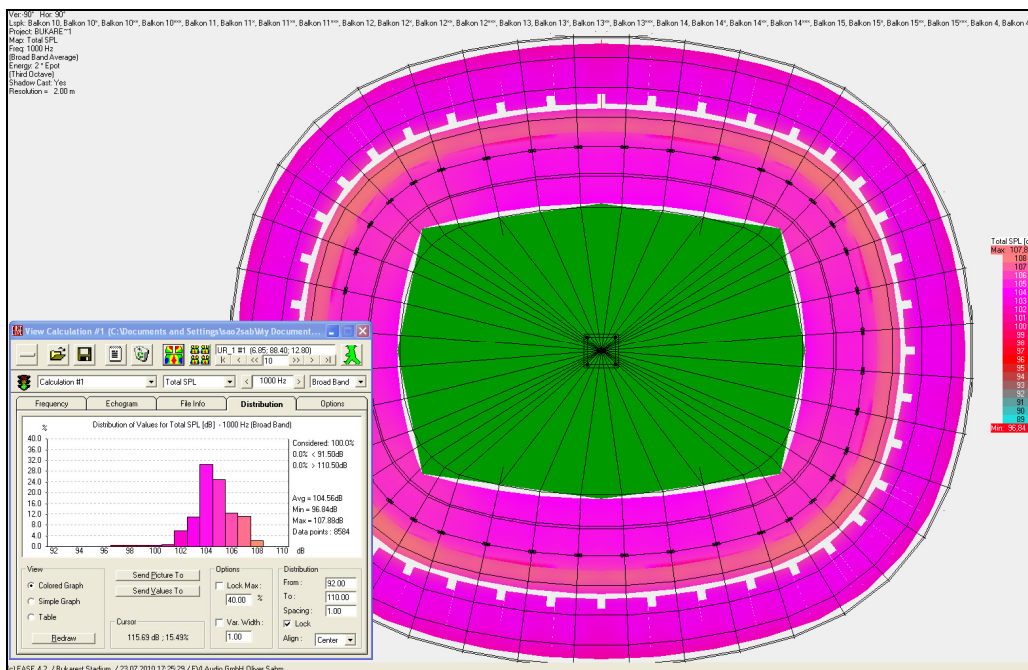
Length section



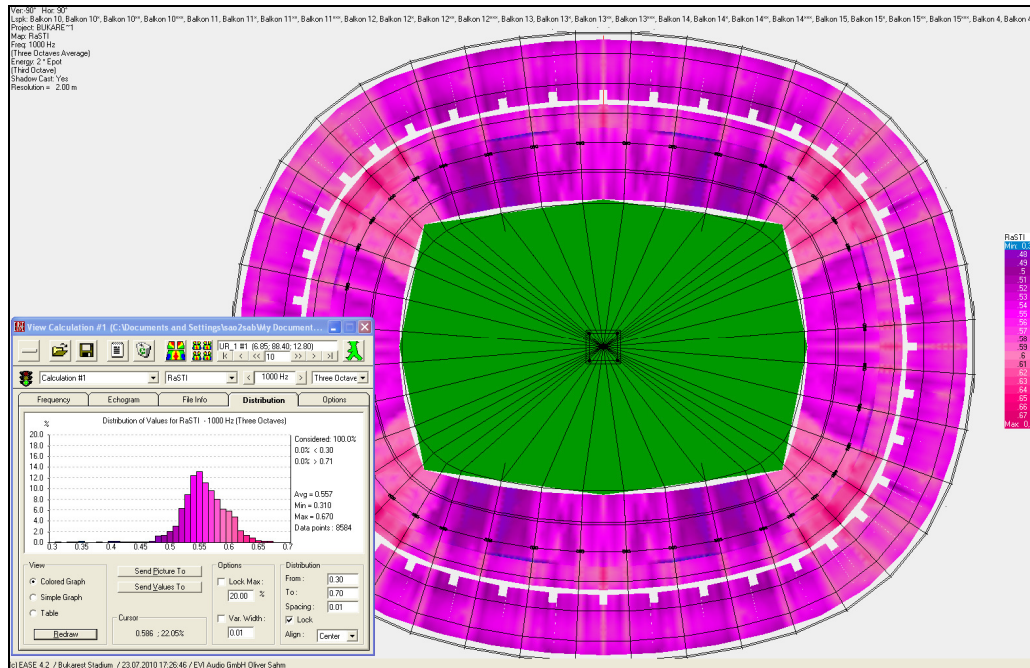
3D view



Direct sound pressure level, broadband

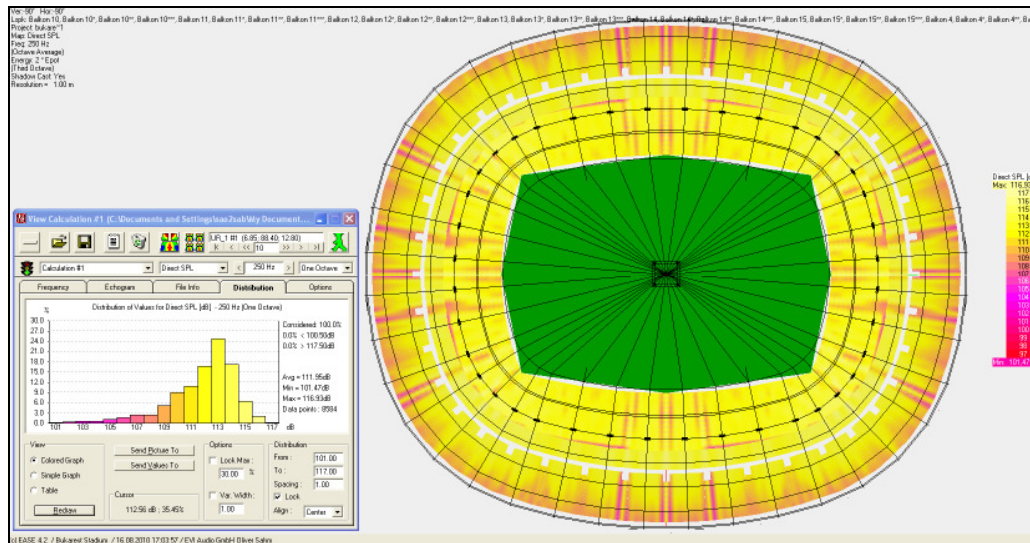


