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MES - GMS

# A Structure in Nature

*The Rani Laxmibai Girls Military school situated at the beautiful village of Kasar Amboli, some 25 kilometers from Pune, is one of the best girls military schools in Maharashtra. A dream project of Pune's renowned academic institution Maharashtra Education Society, the school undertook what is considered as one of the unique experiments in terms of creating a soundspace. SoundSolutions brings an account.*

As a part of the military training, there was a need to construct an auditorium which can take care of all indoor activities, like indoor sports such as badminton, table tennis, yoga–meditation and day-to-day exercises during rainy season.

The covered place was intended to be a multipurpose hall that can address the needs of all types of academic requirements such as lectures, conferences, and cultural programmes. Once the concept was clear, MES' Administration Committee, that included the chairman and the principal, entrusted the responsibility with renowned architect Hemant Mahajan of Group Phi Architects – who won the contract based on the design they submitted to the competition held by the MES – and noted acoustician Vijay Purandhare, both from Pune.

## Architecture

Located on a hill slope, amidst beautiful picturesque settings, the GMS school poses an appealing sight from outside as well as from its premises. Externally, it has a matching

architectural appeal as it is wrapped in stone-cladding from front, though internal spaces are done in RCC. The main hall has a vaulted roof, covered with pre-coated metal sheets that give a different look.

Apart from other internal spaces for various academic purposes, the building also has two badminton courts and two tennis tables. Provision has also been made for an indoor space to cater to needs like Yoga, marshal arts training, apart from audio-visual programming.

Designing a space like that of the GMS Pune was a challenge due to its topographical setting in the first place. The oddity of the irregular shape of the site, coupled by the unsupportive climate for constructions, posed a potential challenge. Keeping this in view, the designer team had



The Structure in Nature: Exterior view of MES-GMS

chalked out a meticulous plan as to complete the task on required lines, handling the oddities.

The approach was to

- Design a plan on the basis of part to whole & whole to part in the campus.
- Design an environment conducive to military training of girls and yet create a second home for them.
- Deliberate and effective exploitation of the topographical constraints for the services- e.g. the elevated storage reservoir was to be placed on the highest contour thereby reducing the burden that would have otherwise been caused by the overhead tanks of traditional model. However, this necessitated the use of a pipeline to pump water down.
- Use natural resources like stone for construction, solar panels for heating water (for bathing purposes at residences), rain water harvesting, recycling waste water for landscaping etc.
- Integrate the teaching, non-teaching and residential areas in such a way as to achieve a hierarchy of public, semi-public and private spaces interspersed with open spaces for an organized interaction. This has been achieved by staggered placement of the structures whose design also avoided the feeling of monotony in that it poses the look of a congruent street façade, and allows small spaces for seating, ottas under large shady trees. The whole setting provides for inter-personal communication in a better fashion.



The inauguration of the auditorium

- To facilitate continuous and sufficient supply of water, implement a lift-irrigation system. Water is lifted from the canal that is 2.5 km away from the site, without causing any problem for the adjoining farm owner.

Use of composite masonry and sloping roofs was a conscious answer to the climatic and topographical conditions of the region. The landscape design aims at creating an environment that accentuates the ambience of spaces created by the architectural design.

As for the residential quarters, the residence of the Principal, who also acts as the rector, is placed close to the dormitories which also acts as a check-point for the dorms. The quarters of non-teaching staff have been deliberately divided into three zones depending upon the distance from the work place, security – they can act as guards at various points of the site – and also as interactive space.



The auditorium in the school: Observe the roof pattern- an experiment in acoustics

## Acoustics

Designing perfect acoustical treatment to such type of multipurpose hall is a challenging task by any means. However, the MES' trustees, who appeared to have a 'sound' understanding of what good acoustics were all about, apparently, laid emphasis on having the best solution in place – in accordance with the topographical environs the building was set in – and the architect, acting on this precise brief, provided the scope for one of the best acoustic treatments.

"My job was actually made easy," says Purandare, the acoustic consultant. "Both the MES trustees, and the architects had planned to have good acoustic environment," Purandare says, "that gave me good scope to work on."

"The main difficulties were the big large volume of the hall compared to the floor area," he says, "due to the height clearances required for various sports activities and the vault like shape of roof, because of unequal heights of the space due to the vaulted roof.

In accordance with the hall size, the stage also was designed in big size. It is equipped with motorized curtains, adjustable side wings, frills and electronically-controlled stage lights. Stage walls are treated with Anutone Ekcelisior acoustical panels with 50mm glass wool backing.

