# THE WINSTON CHURCHILL MEMORIAL TRUST OF AUSTRALIA

## Report by J Craig Brown
## 2003 Churchill Fellow

## The Gilbert Spottiswood Churchill Fellowship to study the design of Performing Arts Centres (PACs) overseas with particular focus on identifying international best practice in the provision of or the alternatives to fly-towers in PACs for Australian schools.

J Craig Brown, RFD, B Arch Hons, RAIA
Architect
McIldowie, Faithfull and Brown Pty Ltd, Architects
325 Flinders Lane, Melbourne 3000

phone 03 9629 8100
fax 03 9629 8155
e-mail jcb@mfbarc.com.au

## Index



## Annexures

# 1. Introduction

In the period 2000 to 2003, I assisted two schools - Ballarat Grammar (as the project architect) and St. Margarets School (as Chair of the Buildings Committee) - with the development of Client Briefs for the construction of new Performing Arts Centres (PACs). In both cases, the aim was to provide a venue to meet a vast number of needs within the school and to present an opportunity for the schools to contribute to their broader regional community.

The core requirements were for each PAC to be a venue for:

- assembly for the secondary school (Years 7-12) and occasionally the whole school (P – 12);
- music performances including choral, orchestral, concert band, brass band, soloist and ensemble performances;
- drama productions including the annual school play, musical and small-scale dramas forming part of the curriculum;
- classical and modern dance performances;
- lectures, speech nights and audio-visual presentations;
- school dances, fundraising dinner and other social gatherings; and
- examinations, information evenings, parent/teacher interviews, open days and art and craft displays.

As each of these uses had specific needs, the PACs therefore had to be designed to cope with the multiple purposes and to accommodate the various specific needs without compromising the overall design flexibility. In both cases, the requirement for a fly-tower, the large structure above the stage which houses scenery and other theatrical equipment, became difficult to justify in terms of the development of the client brief. In particular I became aware of the following issues:

- cost - fly-towers are expensive to build not only in terms of the structure and cladding but also in the resulting infrastructure costs, such as the smoke exhaust system, the fire separation system and the provision of stage rigging;
- environmental impact - Australian school campuses are typically located in residential suburbs which are usually composed of one or two-storey dwellings. Fly-towers, which are equivalent to six-storey buildings, are in most cases therefore incompatible with the environment surrounding a school campus. Consequently, attempts by schools to construct fly-towers have invariably led to delays and compromise in the progression through the town planning process;
- occupational health and safety considerations - because of the height of the space, the often complex mechanics and darkness in which backstage operators work, a fly-tower poses a significant number of risks that need to be considered prior to the construction of the facility; and
- acoustic quality - the acoustic performance of the PAC is likely to be compromised by the presence of a fly-tower.

As a result of my work on the Ballarat Grammar and St Margarets School PACs and my concerns regarding fly-towers, I undertook the Gilbert Spottiswood Churchill Fellowship for 2003 to identify international best practice in PACs specifically in the school context.

In particular I have considered the following issues:

- the historical reasons for the development of fly-towers;
- the educational objectives achieved in the drama teaching programme at a cross-section of schools in countries that share Australia's theatre traditions;
- the traditional and historic stagecraft that may provide valid alternatives to the fly-tower;
- the development of new technology to complement the use of the stage for school productions;
- best practice for addressing safety issues in schools; and
- the consequential adjustments to the planning of a PAC in response to the omission of a fly-tower in a multipurpose venue.

Although a PAC is, as I have demonstrated, a multipurpose venue, the focus of this report is on drama productions and drama teaching programmes, as it is these activities which are potentially the most affected by the absence of a fly-tower.

## 2. Acknowledgements

This research project could not have been undertaken without the generous support of the Winston Churchill Trust - helping Australians pursue excellence in their field of endeavour - and the bequest from the late Mr Gilbert Spottiswood. In addition I would like to acknowledge Bill Akers AM, who recently retired as the chair of the Arts Selection Committee, and my referees, Anita Forsyth-Gardiner, Chair of the St Margarets School Council, Stephen Higgs, Principal of Ballarat Grammar and Dr Robin Sharwood AM.

I am truly indebted to all the consultants, theatre directors and technicians, school principals and teachers who have warmly welcomed me and generously made their time and vast experience available to me on this study tour.

In particular I must acknowledge the contribution of Peter Hunt in Ballarat, Dr Helen McDonald in Berwick and Michael Holden in London, all of whom provided special encouragement at the earliest enquiries and signs of a thirst for knowledge.

I would like to thank my practice colleagues for their tolerance and support - Steven McIldowie, Judy Faithfull, Bruno Imeneo, Bowen Jessup and most of all Fiona Smith - and to pay special tribute to three members of my family - Judy Jessup, Geoff Snell and my beloved wife Suzanne Jessup.

This report is dedicated to George F. Mitchell LFRAIA, Architect and Mentor.

# 3. Executive Summary

Name J Craig Brown, RFD, BArch Hons, RAIA
Position Director, McIldowie Faithfull and Brown Pty Ltd, Architects
Address 325 Flinders Lane, Melbourne, Victoria 3000
Phone 03 9629 8100
Fax 03 9629 8155
E-mail jcb@mfbarc.com.au

### 3.1 Fellowship objective

To research international best practice in the development of school Performing Arts Centres (PACs) and in particular to consider the need for fly-towers in Australian schools.

### 3.2 Fellowship highlights

- meeting some of the world's leading consultants practising in the development of PACs and to have the time to listen to and consider their advice;
- visiting some of the world's leading specialist schools such as the Royal Academy of Dramatic Arts, the Yehudi Menuhin School and the Juilliard School;
- visiting a selection of new and vibrant centres of excellence that serve a community need for PACs, including the New Hampstead Theatre, Le Phenix Theatre and the Chan Centre;
- assessing a broad spectrum of school facilities to form a cross-section of the wealthy, the less advantaged, the established and the recently-formed schools that are delivering performing arts programmes that are meaningful benchmarks for Australian schools. This interaction included meeting the gifted and committed staff who run the teaching and provide the management of these facilities;
- reviewing new and developing technology at centres of excellence such as Theatre du Chateau and to meet the designers who are leading the field in the use of this technology; and
- assessing established and traditional solutions that provide viable alternatives to the fly-tower, in particular through the Lido de Paris, research into Georgian theatres and the inestimable assistance of the curator of the Theatre Museum.

### 3.3 Key findings

The Fellowship helped me draw a number of conclusions regarding PACs, chief among which are five reasons why I would recommend **against** the construction of a fly-tower for most school PACs:

- the trend is toward a series of smaller and more intimate drama and musical productions in the school curriculum with limited time and resources for elaborate stage productions;
- new technology and traditional stagecraft provide a range of solutions for alternatives to the use of a fly-tower for school PACs;
- the cost of operating a PAC, due to rising safety standards and increasing costs of highly-skilled staff, will restrict the viability of schools operating a fly-tower;
- there are higher priorities for school PACs including a flexible stage floor, variable seating capacity and movable proscenium; and

- the desire for community use of a school facility will depend generally upon a low cost being passed on to user groups, which is in conflict with a high capital cost of a centre and the staff level required to use the facility.

### 3.4 Dissemination of findings

It is my role to offer to school communities in Australia at the level of the school board and management team the benefit of this research, and the deductions that are being drawn from the Fellowship.

