Proceedings of the Institute of Acoustics

A NEW CONCERT HALL FOR COPENHAGEN

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1. INTRODUCTION

In 1993 the Copenhagen Municipality called for an open European Architectural Competition for a Concert Hall on the waterfront in Copenhagen. The position is prime but small, see fig. 1.

The winning prices were high £140.000, £50.000 to the winner. The complex is to house first of all an acoustic excellent Concert Hall, one of the best in Europe. Further an experimental opera scene, a symphony orchestra rehearsal hall, a music library, an activity courtyard, restaurants, and all the necessary supporting areas. In all a 13.000 m^2 nett area on a block of land of 10.500 m^2, through which a major distributing road must pass.

276 entries were judged of which nearly 25% were in English language. The highest placed english entry was by Chris Thurlbourne, E. Fasanya and S. Jensen, who got an honorable mention, (nearly the same team took second price in a cultur house competition in Greenland in 1992).

The declared winner was Henning Larsen, a well known Danish architect, whom you may know from the Compton Verney Opera project.

2. THE CONCERT HALL SITUATION I CPH.

Two well known Concert Halls exist in CPH. The Danish Broadcast Studio 1. and the Tivoli Concert Hall. Both are described in ref. 1.

A third hall "Odd Fellow" burned to the grown in 1991. And since CPH is to be the cultural city of Europe in 1996 it is felt, that now is the time to build.

A NEW CONCERT HALL FOR COPENHAGEN

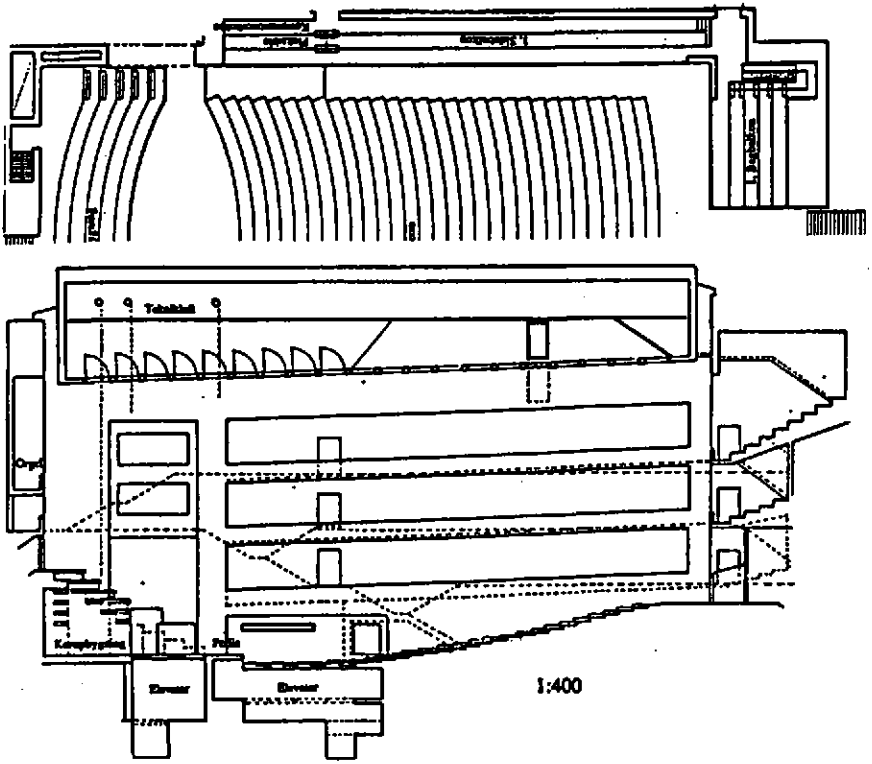
Oversigtskort, målt 1:25.000 / Location map 1:25.000

3. THE CLASSICAL CONCERT HALL.

The competition program stressed the acoustic desires strongly, a volume of at least 25.000 m^3 for an audience of 2.200 seats plus choir (200) and orchestra (100), and a strong early reflection pattern. As references were amongst others named Neues Gewandhaus, Leipzig, and Symphony Hall Birmingham. Especially the latter was hailed as a unic masterpiece by the musician representatives on the jury. Russel Johnson and A.C.Gade served as acoustic consultants to the jury. Although R. Johnson does not publicize measurable acoustic parameters it

was quite obvious from the program and from pictures of the Birmingham Hall, that the "Classical Concert Hall" concept would stand a good chance in the judging. In this case a width of 22 m, a length of 52 m and an expanded height of 22m to achieve the desired volume was adopted for the design. Fig. 2. shows a 1/2-plan and longsection of the winning entry. The program also called for a type of flytower and sidestage area that makes it possible to stage opera type performances but this without in any way to be to the detriment of the acoustics for symphonic music. So the Multipurpose Hall with variable acoustics and with priority of usage is in fact stil going strong.