Total sound pressure level, broadband

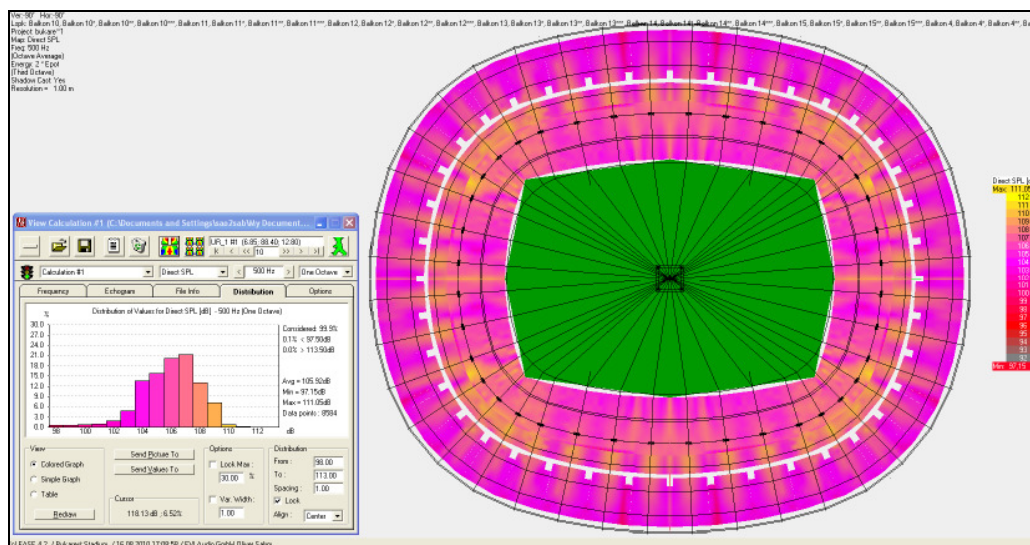


Speech intelligibility, 1000 Hz, three octaves

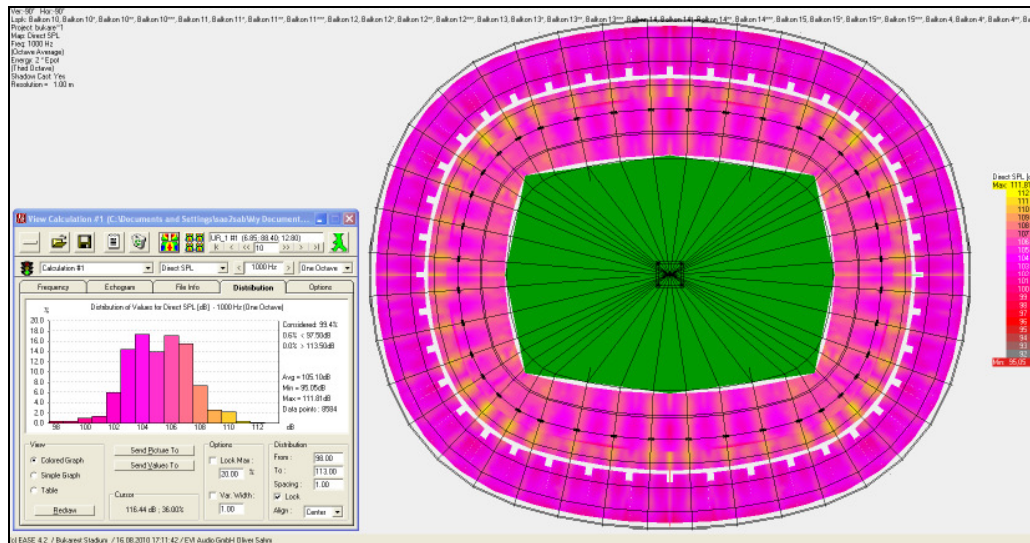
Results in detail are presented on the following pages:



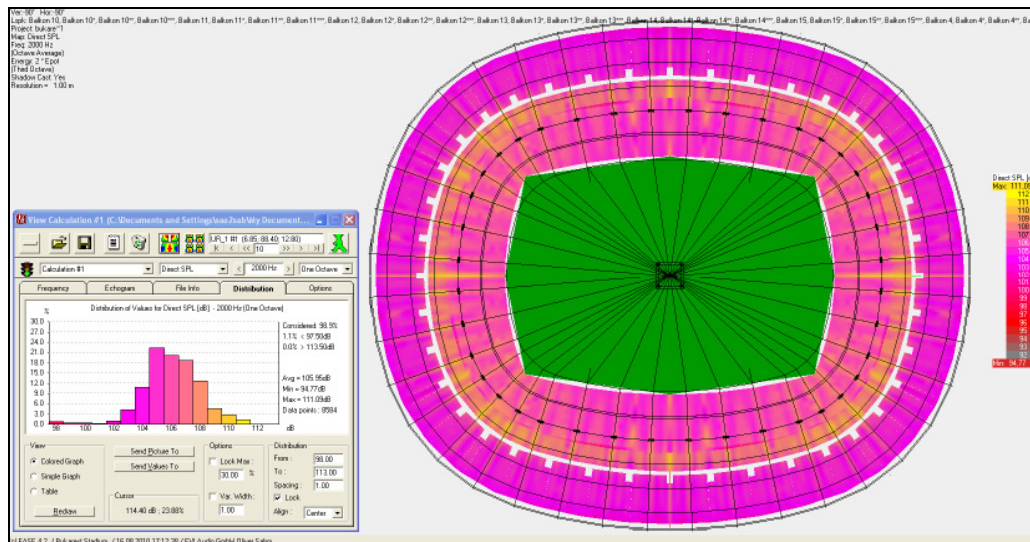
Direct Sound pressure level, 250 Hz, 1 octave



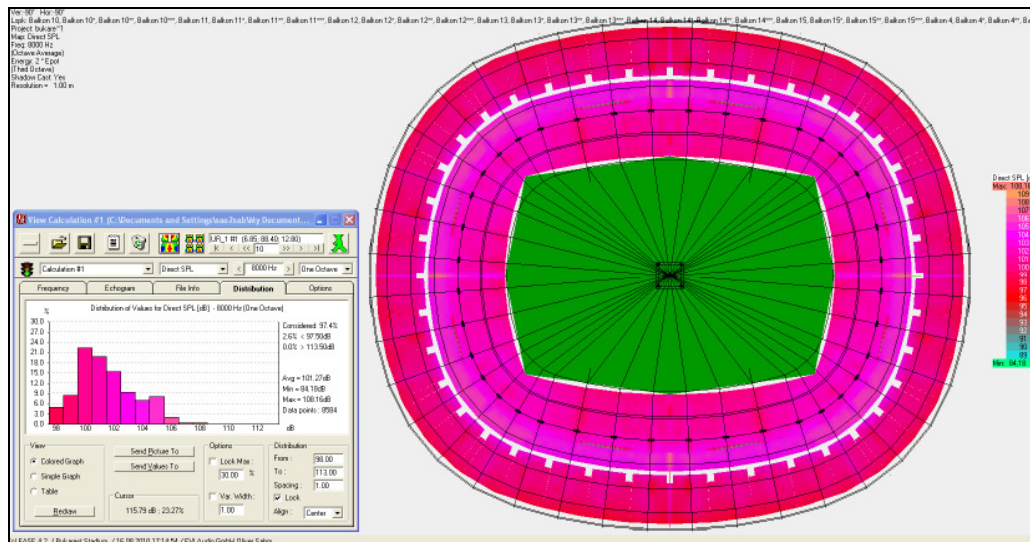
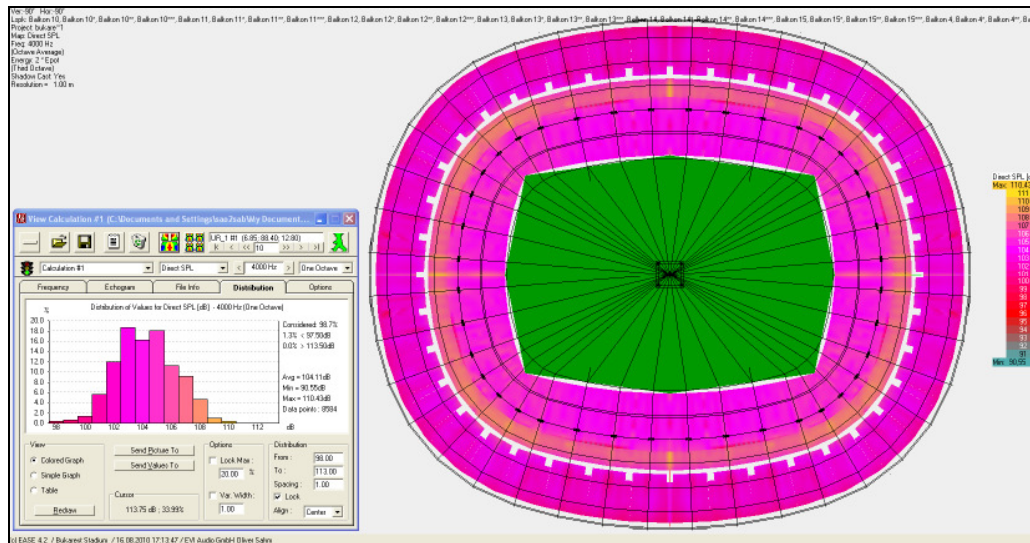
Direct Sound pressure level, 500 Hz, 1 octave