I propose to extend to the Association of Heads of Independent Schools of Australia (AHISA) access to this report through their internet site and to make time available to respond to enquiries from schools that are considering a new facility or updating an existing centre, to comply with the community expectations and safety standards now on our horizon.

I also propose to apply the experiences of this overseas travel to the two projects on which I am currently working.

My aim is to make the provision of high-quality multi-purpose PACs more accessible to schools so that children can learn and grow through the performing arts. This can be achieved, I believe, through effective cost management, removal of town planning impediments and raising of safety standards.

The Royal Australian Institute of Architects and similar professional associations for electrical, mechanical and structural engineers and the international associations of theatre consultants also provide valuable forums for disseminating the findings of this report.

### 3.5 Research

Further research is required into areas such as the safety of lighting catwalks and the matching of flexible solutions for schools to the perceived traditional solution to stagecraft, and further development is required for the successful integration of new projection technology into school PACs.

J Craig Brown
January 2004

# 4. Programme

### 4.1 United Kingdom: 6 - 12 October, 2003

| Organisation | Address | Contact | Comments/ Highlights |
|---|---|---|---|
| Society of Theatre Consultants and Association of British Theatre Technicians | 47 Bermondsey Street, London | | |
| The Theatre Museum | 1E Tavistock Street, London | Dr James Fowler, Curator | Access to an extraordinary library and its wonderful custodian |
| New Hampstead Theatre | Eton Avenue, Swiss Cottage, London | Jon Titcombe, Production and David Tuff, Technical | Tour of all parts of this new and skilfully-designed theatre |
| Theatre Projects Consultants | 3 Apollo Studios, Charlton Kings Road, London | David Staples, Director | An extraordinary perspective view of theatre design and international best practice |
| Tim Foster Architects | 1 Purley Place, London | Tim Foster, Director | Review of Dulwich College, Cheltenham Ladies' College, Tricycle Theatre and St Paul's Boys School |
| Royal Academy of Dramatic Arts (RADA) | 62-64 Gower Street, London | Neil Frazer, Senior Instructor Technical | Review of the three performance spaces at RADA and the teaching programme of theatre technicians |
| Players Theatre | The Archers, c/o 21 Woodfield Road, Thames Ditton, Surrey | Dominic Lefoe, former Director | Review of the tricks of the stage from one of its characters |
| Theatres Trust | 22 Charing Cross Road, London | Peter Longman, Director | Review of Normansfield Theatre and a network of contacts for further research |
| The Arts Team at RHWL | 133 Long Acre, London | Suzie Bridges, Associate | Review of Wells Cathedral School, Gresham's School and Sadler's Wells |

| | | | |
|---|---|---|---|
| Michael Holden Associates | 17 West Heath Drive, London | Michael Holden, Director | Review of Woldingham School, Derry Theatre, Kingston Theatre Trust and Cleves School and an insightful, hands-on approach to theatre design issues |
| The Globe Theatre | Southbank, London | | Tour of this reconstructed landmark - the source of many theatre traditions |

### 4.2 United Kingdom: 13 – 20 October, 2003

| Organisation | Address | Contact | Comments/ Highlights |
|---|---|---|---|
| Theatre Royal | Bury St Edmunds, Suffolk | Colin Blumenau, Director | Review of this unique Georgian theatre and the needs of a director/actor on stage |
| ACT Theatre Consultants | The Old Wood Mill, Church Lane, Madingley, Cambridgeshire | Chris Baldwin, Director | Review of Tally Hoe, Mwldan, Wales, and a broad range of clever technological solutions |
| Dulwich College | Dulwich Common, London | Poly-jane Mason, Theatre Manager | Inspection of facility and understanding of an excellent drama programme |
| The Yehudi Menuhin School | Stoke d'Abernon, Cobham, Surrey | Nicholas Chisholm, Principal | Review of proposed facility and tour of this international best practice school for music |
| Worth School | Turners Hill, West Sussex | Nick Connelly, Drama Teacher | Review of drama studio and music school |
| Woldingham School | Marden Park, Woldingham, Surrey | Philip Walton, Bursar and Roy Brown, Technician | Review of teaching programme, the outstanding Millennium Auditorium and the operation of the facility |
| Cleves School | Oatlands Avenue, Weybridge, Surrey | Linda Wright, Bursar and Sue Croft, Principal | Review of the facility and an inspiring story of achievement |

### 4.3 France: 20 - 24 October, 2003

| Organisation | Address | Contact | Comments/ Highlights |
|---|---|---|---|
| Theatre du Chatelet | 2 rue Edovard Colonne, Paris | Denis Curty, Production Manager | Review of their highly sophisticated technical management of the fly-tower and stage for opera performances |
| Lido de Paris | 116 avenue des Champs Elysées, Paris | Jacques Babando, Design Director | Review of the operation of a complicated musical production within a compact building envelope |
| Theatre Le Phenix | Boulevard Harpignies, Valencienne | Lew Bogdan, Director and Philippe Reinhalter, Senior Lighting Technician | Review of two new multi-purpose spaces in this vibrant regional centre for the performing arts |

### 4.4 United States: 26- 28 October, 2003

| Organisation | Address | Contact | Comments/ Highlights |
|---|---|---|---|
| The Juilliard School | Lincoln Center, New York | Kathy Hood, Head of Administration; Michael Kahn, Director of Drama; and J B Barricklo, Technical Manager | Review of the drama teaching programme, the three spaces used for performances and insight into the operation of the premier auditorium used for teaching music and opera at the school |

### 4.5 Canada: 29 October – 1 November, 2003

| Organisation | Address | Contact | Comments/ Highlights |
|---|---|---|---|
| Collingwood School | 70 Morven Drive, West Vancouver | Jim Burnett, Principal | Review of drama studio, teaching programme and concept design for their new facility |
| The Chan Centre | Crescent Road, Vancouver | Andrew Riter, Senior Lighting Technician and Jay O'Keeffe, Senior Sound Technician | Review of the two major spaces and an appraisal of the technical performance of the spaces in this spectacular new facility |
| Norfolk Glenlyon School | 801 Bank Street, Victoria, British Columbia | Barbara Emmerson, Principal and Judy Treloar, Drama Teacher | Review of drama studio and the vital and inspired teaching programme |

### 4.6 The Australian network

The following schools have kindly assisted in the research phase of this project:

Camberwell Girls Grammar School, Melbourne
Mount Scopus College, Melbourne
Carey Grammar, Melbourne
St.Phillips College, Alice Springs
Ivanhoe Girls Grammar School, Melbourne
Hales School, Perth
St Mary's College, Perth
Yeshivah College, Melbourne
Newhaven College, Phillip Island
Camberwell Grammar, Melbourne
Westminster School, Adelaide
Walford Anglican School for Girls, Adelaide
Founders Hall, Ballarat
Cardinia Cultural Centre, Pakenham

and the many schools in the Association of Heads of Independent Schools of Australia (AHISA) network which have contributed advice and comments by e-mail.

The following consultants have kindly contributed to the research phase in Australia:

David Bird, Director, Vision Design
Denis Irving, Director, Entertech
Andre Tammes
Peter Dale and his team of special advisors to Ballarat Grammar

# 5. Origin of the fly-tower

The first fly-towers appear to have been constructed at the Flemish Theatre in Brussels in 1887 and the Theatre Royal in Leicester in the following year. It is appropriate to revisit the reasons for their being built and to consider the relevance today of the factors that led to their construction in schools.

