

Proceedings of The Institute of Acoustics

A PRELIMINARY ASSESSMENT OF THE Q.E.H. OLDHAM

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SUMMARY

The new Queen Elizabeth Hall in Oldham is designed to accommodate a wide range of activities. The acoustic and other compromises which produced a successful multi-purpose Hall are described.

1. INTRODUCTION

A recent paper at a meeting of the Institute of Acoustics described the design and subsequent operation of the Grange Arts Centre in Oldham. Just across the road from this Arts Centre lies the recently completed Civic Centre which incorporates a multi-purpose auditorium, now known as the Queen Elizabeth Hall. This Hall has been designed to complement that part of the social life of Oldham which is already filled by the Arts Centre.

This paper describes some parts of the search for the compromises that would satisfy the still-diverse applications envisaged for the Hall. It would be too much to claim that we got all the answers right; the difficulties are varied and manifold - economic, personal, semantic, cultural, and, of course, acoustic. If a safe path can be negotiated through this minefield of design hazards then a satisfactory working Hall will result.

2. DESIGN PARAMETERS

2.1 Multi-Purpose Planning

The list of possible functions for the complex considered by the Authority Working Party was almost global in content. However, a strong emphasis was

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placed on music including music of a large scale and serious character; thus symphonic, brass band, operatic and choral concerts all feature on the list, together with pop concerts, discotheques and other less serious events.

Speech also is included within a requirement for lectures, public meetings, school speech days and similar events.

Banquets, Charity Balls and Gymnastic Displays clearly enforced the necessity for an overall flat floor.

Conferences, Exhibitions, Committee Meetings, Wedding Receptions and the like pointed to the need for as many possible subdivisions of the available space as could be achieved.

It was hoped that an organ rescued from a local church would be included in the Hall and the rear of the stage houses an organ loft together with a space over the front of the stage. However the organ did not survive the gestation period and these spaces are not used.

2.2 Acoustic Aims

The fundamental acoustic conflicts of a multi-purpose auditorium were all present in this case: a need for an adequately long reverberation time with sufficient warmth and diffusion to support orchestral music; the impossibility of achieving good speech conditions in such an acoustic environment; the inevitable poor direct sight and hearing lines resulting from a flat floor.

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It was apparent at an early stage in the design that the provision of any means of varying the reverberation time - electroacoustic systems, movement of absorption, and, certainly, movement of major structural elements - was ruled out on economic grounds. However a speech reinforcement system was obviously essential, particularly to penetrate into the rear ground floor areas.

A compromise had to be effected and this was believed to lie in some limitation of the reverberation particularly for the low frequencies which provide so little speech intelligibility but mask the more important speech frequencies so effectively. A mid-frequency reverberation time of 1.5 seconds was selected as a design aim together with sufficient diffusion to ensure a good distribution of sound.

Had the organ in fact been successfully incorporated the acoustic design would have been uncomfortably dead for this use and this was accepted.

A low level of background noise was considered to be important and NR20 was proposed as a design aim. This was felt to be too onerous by the Mechanical Services Engineers who retained responsibility for this aspect of the design and the requirement was regretfully reduced to NR25.

3. REALISATION

The basic shape of the main auditorium is square in plan; however the scale is sufficiently great for the axial modal pattern to be well developed over the audible frequency range; in addition, under the more critical listening conditions the extra seating areas are coupled to the Hall to form highly absorbent openings.

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The Hall incorporates a stage recessed within a proscenium opening; an orchestra playing in the Hall has to be seated on this stage although stage extensions can be added to accommodate the larger orchestras which will bring part of the orchestra clear of the proscenium. A good orchestral sound can be produced on a stage provided adequately diffused conditions exist but in general the sound is not projected fully into the Hall.

The search for diffusing wall elements which would satisfy the architectural requirement for a monolithic appearance progressed through various stages from projecting control room or translation booth windows by way of added rectangular irregularities to the present triangular ridged decorative concrete panels; a pleasing surface texture and colour is applied to these panels in their construction by Faircrete.

The subdivision of the space is by movable partitions which jack into position.

The divided spaces work satisfactorily although some compromises were necessary and some acoustic insulation problems remain.

The volume per seat in the auditorium varies between 8 and 10 cubic metres per seat depending to what extent the additional seating areas are opened into the Hall.

In view of the hard surfaces that constituted much of the Hall considerable efforts were made to introduce additional absorption, particularly at low frequencies. These efforts were successful and the final reverberation curve in the empty auditorium is about 2.2secs. average at mid frequencies but falls to 1.8secs at low frequencies.

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Calculation indicates that the full auditorium may be slightly deader than the design figure.

4. CONCLUSIONS

In general speech with some assistance from the sound amplification system is clearly audible.

Music from small groups comes over well but large orchestras which stretch to the rear of the stage are not quite so well blended.

Acoustic separation between the various sub-divided spaces has not always satisfied the Management - perhaps because expectations were set too high.