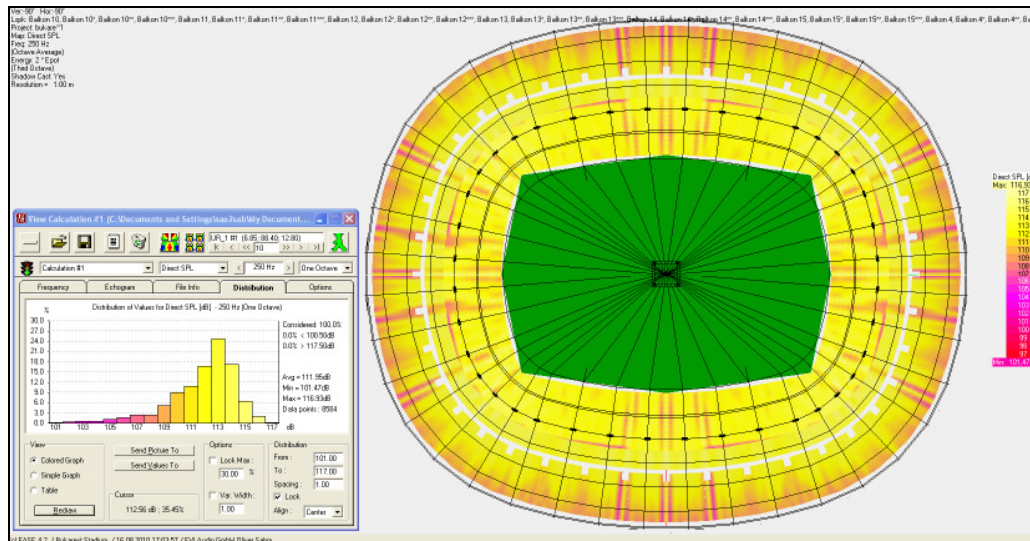


Direct Sound pressure level, 1000 Hz, 1 octave

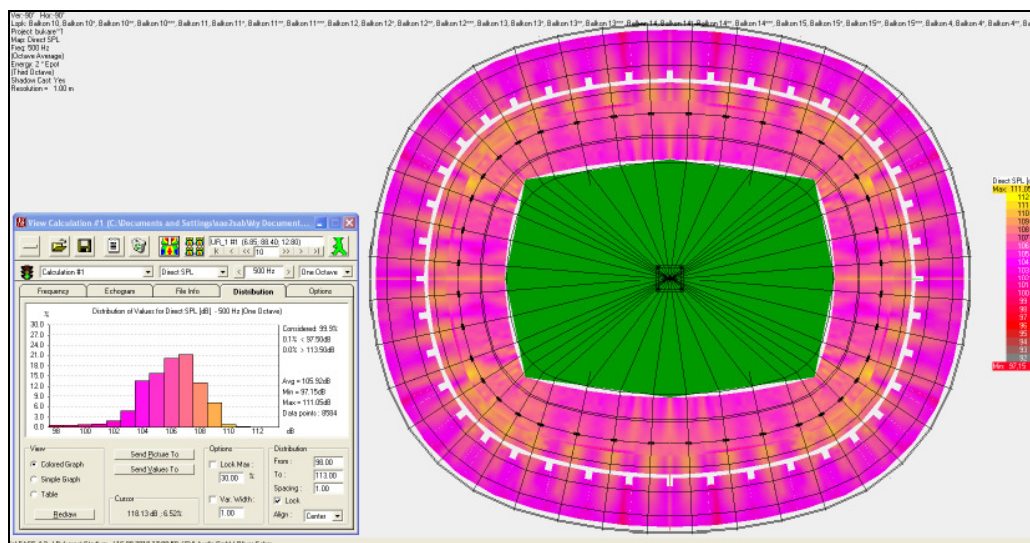


Direct Sound pressure level, 2000 Hz, 1 octave

