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SYMPHONY HALL BIRMINGHAM : A FUSION OF ARCHITECTURE AND ACOUSTICS

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Percy Thomas has spent five years designing and bringing to fruition a Concert Hall which the City of Birmingham demanded should become one of the finest venues for orchestral music in Europe, if not the world. Such a project cannot be realised by the work of man alone, nor indeed by one firm. Such a project is only achievable by a fusion of skills and design talents in the fields of acoustics, theatre planning, architecture and engineering, in a collaborative effort aiming at excellence in all aspects of the design of the building. Percy Thomas has provided the inspirational leadership to draw excellence from the design team at all levels to achieve the ultimate goal, the creation of a hall which fully meets the aspirations of the City of Birmingham.

In simple terms the brief was to achieve the finest acoustical characteristics in a hall which also provided the finest visual setting imaginable. Artec of New York provided the specialised consulting assistance on all technical aspects of the Symphony Hall, to enable Percy Thomas to undertake the design and construction of the hall. Artec, however, brought more, they devised the basic shape, volumetric and acoustic parameters of the room, and the strategy for the accommodation of the audience. Artec drew their inspiration for acoustical quality and functional excellence from the opera houses, theatres and concert halls designed and built in Europe between 1600 and 1910. They looked to the past to provide the guidance for the spacial parameters of this hall and to these added important innovative technical features, to improve on the performance of the best of the great old halls. Artec believe that the acoustic quality of these halls was due largely to the dimensional characteristics and the heavy masonry construction of the buildings and to these basic parameters Artec added a reverberation chamber, a moveable acoustical canopy and the concept of moveable sound absorbent screens. These would enable the hall to perform properly for a wide range of music, other than orchestral music and also for needs such as speech, cinema and even for product launches if the need arose. Artec published its basic strategy for the Symphony Hall in October 1984. At this time the design of the project was delayed awaiting EEC funding. However in early 1986 the International Convention Centre and the Symphony Hall project received approval to proceed from the City of Birmingham.

It was at this time that Neil Graham of Percy Thomas Partnership commenced work with a small team of young architects to take the Artec acoustical model through to a completed design, responding immediately to the spacial concept and working to develop an architectural concept equally as powerful as the acoustic concept but working very closely with Russell Johnson of Artec on all stages of the development of the project.

The architectural concept was essentially three dimensional, fully embracing the Artec spacial concept, but bringing vision, geometric order, clarity and sculptural excellence to the basic Artec proposal. Percy Thomas established a strong geometric design framework and created two major radix points for all curved elements in the room. These points were forged from the basic geometry of the angled walls at the front and rear of the room and these locations were 'anchored' visually and structurally by four pairs of massive columns, based on the axes of the radix points and the key angled walls. These 'anchor' locations act as fulcrums to turn the straight side walls into the reverse fan geometry at both the front and rear of the hall. The anchor points also became the locations for entrances at both the rear, where the audience enter and the front for the performers. The concept of the room is a single space. The performers and the audience are therefore naturally together in this space and no proscenium arch is

required. The dimensions of the space are some 27 metres in width and 55 metres in length, with the height of the space roughly equal to the width re-creating the classic tall and narrow shape of the great old halls. Percy Thomas recognised that these volume and height dimensions created a tremendous potential for a space of great drama and visual beauty and worked to perfect the sculptural potential of the space, organising the seating tiers, performance stage and ceiling geometry to spring naturally from the basic root geometry of the two major radix points. This ensured that all curved elements were complimentary and in harmony and this was also true for the vertical geometry. Around this basic framework Percy Thomas developed a whole architectural language of detailed shapes and forms. One of the early decisions was to establish a strong vertical language of plinth, side tiers (or entablature) and roof: in other words classical traditions for this geometry. They also visually detached the high level volumes of the reverberation chamber from its support walls in order to mould this element into the ceiling soffits rather like a great 'cornice'. At the sides of the room the audience tiers became slender shelves and these were terminated and returned to the side 'anchor' walls, reflecting the geometry of the main axes. In a room without a proscenium arch there is a danger that the front of the room geometry becomes indeterminate. In effect there is nothing to terminate the side tiers as in a traditional proscenium arrangement. At the same time as Percy Thomas was contemplating this problem, Artec were searching for a way of establishing an enlarged reverberation chamber, increasing the access doors to this volume and introducing some additional acoustic 'shelves' at the front of the room. These were needed to help provide the early reflections necessary for the orchestra to hear itself well during a performance. At this stage Percy Thomas created the 'master stroke' of the room, the concept of a stepping reverberation chamber or 'cascade' as it ultimately became known. Taking the upper volumes of the reverberation chamber as the high point in the room and the organ chamber side walls as the low level springing point, they created a stepping sculptured volume between these two locations which created a powerful physical element at the front of room and also provided a proper termination for the side tiers. This also solved the acoustical shelves and reverberation chamber requirements at a single stroke. The 'cascade' also followed the curved plan geometry 'rules' and was therefore entirely in harmony within the overall concept.

