

the bold extravagances of colour that panto demands . . . and are a joy for any lighting designer to have a chance to give.

For solo songs, remember the old dodge of a coloured full-body follow spot for the costume, with a tighter pale tinted one for the face.

I only ever do without footlights in panto if their presence will impair the sightlines to the dancers' legs.

Battens with heavy saturated, near primary colour are useful for toning the cloths, cuts and borders.

If the scenery is from stock, it will need increasingly saturated filters as it grows older.

The hangings, especially downstage, are usually too close to allow much scope for backlight, but downlighting is possible and often essential from bar one to get some depth into the shallow playing area downstage of the frontcloths.

There can be so many flying pieces that side lighting usually has to focus straight across rather than on a diagonal.

When the chorus are standing still (i.e. listening or singing but not dancing) it is often better to treat them as scenery for lighting purposes.

Gobo texture is virtually an essential component of the palette for shading over the joins and cut-off edges that appear as an inevitability of a hanging plot that has to favour scenery rather than lights.

The memory board, with its ability to do a quick recall of lighting states that include excruciating levels like "2½ double plus with a just a tickle more", has enabled the most unlikely spot bar focussings to make a painting contribution to the front cloths.

And please join me in shedding a tear for any pantomime unfortunate enough to have its principal boy played by a boy. (Even worse, one theatre this year is having its Mother Goose played by a girl: *is nothing sacred!*)

Aspects of the Acoustic Design at Plymouth

RICHARD COWELL

The acoustic design for the main auditorium at the Theatre Royal Plymouth emerged from an interesting range of influences — many of which are common to other projects, some of which are unique. The design development included some fundamental research, some use of new techniques and, of course, the application of established principles. This article describes some of the more interesting features of the acoustic design.

As many readers will know, the building, designed by the Peter Moro Partnership, is located adjacent to the Derrys Cross roundabout in the centre of Plymouth and contains two auditoria — the main theatre auditorium and a small studio theatre. The larger auditorium is a 1296-seat theatre, with a moving ceiling. The ceiling can be lowered to cut off the upper gallery, leaving 768 seats in the lower two tiers. These are linked by raised side stalls on one side, lending asymmetry to the lower auditorium.

The stage is brought forward into the auditorium with the front taking the form of three sides of an irregular octagon, each parallel to the seating arrangement in the auditorium. The forward part of the stage is a lift allowing scope for an orchestra pit.

Intended function of the auditorium

The auditorium was to be designed primarily as a major drama theatre to accommodate not only the local theatre company but also touring companies. Within the confines of achieving this requirement, the building was also to allow scope for as wide a variety of complementary functions — e.g. musical concerts of limited scale, opera/opera, cabaret/light entertainment — as possible.

Design Targets

The acoustic design targets were therefore set mainly for a drama theatre. However, to allow for the other functions (and bearing in mind that the acoustic needs of a concert hall are quite different from those appropriate for speech) some means of adjustment to the acoustics was necessary.

At the preliminary design stages the volume of the auditorium was low and it became clear that any substantial increase in volume was not compatible with the relevant financial restraints. Indeed, it was found that balconies would need to involve relatively deep overhangs to accommodate the audience. As a result, the volume per seat is very low, even for speech. Therefore, even if the ceiling were treated as a solid

construction which could be opened to include the volume above it, this resulting total volume was not enough to suit music. Options were therefore to consider (a) use of the fly tower volume, (b) use of reverberation enhancement using loudspeakers. The use of the fly tower was considered but the quality and timing of the sound returning from the tower was not sufficiently appropriate in itself to solve the problem. This did not mean that a contribution from the tower could not be helpful, and it has proved possible to take advantage of some of the reverberation in the tower, provided it is controlled. To avoid a 'booming' or 'ringing' tower during use as a theatre, it was necessary to introduce some sound absorption on a permanent basis. This took the form of permanent lining of the tower with exposed wood-wool panels. Being a touring theatre, reliance on fly tower contents alone to deaden the reverberation was not enough although the contents remain an influence on the feedback from the tower.

It therefore became apparent that music — particularly romantic music — was unlikely to sound well without an alternative form of reverberation control. At this stage it was decided to consider electro-acoustic reverberation enhancement. The Assisted Resonance (AR) system, born and bred in the Royal Festival Hall London (and subsequently used in a number of other halls in the UK and overseas) was considered to have the best track record and to be the most likely to succeed in the building. The system works on the basis that sound is collected by an array of resonators containing microphones, each dealing with a given bandwidth of the relevant frequency range (63–1303 Hz), and is amplified and fed back via loudspeakers in a manner which prolongs the decay of room modes and therefore prolongs reverberation.

Therefore, reverberation time targets were set on the basis that the natural room acoustics would suit drama. A reverberation time at mid-frequencies close to 1 second was intended with a very small increase at low frequencies. Assisted

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