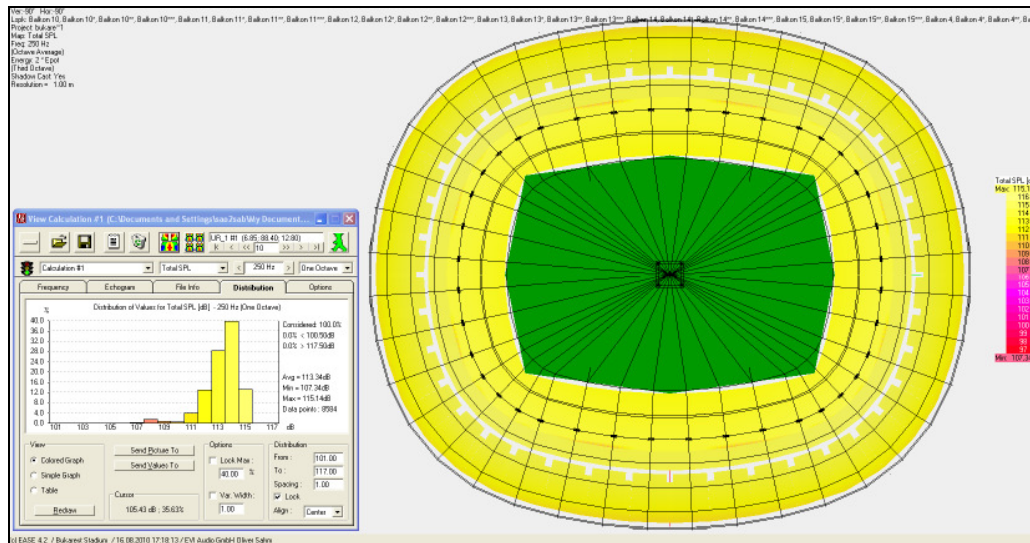




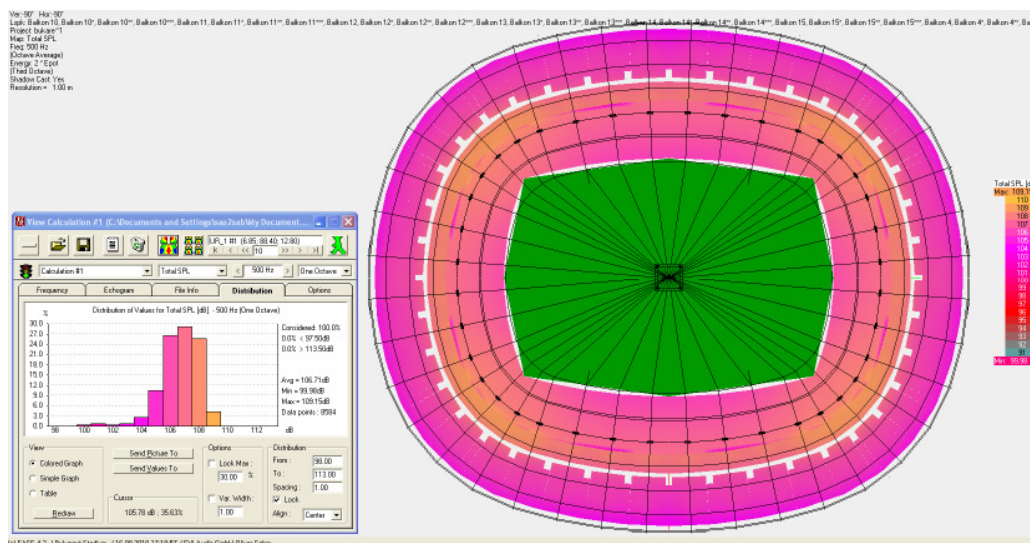
Total sound pressure level, 250 Hz, 1 octave



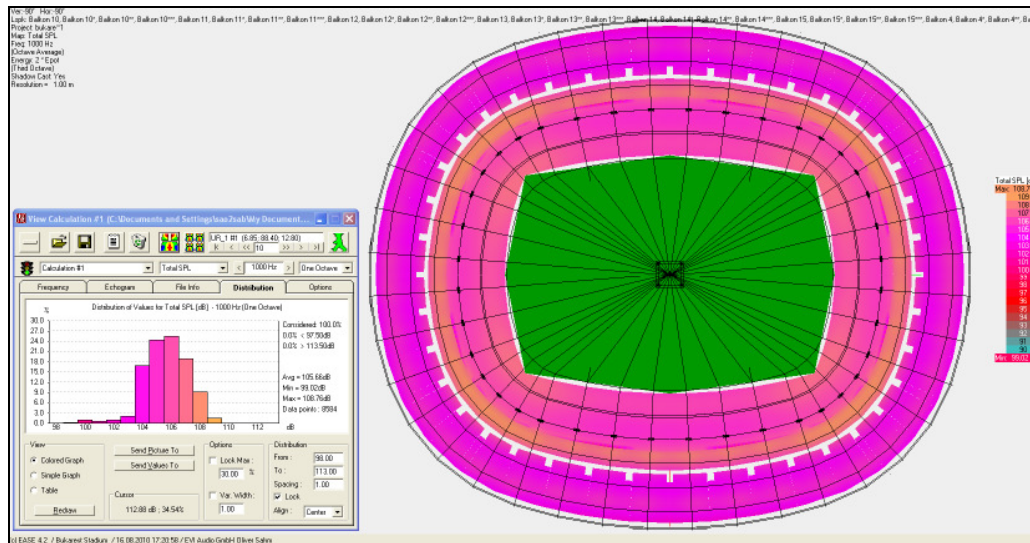
Total sound pressure level, 500 Hz, 1 octave