Percy Thomas worked with over 70 design models during the subsequent stages of the development of the design. Every piece of the room was perfected and tuned to accord with the acoustic and geometric principles that had been established. Visually one of the most important details is the balcony edge front. Percy Thomas wanted to make these edges visually very strong to emphasise their horizontal and vertical stacked rhythm. For sight-line reasons the precise arrangements of the curved tiered seating cannot necessarily be planned on the same geometry as the balcony front and to make sure the balcony edge geometry was perfect, Percy Thomas cleverly varied the thickness of the balcony front to correct this difficulty. This was easy to achieve as the balcony fronts were made of solid concrete for acoustic reasons. The balcony tiers themselves contain all the electrical and sound system services, lighting points and air conditioning ducts. Percy Thomas and Ove Arup worked to integrate these systems into the smallest achievable structure and to perfect the performance of the air systems which had to be silent in operation, in order to achieve the 'perfect silence' noise criteria for the room. The special low velocity air system is unique to this hall, air entering at a very low velocity through slots in the balcony edges and gently wafting over the audience. The air delivery slots and the curved edge detail was developed to allow the air to move smoothly over the edge profile. Air is also introduced from underseat locations on the raking tiers. The design and concealment of all ducts and wiring services required for the hall itself took many months of work to carefully integrate them and to avoid any intrusion on the classical simplicity of the surfaces of the room. The curved edge detail developed for the air delievery slot and balcony edge was used throughout the edges of all projecting soffits and bulkheads and became a powerful design image in itself in 'tune' with the general curved geometry. The detailed design of the 'cascade', with over

SYMPHONY HALL

40 heavy concrete doors required special attention. The framework of this element was formed in concrete as were all the soffits for acoustic reasons. Percy Thomas wished to visually emphasise the hanging, stepping vertical emphasis of this feature. As sharp edges could not be tolerated for acoustic reasons they devised a partly engaged 'hanging column' detail. These columns work visually as normal columns would except that in the Symphony Hall they are thrusting downwards from the roof. The visual 'erosion' of the cascading reverberation volume by the side tiers at the front of the room is one of the unique architectural features of the Symphony Hall. After nearly two years design work which included the detailed design with Ove Arup of the concrete substructure, voided piles and rubber mountings necessary for all piles to isolate the chamber from its foundations to avoid any external ground vibriation from entering the Hall, the major concept were in place. The Hall had now taken on a distinctive visual quality not dissimilar to that of a huge musical instrument.

Having completed the sculptural stage of the design, Percy Thomas turned its attention to the question of finishes and detailed materials. They wished to balance the strong horizontal elements with the vertical emphasis that the high building required and they chose hard materials for all finishes for acoustic reasons, emulating the choice of the designers of the great old halls. Granite was used extensively for the plinth or stalls level and balcony fronts a the base of the room and this granite was carried vertically up the anchor point side walls as a feature to strongly emphasise these walls and the four access locations to the Hall.

The granite is appropriate to a hall of this civic importance and is also appropriate as a hard sound reflector. Above stalls level, walls are generally finished in thick polished plaster achieving a finish quite unlike normal plaster and reviving trade skills last used extensively in the foyers of the classic interiors of the American Art Deco Period. Percy Thomas wished to bring a richness to the finishes in keeping with the quality of the music performances in the room and also wished to echo the quality and materials of the musicians instruments themselves. Polished wood and metal, the latter both polished and matt, were chosed because of their affinity with the instruments and because of the visual richness they would contribute. Polished wood was also specified for the side screen walls, the stage, the main floors and the orchestra risers. In the development of this affinity between the performers and the materials of the room itself Percy Thomas sought to achieve the complete harmony of the audience, the hall and the performers, thus emphasising the concept of a single space and a single experience, shared by audience and performers, perhaps a visual and musical time warp, to create an unforgettable experience for the audience. The polished metals and wood of the reverberation chamber can be likened to a musical instrument itself. Percy Thomas developed fine horizontal metal details incised into the plaster and wood surfaces, designed to emphasise the beautiful curved geometry of the hall and also to pick up random light reflections much as the walls also reflect the music itself. Finally a strong scarlet colouring was chosen for the columns and balcony edges and this colour was echoed in the seating fabric, the colour being deliberately chosen to add emphasis to these strong visual elements. Percy Thomas would have perhaps preferred Terra Cotta as a finish for these curved edge details, but here at last the cost constraints which ultimately restrain even the most ambitious of projects finally led to a decision in favour of fibrous plaster.

The Symphony Hall received its inaugural performance in April 1991.