### 5.1 Hanging scenes

Theatres in the late nineteenth century hung large hand-painted canvas drapes to create scenes or backdrops for the action on the stage. It was desirable for these drapes to be hung rather than folded so as to maintain the fabric, reduce the risk of damage to the artwork and make storage of sets easier.

### 5.2 Fire

Stage lighting at this time was by gas lamps and buildings were generally of timber construction. As a result, the risk of fire was significant. The construction of a fly-tower facilitated the introduction of a fire curtain - a lead-based panel which separated the audience from the stage. By 1896, the London County Council had introduced requirements for all theatres to have fire curtains to address this safety issue.

### 5.3 Labour

The theatres into which these fly-towers were introduced were commercial enterprises operated by theatre managers. The cost of labour required to change scenes was a significant part of management expenses. The flying of sets (or the lowering and raising of the hanging scenes stored high above the stage in the fly-tower) was considered a labour-saving and therefore cost-cutting strategy.

### 5.4 Scenes and wings

From the 1860s the trend had been toward the preparation of more elaborate and complex scenes. This was a cultural trend that saw the actor continue to evolve from the freelance entertainer in the courtyard of an inn to a recognised performer in a purpose-built venue. These venues, however, had little space for storage and no wing space beyond the width of the auditorium.

### 5.5 Mechanics

The shafts and drums for the operation of the stage were constructed of timber, making them heavy and cumbersome to operate. It was not until the mid-1870s, at the great opera houses of Europe (Paris Opera House in 1875 and the Opera House of Dresden in 1878), that iron was first used in the construction of parts of the stage mechanics and the stage structure.

### 5.6 Density and grandeur

The buildings in the neighbourhood of the theatres in the late nineteenth century, such as London's West End, were a mixture of construction methods, materials, shapes and sizes. Usually, the grand opera houses were the pinnacle of the cultural achievement of the society and duly constructed on a grand scale.

### 5.7 Schools today

The environment into which we are considering the construction of a fly-tower is quite different to that of the late nineteenth century in the following ways:

- set construction materials, including the fabrics and the paints used for scenery, are technically advanced;

- backdrops are not restricted to two dimensional 'scenes'. Electronic technology, such as liquid crystal displays (LCD), is increasingly employed in staging a play;

- fire hazards are better managed, for example through early detection, selection of non-combustible construction materials, incorporation of effective egress pathways, and installation of sprinklers, hydrants and drenching infrastructure to douse fires. (It is worth noting that the Building Code of Australia recognises that a stage of less than 300 square metres in a school PAC does not require a fire curtain.);

- students can be a source of labour in school PACs, provided the work contributes to a meaningful learning experience and does not contravene safety requirements;

- there is an observable trend in school dramatic performances away from the literal interpretation of scenes to the emotive, atmospheric and stylised presentation of sets;

- generally speaking, Australian schoolgrounds have sufficient space to allow for adequate wing space in PACs;

- the mechanical systems that can be integrated into the construction of a PAC bring the benefit of more than a century of development in steel, synthetic fibres, computer control systems and lighting. These developments, which make the origin of the fly-tower at the time of wooden mechanism evolving to iron appear less significant; and

- the Australian context of the school PAC is often a single or two storey environment with tight town planning and neighbourhood character controls in place.

### 5.8 Conclusion

Many of the reasons for the development of the fly-tower in the late nineteenth century are no longer applicable to Australian schools.

# 6. Fly-towers today

Having established the origin of the fly-tower, it is appropriate to assess its current validity and use of the space above the stage. The following valid reasons have been offered in discussions with consultants and theatre managers for the continuation of a fly-tower.

The 'flying' of sets and scenes is commonly used as part of drama and musical productions but less frequently for dance productions where the construction of sets is less important than providing an open clear space for the dancers.

### 6.1 Magic

The 'flying' of sets, props and in some cases even performers, contributes to the magic of the stage. That is, the silent, seamless transition from one moment of action to another scene, before the eyes of the audience is a component of the intrigue and charm of the stage.

### 6.2 Storage

The space above the stage becomes a valuable resource in terms of storage and arranging the sets in the order and place required on the stage. Using this space leaves the wings clear of large objects and transportation systems. It also provides the space for large elements that cannot be rolled, deconstructed or compressed in any way. Set design issues may therefore dictate whether there is a need for a fly-tower.

### 6.3 Fire curtain

The fly-tower doubles as storage space for the fire curtain. To some extent, however, this is a self-fulfilling requirement, in that the need for a fire curtain in school PCAs is, under the Building Code of Australia, only necessary if there is a fly-tower and proscenium.

### 6.4 Speed

The installation of the rigging within the fly-tower can become an aid to the speed of changing over the sets. As one scene is removed another can be quickly and smoothly put in place on stage. Thus if a school feels that these standards are worth aspiring to in their drama and musical productions, then a fly-tower could be a consideration.

### 6.5 Labour

A fly-tower facilitates bumping in and out large-scale productions. Furthermore, the complex changes to scenes can be controlled by a smaller back-stage crew during the production. Fly-towers therefore minimise the need for labour and limit the amount of manhandling required.

### 6.6 Training

The use of a fly-tower during the school years is a useful training ground for the next generation of technicians who will inherit the operation of our historic theatres and significant auditoriums.

Each of the positive factors described above has been considered in some detail as part of my research in Australia and during the course of the Fellowship. The following conclusions have been drawn, with the benefit of the advice of the specialists with whom I have been meeting. I therefore offer my responses to the positive reasons for constructing a fly-tower.

### 6.7 Simplicity

By not providing a fly-tower it is possible to focus on the simplicity of the stagecraft. From my observation, the fly-towers that have been constructed in schools in Australia and overseas are underutilised. They are too complex for the short seasons of school productions.

There are limited time opportunities available in the school calendar to students and to staff for training to achieve a level of confidence and safety to use a complex fly-tower system and to then integrate this skill into their productions. In short there is insufficient time for school students to successfully operate a fly-tower.

Generally speaking, the sets that are designed are simple and do not warrant being flown.

A highly-technical stage requires a larger and more qualified staff to operate the systems for the school and to allow the broader community to use the facilities.

### 6.8 Return on investment

A fly-tower and its associated equipment are a significant capital cost to a project and from my observation of schools, the fly-tower is used too infrequently to justify this expense. In addition, fly-towers generate a need for more highly trained staff, which is a further cost to the school.

The presence of a fly-tower implies that the cost of the staging of a production will be higher, because of more complex scenes and number of sets to be designed and built, or hired for a single event.

There are other ways in which school funds could be directed in order to generate a return to the school, such as the flexibility of the space and the suitability for other school needs.

### 6.9 Participation

Drama and musicals are opportunities for participation of students in the arts. Labour-saving equipment such as a fly-tower, is usually not a priority, unless it means that the use of the stage is safer.

Unlike a theatre which is used for commercial productions, the time to bump in and to dismantle the stage at a school is not so critical. Indeed it is likely that the set will in part be built on the stage or the wings and that the rehearsals will be conducted in and around the PAC. So speed and ease of the change before and after the production are not critical factors for consideration.