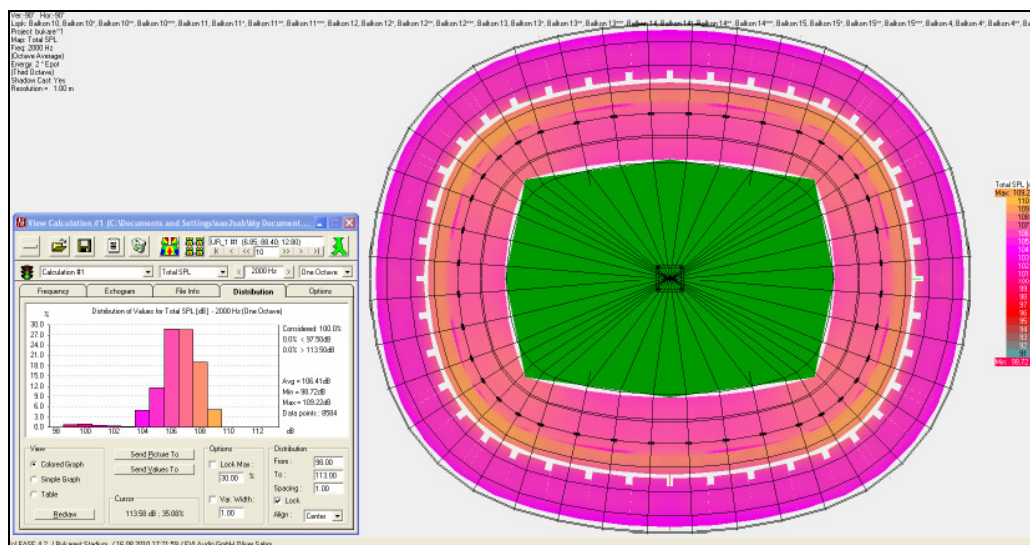
Total sound pressure level, 250 Hz, 1 octave



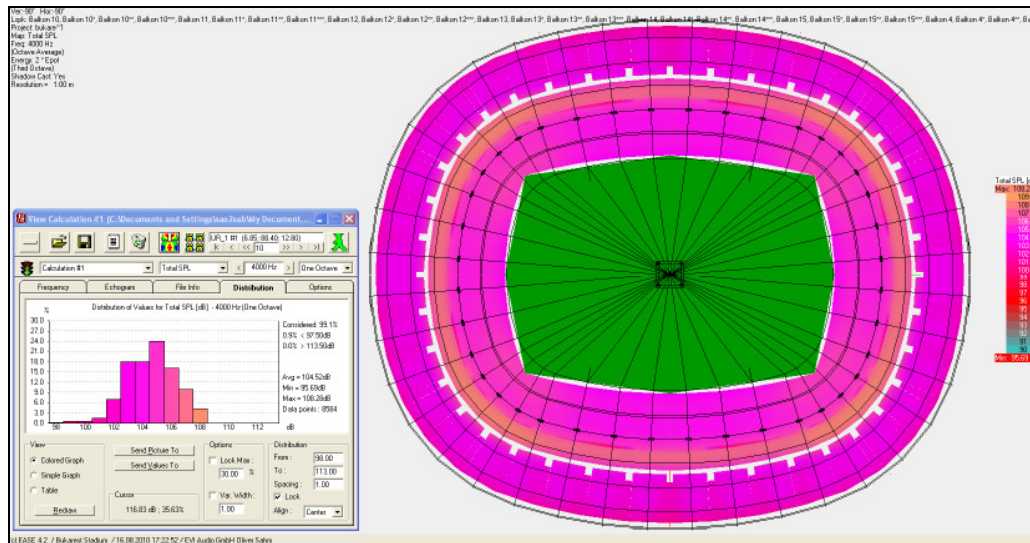
Total sound pressure level, 500 Hz, 1 octave