Acoustical treatment given to the main hall is a good combination of absorption, reflection and diffusion. In order to suit the requirement, the complete vault shape is treated with glass reinforced pop acoustical tiles with glass wool backing, except for a very big suspended acoustical reflector made from plain gypsum. Sidewalls are treated with Anutone Mikrofibre chamfered edge tiles and the rear wall also with Anutone Mikrofibre tiles having zigzag pattern.

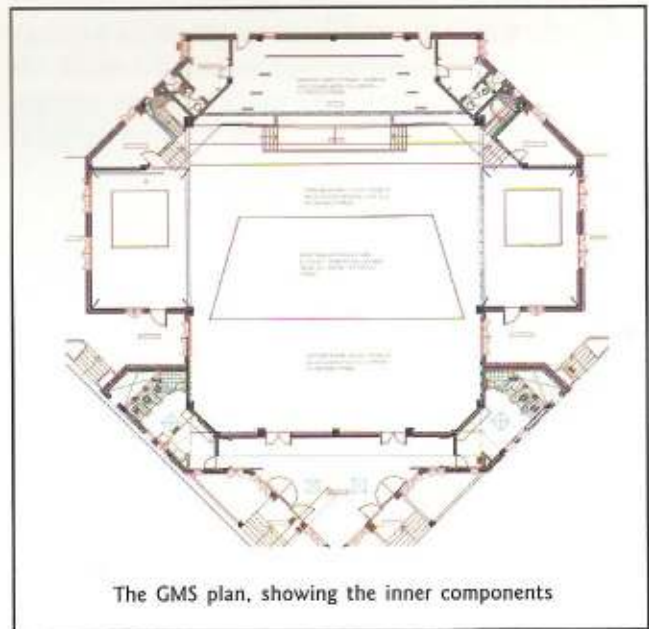
The acoustical design here is significant in that it employed use of agro wood strips of varying width (i.e., 2" to 6") on wall surfaces up to some a height of two-meter height area, where hard surface is required considering the



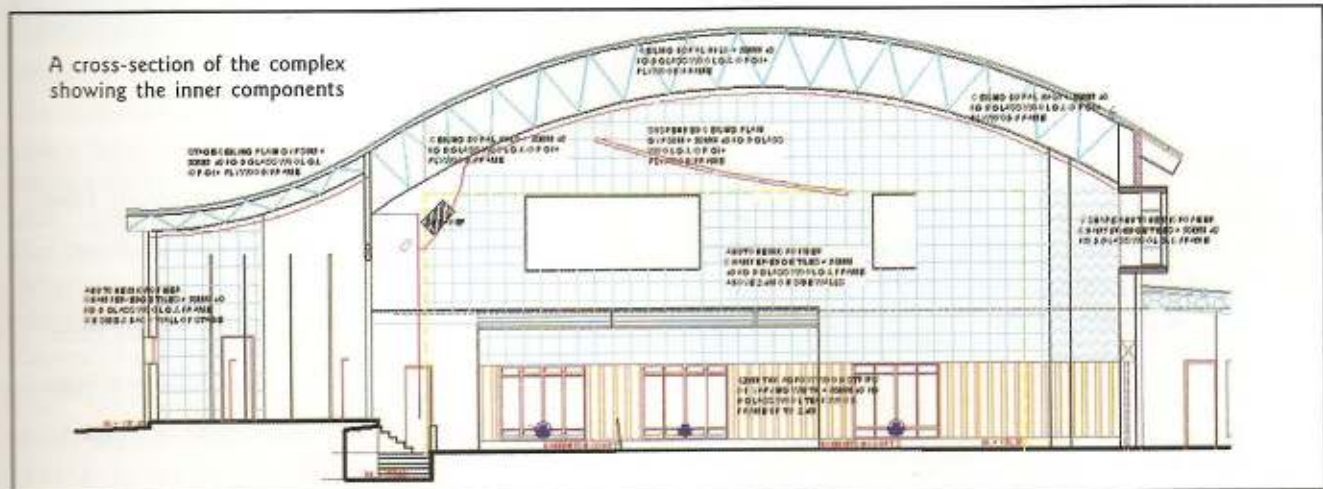
The special acoustical panel, customised to suit the GMS auditorium requirement

possibility of the sound impact during sporting events. This pattern of varying width of agro wood strips, which gives varying perforation percentage, is used to achieve broadband sound absorption as well as for diffusion of sound waves.