### 6.10 Commercial use of space

The use of a school PAC as a community arts venue is significant and should be encouraged. It appears that the most successful format is for the venue to be low cost and accessible to amateur companies, other neighbourhood schools and as a focal point for holiday programmes and other teaching groups to develop skills and harness young people's enthusiasm for the arts.

By making the school PAC a greater cost to hire, due, for example, to the capital cost or operating costs, it is more likely that the affiliated user groups will be discouraged. The consistent advice from these user groups is that they rely on low hire costs and opportunities for rehearsal and preparation, rather than on a facility which enables quick changeover of sets.

### 6.11 Magic

The craft of the stage is filled with tricks and resources to enable the magic of the stage to appear before the eyes of the audience. The challenge for the designer and the director is to ensure that the magic of the stage can be preserved without a fly-tower.

The following section details some alternatives to the fly-tower. These are indicative only and do not constitute a comprehensive list.

### 6.12 Conclusion

Although there are still valid reasons for constructing a fly-tower today, there are other factors for Australian schools, such as return on investment, participation and enabling low-cost use of the PAC by the broader community, that question the need for a fly-tower.

# 7. Alternative stagecraft

The fly-tower has been associated with the stage from Victorian times when it ushered in an era of stagecraft characterised by rapid scenery changes, and complex and elaborate sets. There are, however, many techniques that predate the fly-tower and which are not dependant upon the fly-tower to enable the performance to unfold. These techniques are discussed briefly to demonstrate that the development of backstage crews and the support of the actors will not be restricted by a PAC lacking a fly-tower.

## 7.1 Tumble systems

The tumble system of scenery housing is based on the furling of the painted fabric cloth or a scrim onto a spool. It is revealed by releasing a single rope, traditionally known as a hemp, which allows the weight of the bottom rail to lower the scene to the stage floor. This process is quick and quiet. To remove the scene the process is reversed and the same rope is pulled to roll the spool and rewind the fabric to the top of its travel, out of sight of the audience. While raising the tumble is slower than lowering it, the process is nonetheless quiet and unobtrusive.

The tumble system has excellent storage advantages in that whole scenes can be held from one production to the next in the rolled format. Installation is inexpensive and there are no mechanical components. Regular inspection of the pulleys is advisable. (Refer to Annex A, diagram no. 1.)

## 7.2 Trucks

A truck is a platform on castors which enables the rolling of scenery onto the stage from the wings as a complete module. At a micro level it could be a piece of furniture and at the macro scale it could be a whole scene. It is a technique that is most valuable for the setting of three-dimensional scenes, such as the furnishing of a room. Trucking is a manual process that is undertaken by the stage crew ("the men and women in black") and can be used on all types of stage. It contributes to the magic of the stage because a complete scene can appear from one of the wings or simultaneously from both sides of the stage.

Building designers need to take into account the use of trucks as they require space in the wings and locking mechanisms. Advantages are that trucks generate low levels of noise and are manual. (Refer to Annex A, diagram no. 2.)

## 7.3 Traps

A trapdoor or removable panel in the stage used to, say, lower a coffin or raise an actor, provides opportunities for creative stagecraft. Sometimes the need for a trap will be governed by the script of the drama or musical. Shakespeare's plays, for example, often require actors to rise through or descend below floor level.

Traps require the construction of a basement below the stage. Building a trap is not expensive, particularly if it occurs at the time of construction of the PAC. Indeed if the whole stage is a timber construction as opposed to resting on a concrete slab, the provision of a trap can be entirely at the discretion of the director. Traps in their own right require a safety management plan. (Refer to Annex A, photograph no. 3.)

### 7.4 Tracks

Tracks are also known as guides and are a traditional technique for moving pre-fabricated panels of painted scenery or flats onto the stage to set a scene and to form a perspective within that scene. (Refer to Annex A, diagram nos. 4, 5, 6 and 7.)

Guides are in the form of parallel slots at floor level and the top of the flat, which enable the flat to slide onto the stage from the wings quickly and quietly for each new scene. It is possible to pre- determine the travel of the flat by discrete markings on the floor. The flat may also be a sculpted to a shape, such as a column or silhouette.

The availability of extruded track systems and the use of nylon runners for proprietary tracks increase the speed and the silent magic of the stage changes. The risk of tripping on stage can be avoided by using tracks with a neat slot cut into the stage (and kept clean for smooth running) or by omitting the floor track. This type of track system is in use in theatres of the calibre of the Juilliard School in New York and the Lido in Paris. If the tracks are mounted on a bar with a winch for raising and lowering, the height of the flats can be varied and installation made easier.

### 7.5 Panoramas

The panorama technique is the storage and display of scenes at the rear and sides of the stage using two vertical spools. The scene is reeled from one side of the stage to the other using a curtain track to keep it suspended from above and moving in the correct path from one cylindrical store to the other.

It is a manual system and has the benefit of reducing the reliance on tabs at the sides of the stage to conceal the wings. The system has, however, limited flexibility and is perhaps most appropriate if used in conjunction with other techniques listed above or as the backdrop to a dance sequence that requires a clear and open stage for movement. The placement of vertical mirrors to each side of the panorama can extend the sense of infinity. (Refer to Annex A, photograph no. 8.)

In addition to the traditional alternatives, I have observed a range of different approaches to design that are not dependent upon the use of a fly-tower.

### 7.6 Stylisation

By simplifying the design of the production to a stylised set for each scene, it is possible to achieve rapid, simple and cost-effective changes on the stage. For example donning a coat and scarf can change the season; a single piece of furniture can imply a room; the use of a sound overlay during a scene can draw the audience's attention to events occurring off-stage; and the actor moving from one pool of light to another on the stage can indicate the context of the action has been relocated. It was a telling remark by David Staples of Theatre Projects Consultants that "… everybody in the audience knows that they are in an auditorium, so it is appropriate to allow that to use their imagination."

### 7.7 Lighting

Lighting as a resource has progressed significantly in the past 10 years, including the range of lighting themes, the availability of automatic and manual control systems, and the use of different materials to complement the lighting, such as smoke and translucent fabrics.

By investing in good lighting design it is possible to achieve a broad range of experiences and emotional responses, without adding to the cost of production or to the cost of building construction, apart from creating a network of power outlets for the lights to be installed.

It is significant that the height of the lights above the stage varies little for each production, being linked to the height of the proscenium opening and the borders.

### 7.8 Projection

Projection is expected to be the most rapid area of development in the next 10 years, with the quality of LCD projection equipment, capacity of CD Rom storage of information, and the availability of computer-generated graphics and images all producing new opportunities for stagecraft.

I have observed back projection, forward projection, duplication of projection and have been briefed on the development of side wall, multi-screen projection and projection onto three dimensional, white sets and onto actors on the stage. They are all areas of rapid change and opportunity. (Refer to Annex A, photographs nos. 9 and 10.)

School students have shown a keen interest in and capacity to contribute to this area of stagecraft, which is becoming increasingly more cost effective and accessible. The key to success in using this technique is to provide the infrastructure cabling in the PAC.

During my research, I did not find a single installation that represents international best practice but would expect there to be vast changes and rapid development in this area of technology. Attached are some photographs of systems currently in use.