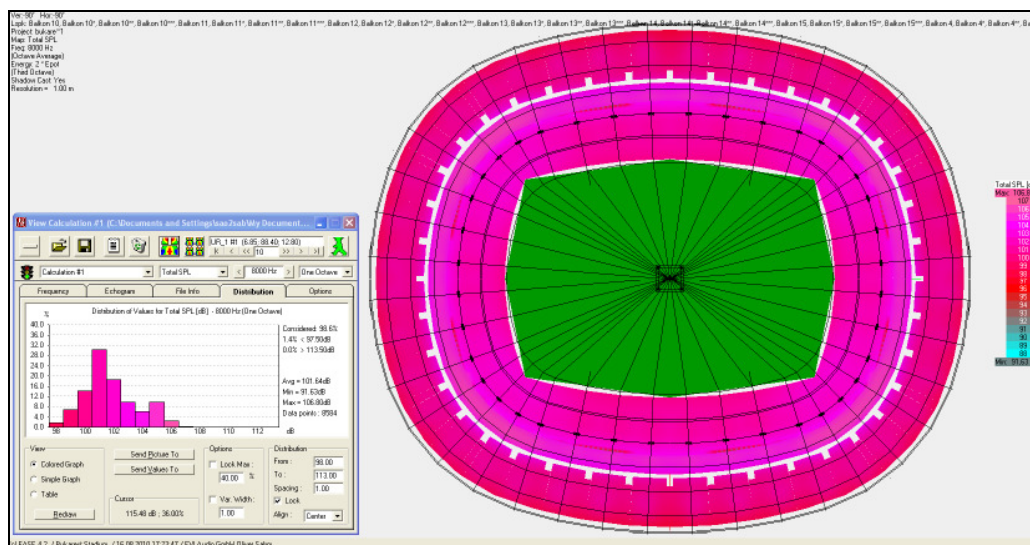
Total sound pressure level, 1000 Hz, 1 octave



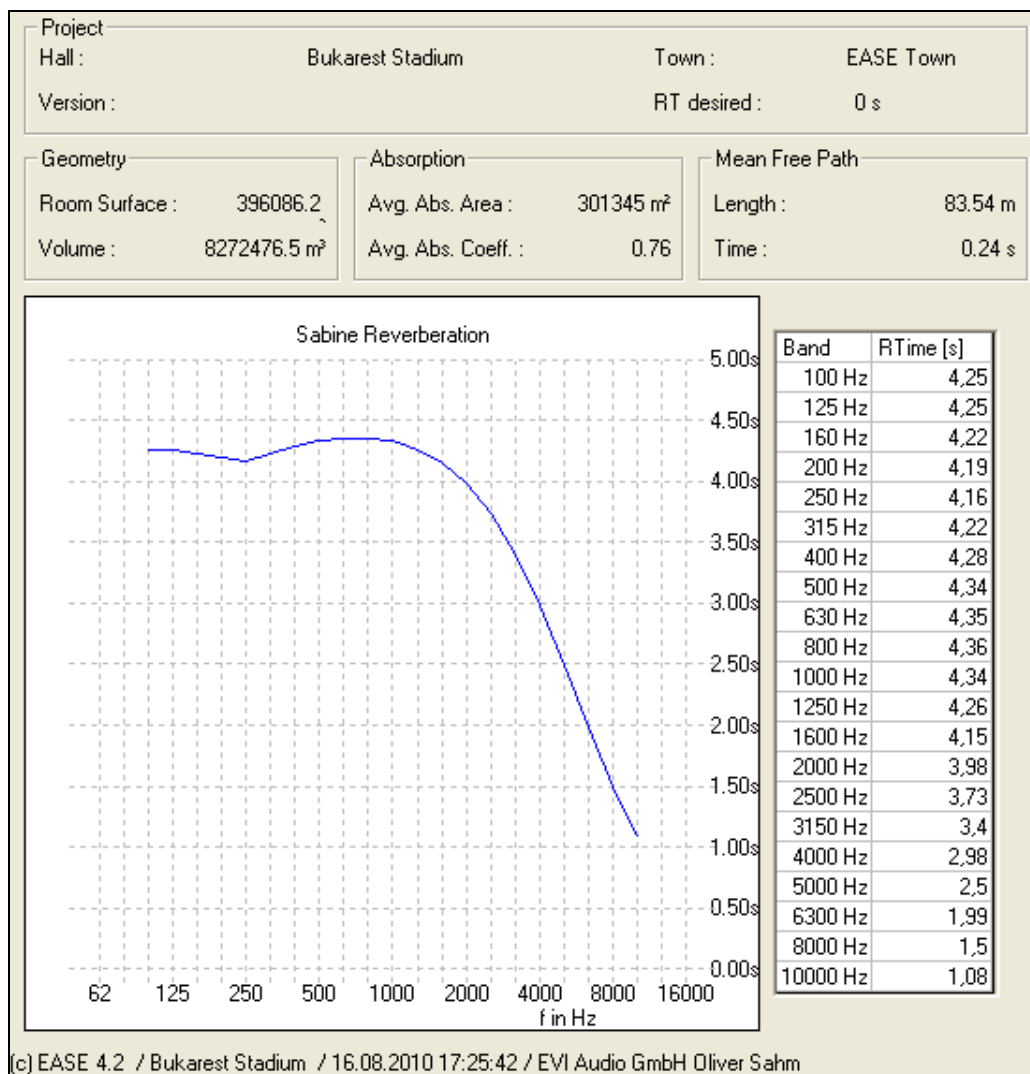
Total sound pressure level, 2000 Hz, 1 octave



