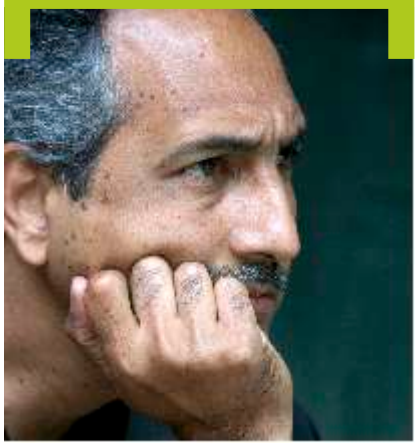
PONDICHERRY CONVENTION CENTRE

accommodating expansive span and lightweight design of roof



ARCHITECT RAHUL KADRI
Partner & Principal
KADRI Consultants Pvt. Ltd.

The idea of the convocation hall of the University of Pondicherry was born from the very inspiring energy of the then Vice Chancellor Prof. Tarin. Together, we dreamt of a place that will express the joy of graduating from university, students come together and celebrate their collective achievements marking the important milestone. The Centre is an expression of these thoughts manifest in a variety of ways, distilling it into an iconic form

At the outset, the design team was briefed to create a 2500 seating capacity auditorium for the University of Pondicherry to host university events. The space was also intended for use by the Central Government for SAARC summits which necessitated the provision of a separate VIP entrance. Located in Pondicherry, the land of the rising sun, the sea, sand, its French colony and the Aurobindo and Mother's influence, the project draws inspiration from the passion of the then Vice Chancellor as well as the university anthem and logo which features the sun and the lotus as a symbol of knowledge.

Design Geometrics

The design of the impressive auditorium takes cues from the geometrics of the circle, in sector, in arc for the planning. Seating, span, false ceiling support and the lotus hall also form a part of a whole- the "circle".

Incorporating Steel

A lightweight material like steel was incorporated to depict simplicity, accommodate higher volume, depict purity of thoughts and also discover wisdom. Moreover, the expansive span and lightweight design adopted for the roof structure dictated the choice of the material. The spans of the roof trusses range from

2.0m to 45.0 m. All trusses are made in structural steel. The curved nature of the roof required that the heights of the trusses be adjusted to accommodate the passage of services between the trusses. This structural steel roof features insulated sheets while services area, are G+2 and G+3, made in RCC.

Different sections, channels, of steel were used in this project. As the form is a part of a circle, the geometry arose from the concept of the circumference, and the team envisioned a design that was simple and cohesive in appeal. When designing any structure, the climate needs to be accounted for and Pondicherry is known for its heavy wind loads. Adopting a light roof for the design was as challenging as its function of incorporating large spans. To counter this, sandwiched galvaluminium sheets were used. Pre-coated with a PVDF finish for durability, these are rolled sheets, which makes wrapping around the steel structure easy. Accomplishing the challenging design was possible because of the steel roof which allowed the incorporation of a number of supports while creating an uninterrupted volume for the auditorium.

Salient Features

The concept which arose as one approaches the building was that of the rising sun, giving the impression of walking towards knowledge as it spreads out to one and all. The front façade makes use of steel as well. Double height volumes lend a feeling of grandiose to the design. An elliptical, stairway stands suspended in the foyer lending a touch of finesse to the area. This single-flight steel encased stairway is devoid of a landing and conventional column supports as lightness was a pre-requisite. Instead, structural steel pipes that come down from the ceiling have been used and give the staircase a "floating" feeling, which ultimately creates a wonderful amalgamation of impressive aesthetics and finesse.

The waist slab (flight) of the staircase is made of RCC-steel composite. These stairs connect the ground level foyer with the balcony level at +9.0m level. The false ceiling is yet another noteworthy addition. The walkable area of the ceiling is made in structural steel and is suspended from the structural steel roof trusses. The void created between the walkable false ceiling and the roof accommodates all the services. The balcony level is made in RCC and is balanced in the seating area and into the foyer at +9.0 m level. The balcony caters to the spill-out crowd from the upper level seating. The pairs of columns supporting the balanced cantilever balconies are proportioned to cater to a scenario where the only one side cantilever has live load.