### 7.9 Mirrors

Reflective panels can be used to extend, reverse or amplify a scene and to create illusions. The development of lightweight synthetic materials to create a high tension reflective membrane creates many opportunities on stage. (Refer to Annex A, photographs nos. 11 and 12.)

### 7.10 In-the-round

The placement of the audience relative to the performance is an interesting, variable part of the director's repertoire. Traditional fly-tower stage design implies a fixed audience/performer relationship. By creating a degree of variability of the performer to the audience it is possible to explore a more intimate and sometimes confronting relationship.

The next section deals with the theme of flexibility, such as theatre in-the-round, actors in the audience, thrust stages and the drama studio as being more worthy investments in infrastructure than a fly-tower.

### 7.11 Conclusion

There are many aspects of stagecraft which do not require the use of the traditional fly-tower which can be incorporated into the design of a school PAC.

# 8. Flexible floors

The consistent response from consultants, school staff and directors at the professional theatres visited on this tour is the value of a flexible stage floor. In this context, 'flexibility' means the ability to change the performance location, the space available on the stage, the relationship to the audience and the surface on which a performance is to be staged. This appears to me, as the result of the meetings, to be the most important quality of a PAC as a multipurpose facility.

This section explores a broad range of flexible floor options for consideration and incorporation into a school PAC to meet the client brief. The simple principle is that in a PAC with fixed seating, the performance is the commodity which must be moved in order to maintain the relationship of the stage to the audience. This principle also makes it possible to vary the seating capacity of the auditorium to suit the type of event to be staged in the space.

Different performances require different configurations. For example, for dance, the stage is ideally extended and flat; for drama, a thrust stage can be arranged to allow a compact performance space with the audience gathered on three sides; for a play calling for a proscenium arch and lots of sets, the audience could be placed on seats arranged below, level with and above the level of the stage; and for a concert performance or assembly the location and dimensions of the stage could be adjusted to suit the size of the audience.

### 8.1 Plats

A plat is a removable section of floor that forms part of the stage. It is of a size and weight that makes it easily managed by two adults. Plats can be set at the level of the stage or lowered to step down toward the stage. The most elaborate system inspected was at the main auditorium at RADA, which was fully mechanized. The plat system used at Woldingham School was manually changed and stored in tablets on a trolley in a space below the stage. The simplest systems were at Cleves School and Dulwich College, where each panel remained in the same location in plan but was changed manually in its location vertically, relative to the stage.

Each of these concepts is shown in a photograph or in an explanatory sketch to illustrate the principle of the construction. (Refer to Annex A, sketches and photographs nos. 13 to 18.)

### 8.2 Pits

A surprising finding was the value to the schools of orchestra pits within their PACs. With the exception of Worth School, UK schools had a capacity for the traditional placement of the orchestra in the front and centre of the stage. It therefore becomes a component in the jigsaw that is broadly categorized as the flexibility of the stage.

Worth School had a specific reason related to the egress from the PAC for not placing an orchestra pit into their 220-seat studio space. However, a restricted orchestra can be placed either to one side, to the rear of the stage or, at a pinch, on a balcony.

Woldingham has a fully-automated screw pile orchestra pit manufactured by Spira Lift, which serves effectively as a lift for the storage of the seats and plats. This is an expensive but valuable solution.

Alternatives that have been identified include Serapid chain lift systems, screw jacks, and scissor mechanisms. All options require detailed study and review of viability for each project.

Cleves School and Dulwich College have the capacity to site an orchestra at a level of approximately 800 mm below the stage, which is nominally 2000mm below the eye level of the closest member of the audience. This makes the orchestra members visible and a part of the main auditorium to a far greater extent than if they were hidden below in a separate pit. The conductor is seated on a stool to ensure the relationships between the orchestra, stage, actors and audience are preserved.

The Yehudi Menuhin School is not planning an orchestra pit within their concert venue and RADA does not integrate musicals into their teaching programme. (Refer to Annex A, photographs nos. 19 to 21.)

### 8.3 Flat stage

All stages inspected were flat with the exception of the grand opera stage of the Theatre du Chatelet. The challenge for directors is to define the area of the stage that is available to the performers and on view to the audience. This idea is explored further in Section 9 below.

### 8.4 Wings

In almost every circumstance, I found that what was most desired was more wing space. Significantly, wings were not seen as being the equal and opposite in effect to the need for a fly-tower. That is, if there was a large wing space, the fly tower was not seen as redundant and visa versa. The wings have their own value, for example, for storing props, providing room for waiting performers and performers exiting the stage in a hurry.

There are theatre design guidelines for wing space, however for schools it is especially important to provide generous wings – particularly for Junior School concerts!

### 8.5 Surfaces

The vexed question of the stage floor surface has been considered by all theatre designers and theatre managers. The balance to be struck is between the aesthetically rich treatment of a clear finish to a natural timber to appeal to the audience's eye during a concert, as opposed to a more robust matt painted finish to a particle board substrate.

It is significant that three recently-completed venues that I visited have provided a clear response to this question.

- New Hampstead Theatre in London is a hothouse for new drama production. It requires a sacrificial floor in hardwood (masonite) for the installation of each new production. The selected floor is working well.

- Le Phenix Theatre in Valencienne has elected to change from a clear finish to the timber floor to a matt painted finish due to the difficulty of maintaining the floor in a multipurpose venue.

- The Chan Theatre in Vancouver, a specialist concert venue, has experienced real difficulty in managing their clear finish to the stage due to the constant movement of chairs and music stands.

In a cost benefit analysis it would be difficult to find a more practical floor finish for a school PAC than a particleboard that can be recoated (all or in part) by unskilled labour overnight, without special ventilation and then used the next day by the school. The challenge is to find a colour and finish that is not too dull or too black.

### 8.6 Sprung floors

It is my understanding from a broad cross section of consultants and theatre managers that there are three options for a sprung floor. The aim of the sprung floor is to protect the young and developing ankles and feet of dancers. It is of particular importance on spaces to be used for rehearsal, where repetitive injury can occur.

The first option is the construction of a fully-sprung floor as detailed in Annex A, sketch no. 22. This is a complex construction solution that is considered best practice for dance schools and specialist dance studios. However, it is often too expensive for schools and incompatible with other uses of a PAC.

A semi-sprung floor composed of hardwood on 50 mm battens at 400 mm centres mounted on 10 thick neoprene pads (as detailed in Annex A, sketch no.23) appears to be consistent with a multi purpose stage, where balancing the cost against the frequency of use for performance by the dancers is important.

The third and perhaps the most practical option is to store a specialist dance floor, such as proprietary brand Harlequin (British Harlequin PLC 01732 367666), which covers the working floor surface and provides a 3 mm cushion covering to the floor.

### 8.7 Conclusion

Stage floors that are flexible in their size, configuration, finish and structure are of significant value to schools. Investment in the stage floor is critical to the success of a school PAC.

# 9. The proscenium

The proscenium arch is the traditional framing of the stage and the performance space, to which I found a variety of responses in school PACs. Ideally, the aim is to be able to vary the width, the height, the acoustics and even the location of the proscenium. This enables the one auditorium to be tailored to suit the different needs of drama, recital, assembly, musical and other roles that a school auditorium will fulfil.

On the other hand, for compact drama performances a rigid proscenium is not required at all and may even restrict the mode of presentation of the production or drama teaching opportunities.