Total sound pressure level, 4000 Hz, 1 octave



Total sound pressure level, 8000 Hz, 1 octave



The roomacoustic parameters used for the calculations, RT60, volume, statistic absorption

For all STI calculations the above shown reverberation time and a split time f 35 ms was used. All loudspeakers were powered with RMS power for long term operation and wideband signals.

Conclusions:

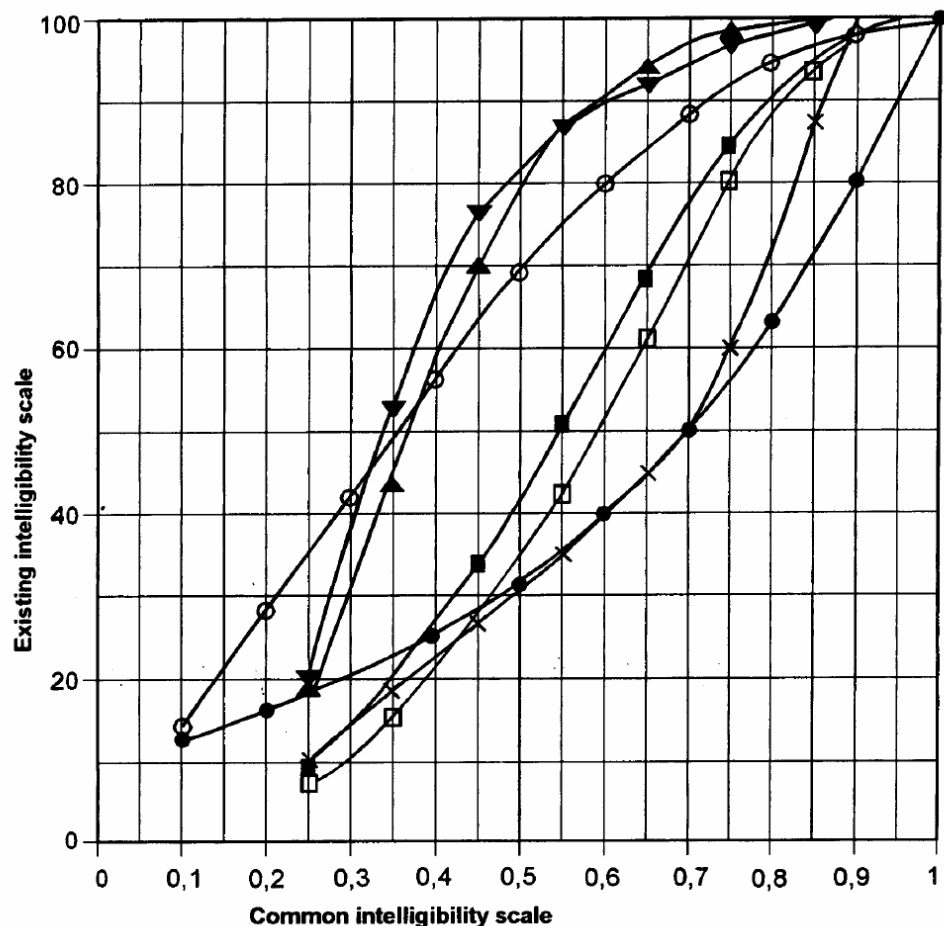
The sound system design is based on the tender design and uses coaxially hornloaded loudspeakers of the series Electro-Voice EVH along the front line in the roof.

Each group of loudspeakers consists of three loudspeakers providing even coverage in the vertical plane on the grandstand.

Additional to the loudspeakers in the roof, 21 loudspeakers in the central video cube can provide sound on the pitch itself and provide an acoustic sound source location in the center for announcements in combination with video displays.

The calculated sound pressure level coverage is very even and provides very good sound pressure levels of about 105 dB +/- 2 dB in combination with good STI values above STI=0,5.

Appendix: Speech intelligibility measures rating and comparison



IEC 403/98

- ▼ Phonetically balanced word scores (256 words)
- ▲ Short sentences
- Percentage articulation of consonants (100-(% Alcons))
- Phonetically balanced word scores (1 000 words)
- 1 000 syllables
- × Articulation index (AI)
- Speech transmission index (STI x 100)

NOTE – The marked points on the curves indicate the correlation values which were derived from published sources. See annex D, reference [5].

Figure B.1 – Conversion of existing intelligibility scales to the common intelligibility scale