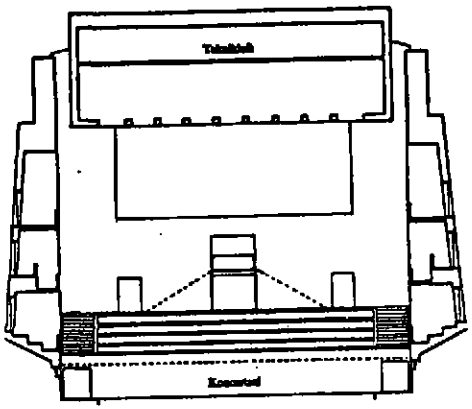
A concert hall on the waterfront in Copenhagen



A NEW CONCERT HALL FOR COPENHAGEN

The positive acoustic features of the "Classical Concert Hall" are, besides a narrow width and a great height, balconies along the side walls and an abundance of sound scattering devices (pillars, frames, ornamentation etc.). The balconies in this design are recessed into the walls as alcoves or niches, see cross section in fig.3, a feature also used in other Concert Hall designs, i.e. the Concert Hall in the Sydney Opera House. The sound diffusing elements are at this stage not detailed since they will develop with the development of the design.

Both acoustic advisers to the jury found that this project would with further development fulfil the demands to a Concert Hall of the highest quality.



Volume 26.300 m^3

H=22, B=22, L=52 m

Area 1600 m^2

podium 180/360m^2

aud. 1400 m^2

Seats 2200 (2500)

12m^3/pers.

0.7m^2/pers.

T = 2.3 sec.

year ?

4. INVESTIGATIONS

In the period since the price announcement in Dec. -93 it has been possible to start preliminary testing of the design with the ODEON room acoustic testing program. It was envisaged in the competition program that both computer based and scale models should be utilized to optimize the acoustics of the hall. So far only a single run has been performed since the final decision to build has as yet not been taken.

The ODEON program, which is also widely used in the UK, is a very strong tool in predicting room acoustic changes for different designs, whereas it is believed to be less accurate in absolute values than physical models are. Fig. 4 shows the grid response from this first test run for the parameters EDT and C. Over all acceptable values are obtained although it is a little disappointing that the general level of EDT values are on the low side, despite the big volume introduced.

In fig.5 SPL values are shown over the audience area. And although the levels are OK on the main floor and the lower balconies a dramatic decline can be observed on the upper balcony, an area which normally receives an abundance of level. The long section discloses the reason straight away. The upper balcony receives less energy due to the design.

5. CONCLUSION

If the go ahead is given for this project it is the plan to let the detailed design of the Concert Hall undergo a thorough room acoustic investigation involving both the ODEON program and a physical 1:10 scale model. It is believed that our knowledge of roomacoustics and testing accuracy with both computer and scale models are so developed, that there is no excuse for not building perfect concert halls, and designs should no longer be based upon witchcraft.

Jordan Akustik in cooperation with A.C.Gade will be responsible for the room acoustic properties, and we hope to be able to report on the outcome sometime in 1997.