Nonetheless, the continued use and interpretation of the proscenium in the range of facilities inspected indicates that options are available and worthy of investment in the defining of the client requirements and appropriate design response. Below are eight solutions and an appraisal of the benefits and disadvantages for schools.

### 9.1 Soft proscenium

Both Dulwich College and Worth School use black fabric draped from the outside wall of their studio theatre to the edge of the nominal stage opening as the proscenium. This is a cost effective and flexible solution, consistent with the educational philosophy of the schools to allow the students to perform in small intimate spaces. The enclosure over the soft proscenium was not fully resolved on the day of my visit. (Refer to Annex A, photograph no. 24.)

### 9.2 Pivot and slide

The major performance spaces at the Juilliard School and at Le Phenix had similar systems that allowed two actions: to change the width of the opening and to form an integral part of the stage lighting and stage management. With a similar slide capacity of 2000mm, guided by tracks top and bottom, and a vertical lighting bar to allow the casting of lights toward the centre of the stage, the systems worked extremely well. The Juilliard School had an added quality of allowing the panels to pivot and were presented to the audience with timber veneer so that they formed part of the perimeter wall treatment when exposed. (Refer to Annex A, photographs nos. 25 to 27.)

### 9.3 Sliding upstage

Michael Holden has developed a system at Woldingham School which works on a moveable, fully-framed tower, clad in timber panels that can travel up and down the stage. The proscenium can be placed forward as in the traditional stage configuration; adjacent to the rear wall for a very open stage or in any intermediate position. The tower is supported on tracks and visually touches the side wall. It can be operated by one person and is stable and secure when in position aided by a simple locking device. The structure is massive but the flexibility that it generates is considerable. (Refer to Annex A, photographs nos. 28 and 29.)

### 9.4 Air castors

Chris Baldwin has developed a system at Tally Hoe that relies on air castors to carry the weight of the proscenium, rather than a sliding track. The structure is self contained and full height within the stage. It is clad on the side facing the audience and on stage right encloses the stage manager's work position. The air castors are manufactured by Hovair and are activated by power and support the weight on a cushion of air. A stagehand can then move the tower to any position on stage. It is held in position by its own weight when the air castors are switched off.

### 9.5 No proscenium

It is worthy of note that at the Yehudi Menuhin School, where the auditorium was under construction at the time of my visit, and at the Chan Centre no provision has been made for a proscenium. Both spaces focus on music recital and in both cases there is a clever resolution of the performers' entry to and exit from the stage.

### 9.6 Curved and retracting proscenium

The resolution at the New Hampstead Theatre of the proscenium was a delight. The side wall treatment of horizontal slatted timber with a gentle curve created a cavity for the displacement of the proscenium panels, which were also in horizontal timbers, but now butted together to provide a solid barrier. The panels could travel approximately 15000mm each on simple sliding tracks. (Refer to Annex A, photograph no. 30.)

### 9.7 Hinged

The solution at RADA was perhaps the most complex but gave significant flexibility. The proscenium consisted of a series of panels each hinged off each other. The sub-frame was in steel sections and clad in an medium-density fibreboard (MDF). It gave three working positions - small proscenium, medium and largest opening - but also suited the flexibility required for a door opening at the side of the stage and reverting to a studio theatre. It was an interesting solution to a complex client brief. (Refer to Annex A, photographs nos. 31 and 32.)

### 9.8 Sliding counterweight

The final option discussed here is the traditional solution used in the Theatre Du Chatelet in Paris, involving sliding panels that travel across the width of the stage in a set location and operated on a counterbalance system. The weight of the panels is matched by the counterweights and never varies, so the opening and closing mechanism can be easily managed by one person. It is of significance to me that in one of the world's most sophisticated and technically-advanced theatres the counterweight system survives. This installation does not require a fly-tower and the counterweights do not need to be manually adjusted. The operation of the system could be secured in a staff-only enclosure but would require a regular audit for winch and pulley safety.

### 9.9 Conclusion

The conclusion of this review is that there is a need for a variable proscenium to allow the broadest range of uses of the stage, and that there are many solutions worthy of a cost benefit analysis for each school.

# 10. Seating

Achieving a consensus on the seating capacity of a PAC is impossible and capacity will always be determined by factors other than the optimum audience size for any one type of performance or activity. Given a choice, each discipline would choose a different maximum seating capacity to suit the scale and intimacy required for that art form. The following findings from my research explain this further.

Drama-specific spaces appear to prefer a capacity of 250 to 350 people to ensure that every facial expression can be viewed by the audience.

Music productions are more likely to choose 400 to 600 people in a single-tier auditorium for recitals. This gives greater control over the acoustic quality of the space within reasonable sightlines.

Dance and musicals can enjoy a relationship with an audience up to about 900 across various levels, where sightlines to the depth and the width of the stage are important

Opera, the grandest of the art forms, is able to perform to audiences of more than 1000 people, but to my knowledge, there are no schools integrating opera into their typical school year.

School assembly is an essential role for the school PAC. The school enrolment will determine the seating capacity. It may vary from year to year and may reflect the growth or reduction of the catchment area. The decision to gather staff potentially exaggerates the problem, and movement on and off the stage by a choir or award winners can compound the variable needs for seating capacity. My observation is that the desire to gather the school on a regular basis is universal and is the only opportunity that principals have to effectively convey the ethos and values of the school.

Speech night is a once-a-year event that generates a need for parents and friends to witness the awarding of prizes and celebration of achievement of the students graduating from the school. It is exceptionally difficult for a single venue to cater for this type of event, as well as the broad range of performing arts described above, without setting limits on who can attend.

In response to the different seating capacity options listed above, I have observed nine worthwhile techniques for adjusting the seating within a PAC.

### 10.1 Flat floor

One of the simplest school PACs visited was also one of the most inspiring, due to the determination of the government-funded school to develop a specialist facility for its arts programme. At Cleves School the auditorium maintained almost half the floor space of the PAC (18m wide x 13m front to rear) as flat floor on which the primary students could be seated for assembly. The fixed seating capacity was for 230 seats with 80 additional seats in the pit (see 10.3 below ). All other students used the floor as a rapid setup and dismantle configuration for the school.

### 10.2 Bench seats

The type of seat selected at Cleves School also gave a level of flexibility that was consistent with the age of their students. The rows of 23 adult sized seats were bench-like in their construction, with arms that could be fully retracted into a vertical position, allowing the students to sit closer than the standard of approximately 530 mm per person. The seat was manufactured by Figueras, a company based in Spain. The net gain for assembly was in the order of a 10 per cent increase in the capacity. (Refer to Annex A, photograph no. 34.)

### 10.3 Plats

Three schools visited had clever solutions to seating capacity using plats.

Dulwich College had a simple pit constructed on three sides of the stage to a depth of 800 mm that allowed additional seating to be gathered around a thrust stage. The seats were removable and the pit could be covered at the level of the stage. Although the finishes in the 22 year-old space were in need of some refurbishment, the design solution was intact and regularly used. (Refer to Annex A, photograph no. 13.)

Cleves School had a system of covering the pit that contained three rows of additional seating. Each section of floor over the pit could be raised or lowered to a predetermined level that formed the plats for seats to a maximum depth of 900 mm. The plats could also be lowered to the same depth to form an orchestra pit. The system was manual and required two staff to effect. In a school with a only one maintenance staff member this could cause a problem but the design principal is strong. (Refer to Annex A, photograph no. 15.)