DR. JASWANT N. ARLEKAR
Associate
R. S. Mandrekar

Our involvement in the project consisted of conceptual planning, quantification and structural design of RCC and structural steel components of the Convention Centre. The early involvement helped us understand and evolve the structural design. The planning of the geometry of the auditorium's cylindrical roof with trusses spanning from 2.0 to 45.0m, with a tilted axis and the suspended walkable false ceiling, required innovative tweaking to the conventional truss bottom chord bracing system. We arrived at the suspended spiral staircase design after trying out several options to have the bottom-to-top supported staircase. Being associated with this project has been a very satisfying experience

Client	Architects	Structural Consultant	PMC	Contractor	Steel Tonnage
Pondicherry University	**Kadri Consultants Pvt. Ltd.**	**R.S. Mandrekar**	**RITES Ltd.**	**B.E. Billimoria & Co.**	**280T approx.**

The glass façade at the side of this foyer is accented with a dramatic play of lights and is a tribute to the essence of Pondicherry, as wished by the then Vice Chancellor. 3D graffiti art decorates the wall with inspirational words and messages intended to motivate students. Attractive Kolum engravings in the flooring lend a rustic touch to the décor of the large span foyer.

Inspired by the delicate design of the lotus to depict purity of thoughts, the auditorium design originated from enlightenment and the dissipation of knowledge which is why a lot of emphasis is placed on the ceiling which is inspired from the logo as well as the anthem of the university which speaks about the rays of the sun spreading wisdom.

While the roof shies away from the literal translation of a lotus, it does use the same as a muse by way of its form and the arrangement of the petals. The faceted design gives the appearance of a whole flower which makes the design very complex. A design such as this was also effective to easily accommodate the proscenium along with the FOH (front of house) space.

The auditorium is designed taking into account all these factors and features the correct distances to include all the details that are imperative to a structure such as this. Several of the faceted parts in the ceiling were handcrafted using steel sheets, in order to achieve precision in design and appeal.

Defying Challenges

The original plan was to have the 270 deg polar sweep for a height of 9.0m (from ground level foyer to balcony level). However, this was not possible to achieve with minimal thickness of the waist (flight) slab. As a solution, the option of suspended staircase evolved - where the entire staircase is suspended from the roof trusses. The vertical suspenders are made of structural steel pipes, with bracings to arrest lateral movement. The waist slab is in composite (RCC and steel). The RCC portion of the waist slab is anchored into the ground as well as the balcony slab at +9.0 m level.

The challenge for the design and structural team lay in making the auditorium form functional and take it to another level without losing the form and flow of the flower design. The auditorium has a mono-symmetry which divides the stage and the seating area into 2 halves.

The plan of the auditorium is a 90 deg sweep with the center near the stage. The roof of the auditorium is a cylinder with its axis tilted towards the stage. This configuration results in a symmetric roof, but the lengths of the pairs of trusses reduce as one moves from the central ridge to the service areas. Thus, each pair of trusses has a different length. Further, the layout of the services under the roof required that the depth of the trusses be adjusted, resulting in the bottom chords of the trusses to be at different levels. The bracing of the bottom chord of the trusses required additional members and unusual detailing.

The sepals house the LED lights throwing out an assortment of colors that change as the performance progresses. Extensive detailing is involved in each petal in terms of the ambient lighting, accommodating AC grills in a covert manner in order to serve the varied purposes that this auditorium is intended for. Maintaining the gaps for the AC units, modulation of the lighting system was achieved satisfactorily with the design team constantly collaborating and coordinating with the acoustical consultants for the sound, the lighting department, etc. in order to provide an integrated solution. Moreover, installation of the 45.0 m trusses is challenging as the main seating area is surrounded with foyer, services and entrance areas.

Through the use of basic materials like carpeting on the floor, comfortable push-back chairs, wood and marble for the balconies and the sidewall, the design team aimed to remain true to the essence and purity of knowledge. ■