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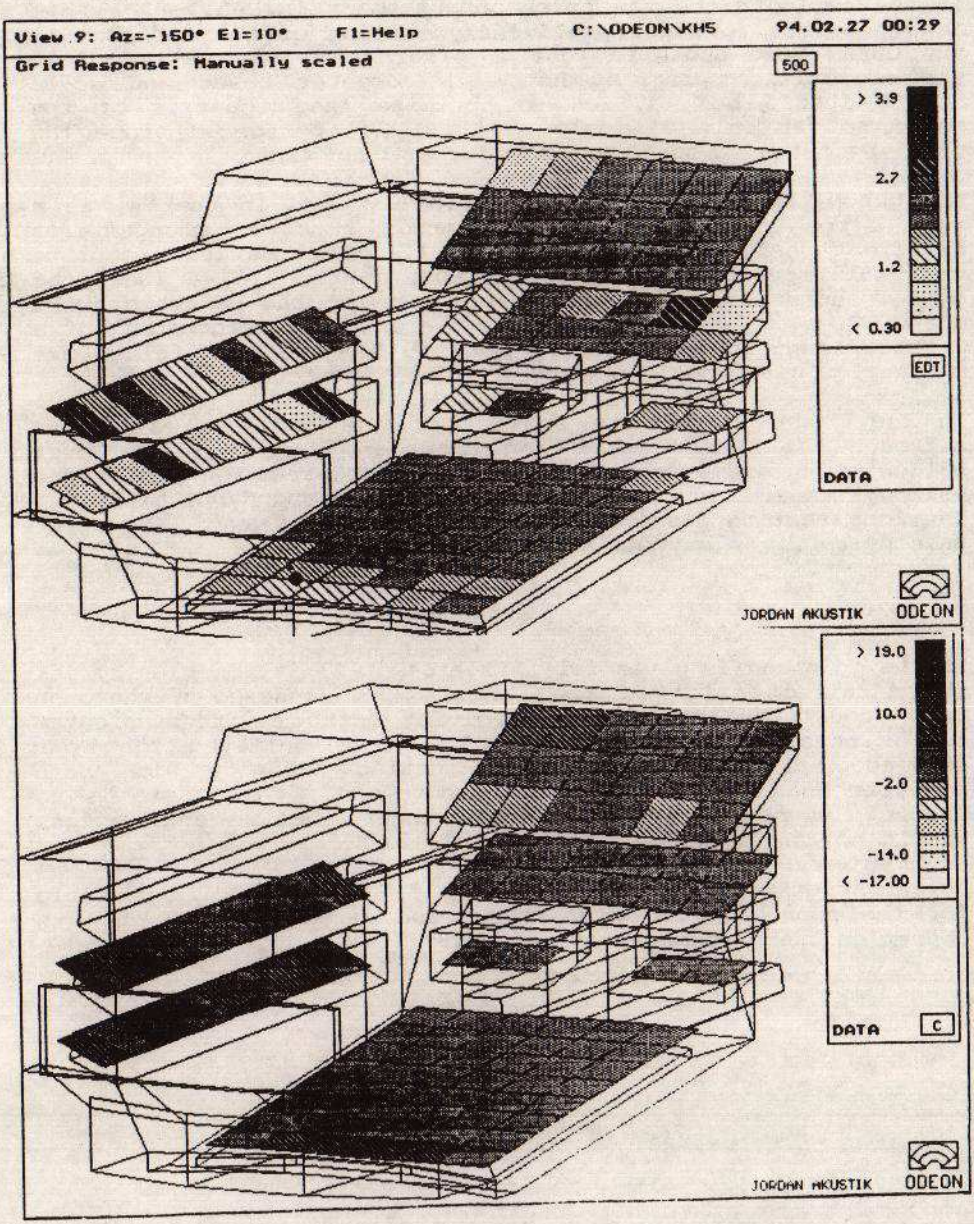

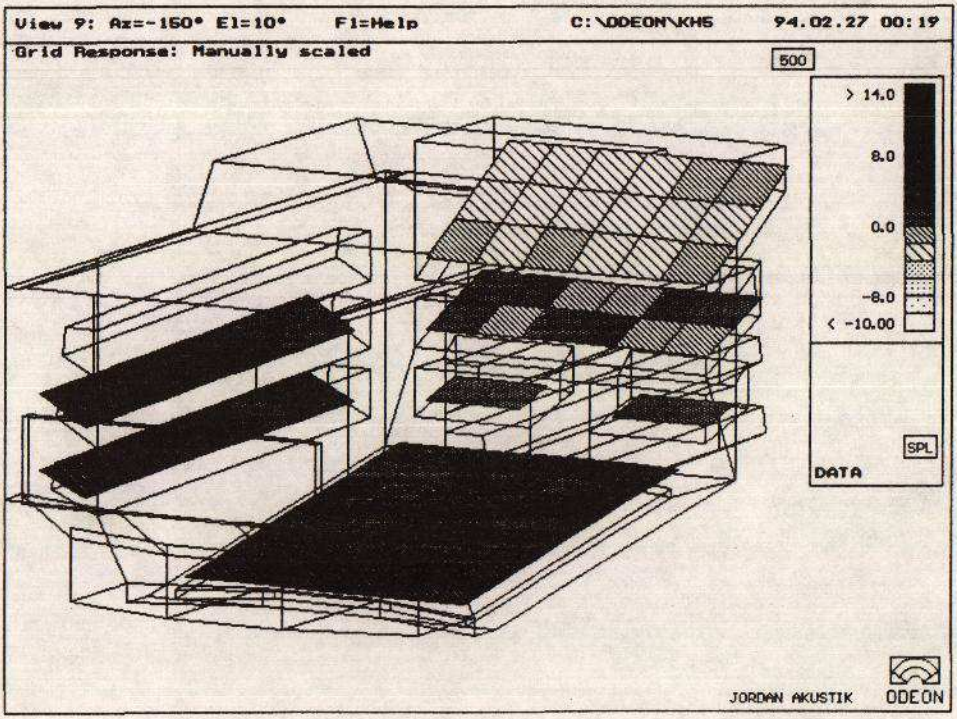

6. REFERENCES

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2. A.C.Gade "Acoustical Survey of eleven European Concert Halls" 1989.
3. V.L.Jordan "Acoustical Design of Concert Halls and Theatres" 1980.
4. M.Barron "Auditorium Acoustics and Architectural Design" 1993.