Woldingham School had a superbly-detailed system for removing covers to plats that accommodated four additional rows of seats. The covers were unique in their size and position and were stored in a basement but were efficient to lift or replace. The seating extended the auditorium and formed the relationship of the stage above the levels of the front row of seats. (Refer to Annex A, photograph no. 17.)

### 10.4 Balcony

The concept of a balcony as a separate seating zone is not new but warrants restating as an option for the management of the capacity of an auditorium. The use of lighting and isolation of access stairs makes this a viable and logical solution for schools to consider as a variable in the seating capacity. Schools encountered overseas have confirmed this is a workable system for their needs.

### 10.5 Mechanised systems

There are two outstanding examples of mechanised systems that would be the envy of many institutions.

RADA has a mechanized series of plats that form the well to the main stalls seating area. The principal is that each row of seats in a sychronised mechanism can vary in height from level to a stepped floor. RADA uses this to change from traditional theatre to theatre-in-the-round. The seats are on a thumb-tight screw fixing so that they are easy to remove and the floor is finished to suit either its flat performance floor or stepped seating mode. This is an extremely costly solution that meets the schools specific brief. (Refer to Annex A, photograph no. 21.)

The Derry Theatre in Ireland has an exceptional solution to multipurpose use and seating capacity. The whole stalls floor (15 rows of seating with up to 25 seats in a row) can be tilted to vary the space from flat floor to graded to a depth of one metre at the stage. The floor is timber supported on four primary steel beams which are pivoted at the rear wall and raised and lowered by four hydraulic rams. To vary the seating capacity the rows of seats can also be removed. (Refer to Annex A, sketch no. 35.)

### 10.6 Aircraft tracks

I have encountered the concept of aircraft tracks but to date have not seen them installed. In this configuration, the space between the rows of seats can be varied, much in the same way that aircraft seating is mounted on tracks for adjustment. Although the intent of the manufacturers is to meet the need to change from a flat floor hall to a fixed seat auditorium, the opportunity to change the space between the rows for uses such as assembly is worthy of investigation. (Refer to Annex A, photograph no. 36.)

### 10.7 Fold-down seats

A surprise solution to additional seating capacity was used along the main aisles in one auditorium. A series of fold-down seats have been fitted to the wall. Although the net gain was small, and may require the special approval of a building surveyor, the principle is simple and clever.

### 10.8 Retractable seating

Despite a preconceived idea that this solution to seating capacity was widely used, I encountered only one space during the study tour where retractable seating was used, at Dulwich College. These systems are in use in sports halls and in some drama studio spaces but were not highly regarded by theatre consultants with whom I met due to the high labour content to operate and the visual and acoustic effect, which resembled a temporary grandstand.

### 10.9 Removable seats

The simplest and most affordable solution to seating capacity is to have additional loose seats on a flat floor. (Refer to Annex A, photograph no. 38.)

### 10.10 Conclusion

There are many ways to vary the seating capacity in a school PAC. Some are inexpensive and others are highly technical solutions. My conclusion is that it is appropriate for schools to plan for a variable seating capacity, to achieve the aims of intimacy between audience and performer, to respond to the changes in the enrolment of the school and to be able to meet the design objective of gathering the school together as a unified body for assembly.

# 11. Drama and the musical

I have identified a pattern of development of drama as part of the school curriculum and the extra-curricular activities in the schools visited overseas, which is consistent with my observations made at the many schools with whom I am working or that I have visited in Australia.

Although the Churchill Fellowship study tour was not exhaustive, it does represent a diversity in the origin and ethos of the schools, the gender mix of the students, the year levels of the pupils and the socio-economic levels of the parent body. The schools visited were in the UK and in Canada, which share our traditions in many aspects of school life, including the teaching of drama.

### 11.1 Compulsory drama

The teaching of drama is a core part of the curriculum at about the age of 13 or 14, which results in small very low-budget plays that focus on the performer and not on the stagecraft. They encourage the use of lighting, allow movement, costumes and small three-dimensional props to aid the performance and are staged in small spaces to promote a very close relationship between the actor and audience . The productions are often prepared in a minimal rehearsal schedule, short in duration and run in rapid succession, often back-to-back on one evening, which is not conducive to grand scenery changes. The objective is to promote expression, confidence and an understanding of the skills of an actor.

### 11.2 Senior drama

As an elective in the last one or two years of school, students may undertake drama as an elective subject for assessment. The subject covers a range of types of plays and methods of delivery, often including theatre-in-the-round or thrust stage performances, soliloquy and interactive sections of plays and musicals. The use of an audience is to simulate the sense of occasion and to engender the need for actors to engage the audience. In the school environment the audience usually comprises the peers and the parents of the actors. The stagecraft is restricted for simplicity and to allow the students time to focus on the acting. Lighting and scene changes are undertaken by the technical and teaching staff with assistance from some students. The productions are low budget and have a short season.

### 11.3 The school play

There is a trend identified in the interviews conducted for the one big school play to be replaced by a series of productions to achieve some of the objectives of the school, including increased participation by students, provision of a range of performance types (such as classical, modern comedy and dramatic) and showcasing the diversity in the school.

It is also a consistent message that schools are choosing the intimacy of a space that carries 200 to 350 people in the audience and extending the season to enable the contact with the parents and friends of the school for each play. This trend has generated a need for a highly-flexible studio-type theatre spaces with dark grey interiors and variable seating configurations. The presence of a fly-tower and a proscenium arch are not consistent with the variable performance type and audience relationship.

### 11.4 The school musical

Each of the international secondary schools reviewed incorporated a musical into their annual calendar in most years. There was a tendency for the single-gender schools to coordinate with the neighbouring brother /sister school for the production of a musical. The junior campus tended to showcase a broad band of talent in the school through a concert rather than a musical.

The productions ranged in their objectives. At Worth , the musical was selected to focus on the drama skills of the cast but more typically the outcome was to focus on participation and an inclusive approach to the show. The cast was large and the orchestra more complex than an equivalent commercial production.

For all schools the production was an opportunity to demonstrate the confidence and the achievement of the school students. Audiences tended to be limited by the capacity of the PAC rather than the other way around. It was important to all the schools that produced a musical that there was an intimacy between the actors and the audience.

At all schools there were weeks of preparation for the musical. Dulwich College presented the most compact programme of events for drama and musicals, in which the scenery was prepared and the stage was partially occupied by the set making, erection and rehearsal in the space. This presented either a storage issue for the continued use of the PAC while rehearsals were in progress, or the desire to close off the stage as a separate zone.

### 11.5 Conclusion

For schools, the objective of providing a forum for students to participate in and develop skills was more important than a commercially-viable audience size, which drives many other performance venues. In my review of schools, the trend is toward smaller performance spaces, where actor and audience connect, with an increase in the number of productions each year and more performances in a season, to allow a higher level of participation and to showcase the talent of the students.

This concept of small scale, intimate space with frequent use by different student groups within the school community, is not compatible with the concept of a grand-scale school production that uses a fly-tower. My conclusion is that schools should build for an intimate relationship between the performer and the audience, which is also potentially in conflict with other aspects of a multi purpose venue for the school, in particular the desire to seat the whole school in the audience.