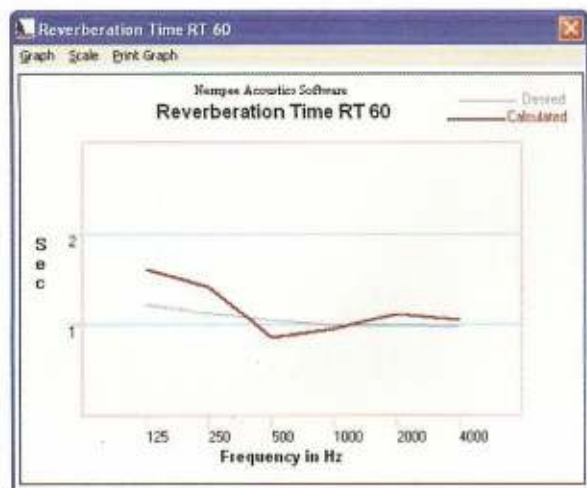
Another important acoustical feature is that a big suspended acoustical reflector measuring 8 x 17m is installed in the



The GMS plan, showing the inner components



A cross-section of the complex showing the inner components



ceiling. The design is such that it achieves proper acoustical reflection while maintaining required height for a sport like badminton. The Anutone Microfiber and NSS acoustical boards have also played their part in taking care of most of the absorption needs on walls.

### Audio Solution

Relatively simple but an effective audio system is used for this hall. The main factors considered here for the required acoustical gain are- main coverage pattern, quality of sound, ease of operation and maintenance, and of course, economy.

In order to bring out the required audio effect, two-way main speakers of 'Nempee' brand have been installed in the proscenium band, with a crossover frequency of 500 Hz. An array of two titanium diaphragm directional horns are used on either side to achieve even coverage and the required acoustical gain along with 2"x15", 600 watts woofers. Except this, the solution is simple in that it has, four 'Phonic' amplifiers provided (two for horn array and one each for woofers and stage monitors) along with a 16-channel Phonic mixer.

Adequate space is provided for the orchestra pit, and the audio and electrical equipment is neatly arranged in a cavity provided under the stage.

A combination of Phonic and Nempee systems has been chosen to keeping in view the quality requirement and the budget.

### Electrical Solution

The electrical solution is based mainly on two things: one- to fulfill the requirements of different activities like stage programmes, and sports like badminton, table tennis etc.; and two- ease of maintenance.

According to Vinayak Vidya, the electrical consultant, with a view to meeting the precise lighting requirement, separate lighting has been provided for badminton and table tennis as per the norms, in addition to the warm-up lighters on the

walls that are controlled by dimmers when applications relating to auditorium programmes are conducted. The most significant feature about lighting is that there is not a single light installed in the ceiling- an experiment which eliminated the requirement of catwalk for maintenance. 56" diameter fans are mounted on walls as per acoustical requirement to minimize the noise, added Vidya.

Overall, the design of the multipurpose hall at GSM-Pune has come to be a perfect match not only to the overall ambience of the military school but also fulfilling the requirements of the school activities.

"Actually, it is the teamwork, and the flexibility displaced by the professionals working on the project that made it possible," Purandhare declares. It was this strength that made the GSM' multipurpose hall that perfect execution.

Design of acoustical treatment considering absorption coefficients of all the materials over wide frequency band- an effort to achieve maximum possible results.

### FACT FILE

Project Name: Multipurpose Hall of Maharashtra Education Society's Rani Laxmibai Girls Military School (GMS)

Location: Kasar Amboli, Pune, Maharashtra

Built-up Area: 850 Sq m (Approx)

Hall Area: 650 Sq m (Approx)

Volume: 8500 Cu m (Approx)

#### Consultants:

Architect	Hemant Mahajan, Group Phi Architects, Pune
Acoustical Consultant	Vijay Purandare, V. N. Purandare & Associates, Pune
Electrical Consultant	Vinayak Vidya, Abhiyanta, Pune
Structural Consultant	Mutalik

#### Contractors:

Civil	Bhamburkar, Subodhan Constructions, Pune
Acoustics & Interior	Mule, Ajanta Interiors, Pune
Electrical	Ghate, Omkar Electricals, Pune
Audio System	Pansare, Zillion Solutions, Pune
Stage Craft	Shirke, Ram Shirke Fabricators, Pune