# 12. Safety considerations

I have for some time been an advocate of the highest possible standards in safety in the design and operation of PACs. The opportunity to travel to other countries through the Churchill Fellowship has heightened that awareness.

It is appropriate to restate that the process of producing a safe facility is a partnership between the school and the design team, with many of the issues crossing between the construction and the operational management of the centre. I became aware of two new factors, as well as the experience of visiting other successful projects, that made this an even more significant experience.

While I was in London in October 2003, a death was narrowly avoided at the Covent Garden Theatre, home of one of the world's leading professional opera companies, when a motorized, slack wire system accidentally lifted a section of the set well above the level of the stage to a point where it toppled to the floor. It was unclear as to why the fail-safe systems had not activated on this occasion but it proved that even the most sophisticated safety systems do not remove all sources of danger on the stage.

The second new piece of information was that the Netherlands have now legislated to outlaw the use of counterweight systems on the stage. Without debating the merit of that decision, it is perhaps an indication of the direction in which parliaments and legislators will take our laws over time.

Below are some of the other factors to be considered by school governors and management teams that were discussed with the consultants and theatre directors whilst overseas:

### 12.1 Insurance

The insurance industry is placing greater responsibility on the insured to develop a risk management plan. This is of great importance to schools which have so many activities conducted by young and inexperienced people on their campuses. Identifying the source of risk to students and staff then adopting a realistic management of that risk will be essential. It is my expectation, from the review of safety abroad, that Australia will continue in its trend to lead in this area and that practices that are considered acceptable now will be increasingly restricted to staff only. This will increase the cost of running a PAC and diminish the reasons for installing complex and high risk systems.

### 12.2 Legal actions

Sadly the community trend is toward a more litigious society. This means that the risk of injury may also be accompanied by the risk of legal action by students, parents, community users and staff. This may lead to better standards but is also more likely to lead to restrictive practices for participation, greater emphasis on keeping of records and an audit trail of the checks and balances in place. The cost to operate a centre will increase and the willingness to share with the broader community will contract.

### 12.3 Staff

The qualifications and training of staff will increase due to the emphasis on safety. The consistent view from the theatre managers and consultants was that there is a need to engage specialist staff and to plan their professional development to maintain a best practice facility. This in turn increases the cost of the PAC.

### 12.4 Vertical access

I have often raised my concerns about the vertical access within the PAC. In particular, who is allowed to use a geanie (motorized lift platform), to use loose step ladders to access lights and to use fixed ladders to reach the lighting catwalks and gantry. I have considered the opinions of the specialists that all of these practices should be, or will be restricted to specialist qualified staff only, and that other controls, such as time limits on ladders will be overlaid on these already restrictive controls.

Attached in Annex A photographs nos. 42 to 50 are a series of solutions to access that need to be evaluated for each circumstance in a school PAC.

### 12.5 Head height

Clear head height throughout the lighting catwalk is expected but rarely provided. It is an inevitable requirement of good safety practices to ensure that there is no compromise in this safety standard for staff or for students.

### 12.6 Safety audits

It is expected that all mechanical systems will require an independent safety check on an annual or more regular basis to ensure that the winches, wires, pulleys and associated fixings are in good condition. Similarly the use of earth leakage circuits, isolation switches, clear labeling of all electrical systems, which is considered good practice now, will become a source of independent audit checks to maintain and update the systems. The use of fire engineers to conduct audits will also be extended to maintain the fire safety systems.

### 12.7 Conclusion

Safety standards and expectations in our community will continue to rise and, through legislation, litigation or the practice of good governance, the staff standards and the work practices will be more restrictive. The cost to operate a school PAC will also rise.

It is appropriate for a school to adopt the highest possible safety standards in the design of a new facility, before it is enforced upon them.

# 13. Conclusions and Recommendations

This section summarises the conclusions and recommendations mentioned throughout the report.

### 13.1 Key conclusions

- Many of the reasons for the development of the fly-tower in the late nineteenth century are no longer considerations for Australian schools.

- There are many alternatives to the use of the traditional fly-tower which can be incorporated into the design of a school PAC.

- Stage floors that are flexible in their size, configuration, finish and structure are of significant value to schools. Investment in the stage floor is critical to the success of a school PAC.

- There is a need for a variable proscenium to allow the broadest range of uses of the stage, and that there are many solutions worthy of a cost benefit analysis for each school.

- It is appropriate for schools to plan for a variable seating capacity. There are many ways to vary the seating capacity in a school PAC. Some are inexpensive and others are highly technical solutions.

- There is a trend is toward smaller performance spaces in school PACs, where actor and audience connect, with an increase in the number of productions each year and more performances in a season, to allow a higher level of participation and to showcase the talent of the students. This trend will lead to simpler, stylised sets rather than large grand scale staging of school plays.

- Safety standards and expectations in our community will continue to rise and, through legislation, litigation or the practice of good governance, the staff standards and the work practices will be more restrictive. The cost to operate a school PAC will also rise.

- It is appropriate for a school to adopt the highest possible safety standards in the design of a new facility, before it is enforced upon them.

### 13.2 Recommendations

Based on the conclusions, I would, in my capacity as a consultant architect, recommend **against** the construction of a fly-tower for most school PACs for the following reasons:

- the trend is toward a series of smaller and more intimate drama and musical productions in the school curriculum with limited time and resources for elaborate stage productions;

- new technology and traditional stagecraft provide a range of solutions for alternatives to the use of a fly-tower for school PACs;

- the cost of operating a PAC, due to rising safety standards and increasing staff costs, will restrict the viability of schools operating a fly-tower;

- there are higher priorities for school PACs including a flexible stage floor, variable seating capacity and movable proscenium; and

- the desire for community use of a school facility will depend generally upon a low cost being passed on to user groups, which is in conflict with a high capital cost of a centre and the staff level required to use the facility.

### 13.3 The way forward

Schools are encouraged to prepare a detailed Client Brief that assesses the types of school use of their proposed PAC and the equipment and resources required to conduct each activity. This is an essential part of the planning process that confirms the viability of overlaying all the uses of a multipurpose facility.

The Client Brief should include a priority, frequency and importance assessment associated with each of the uses of the PAC.

For non-school use of a PAC, to meet the broader community needs, it is essential for a Feasibility Study and Financial Plan to be prepared by the school to assess the cost and return on investment from each component part of a PAC (including the possible inclusion of a fly-tower). Schools play a significant role in our community in providing venues for nurturing the performing arts but the capital cost and operating cost must be considered with care.

It remains my objective to help schools to achieve high-quality, safe facilities that meet their needs, within achievable project budgets.

**Annex - Bibliography**

Earl, John, *Dr Langdon Down and the Normansfield Theatre*, Borough of Twickenham Local History Society

Hume, Robert D, Editor, *The London Theatre World, 1660 – 1800*, Southern Illinois University Press, 1980.

Leacroft, Richard and Helen, *Theatre and Playhouse*, Methuen, London, 1984.

Mackintosh, Ian, *Pit Boxes and Gallery: the Story of Theatre Royal, Bury St Edmunds*, The National Trust, 1979.

Mackintosh, Lain, *Architect, Actor and Audience,* Routledge, London,1993.

Southern, Richard, *Changeable Scenery*, Faber and Faber Limited, London,1952.

Magazine articles and critical review of facilities have not been recorded in bibliography for the sake of brevity.