Cover Story

JSW Corporate Headquarters, Mumbai

an avant-garde masterpiece completely built in structural steel

Fact Sheet

Client
JSW Steel Ltd

Developer
Orbit Corporation Ltd

Architect
Burt Hill Architects

Structural Consultant
Dr Kelkar Designs Pvt Ltd

Steel Fabricator
Structurati Fabrication Pvt Ltd

Structural Detailing
Techflow Structures Pvt Ltd

Steel Suppliers
Jindal Steel & Power Ltd
and Tata Steel International (Corus)

Total Steel Tonnage
3,300 MT

JSW Group began life as a steel rolling mill in Mumbai in 1982 and has grown into a global company with interests in steel, energy, infrastructure and logistics, and other strategic business enterprises. It's much older parent company, Jindal Group, is one of the largest companies in India. JSW has a strongly modern, youthfully oriented business sensibility, as reflected on a recent annual report cover: "Steel in Young India." It openly portrays itself as "the future of the steel industry". The company wanted this image to find expression in the architecture and engineering of its new corporate headquarters in Mumbai. The building was to be iconic, the physical embodiment of JSW's imaginative and progressive vision, reinforcing its brand identity not only in India, but, also globally. The initiative to go for the steel building requires a leader with a vision, and Sajjan Jindal provided this big push to make its corporate office an out-and-out steel building.

About The Project

The JSW HQ is the corporate headquarters for JSW and located in the Bandra-Kurla Complex, Mumbai in the newer international business and financial sector of downtown Mumbai – a further testament to the company's intent on a 21st century image. But even more than location was Sajjan Jindal's concern for exhibiting its corporate conscience, or virtue. He wanted the building, which would be one of the first of its size in India to use structural steel, to set a new building context for India and a benchmark internationally by earning LEED Platinum certification, the highest ranking in the green building rating system.

The building's tight 2.2-acre site, shaped like an eye, suggested its iconic form. Using this geometry, Burt Hill Architects, the designer for this building set the building height at 10 stories, beginning from its hooting stone base, and opened it up through the center with a glazed atrium to stream sunlight into the core. The building's two elliptical sides glide fluidly, one into the other in balanced rhythm, a kind of metaphorical; if modern, yin and yang. To invite connection, a dual-glazed skin supported by a steel structure provides views into, from, and through the building in every direction.

Most buildings in Mumbai employ concrete structural systems. For Jindal Group, structural steel made sense on many levels. It meant using the company's own technology, showcasing its own product. It fostered sustainable performance, and it helped give the building a sleek, contemporary look. The architectural design and structural integrity by using full potential of steel of long spans, creates a modern and flexible work environment of unobstructed office spaces and fast track construction. It will be the first steel building of its kind in the world of Corporate India. This Headquarter Building addresses commitment for creating a transparent and collaborative work culture and reinforces the organization's vibrant brand identity.

Jindal asked for a home for 1600 employees that transparently exhibited its progressive values and aggressive intentions as a company emerging onto the global stage. The architecture of its corporate headquarters supplies this, literally and figuratively. It is being built as one of the most sophisticated open office configurations in corporate Mumbai. It is well within the aesthetic metric in how it addresses the owner's program; in how it uses form and materials to heighten perceptions internally and externally; and in how it creates a context for the built environment from which others can learn.

The building accommodates the needs of JSW's various

departments and high end executive floors on the top 8th and 9th levels with green terraces. On the other hand, in the two lower podium and atrium levels, the building provides in-house functions like 160 seat auditorium, 230 cover cafeteria, large central atrium for meeting and gathering facilities with flexible technology driven conferencing centre and grand entrance lobbies. The middle office floors of the building will have nearly 1000 workstations and 200 cabins for 1600 people, designed as modern, flexible workspaces to accommodate the needs of various JSW departments. The building traffic is supported by two level basement parking structure with space for 400 cars.

The Headquarter Building addresses commitment for creating a transparent and collaborative work culture and reinforces the organization's vibrant brand identity. Space planning reinforces the ability to enhance effectiveness within the workplace while using their facility as marketing and recruiting tools. A 30 foot by 100 foot eye shaped sky lit court was conceived to bring light deeply into the centre of building. Daylight passes or reflected into the office floors, creating a unique design feature creating an atrium that creates a sense of unity to employees working in different areas of the building.

Design Philosophy

JSW Headquarters project evolved from the client's imaginative and progressive vision and an embodiment of design excellence which philosophical is translated in, "5 I'S" to celebrate an architectural spectacle of 21st century in corporate culture. The iconic JSW Headquarter, a fluid 10 storey of architectural virtue and monumentality, the design successfully puts architecture on a par with best contemporary art to explore freely the possibilities of endless creativity. The iconic fluidity of the building form reflects energy of the client; dynamism is achieved with contemporary lines of subtle curves and sweeping planes. Strong facade of modernity exposes the driving force that echoes the vibrant corporate culture of nautical Mumbai metropolis. The movement and velocity evolves morphogenetically through emergence, evolutionary computation and optimization of site restrictions, contextual possibilities, and law of engineering and innovative design solutions.

Inviting Realm of Human Synergies

The journey begins at the entrance, towards the building from distant BKC road. The tower with its sky garden terraces redefines BKC skyline into tangible structure of concrete, steel, and glass. The façade, is a glass canvas, with halo of a roof canopy, that glow with stainless steel rim in the sun and white streak of light in the moonlit night, visible to visitors approaching from the distant. The most dramatic experience is at the point where the triangulation soars at the shimmering knife edge where two rippling glass façades of the form convene. The dynamism of the building envelope captivates the beholder's eye.

One elevates into sublimation and spirituality witnessing monumentality of the canopy hauling over the grand entrance lobby and as one moves closer to the building to experience the refined details. Grandeur of the entrance lobby, opulence of minimalist magnificence, literally designed and carved as a jewel under the foliage of the tower above. An engaging public realm highlighted by sculptural water feature exquisitely juxtaposed in simple unrivaled landscape. At pause, the portal doorway invites the visitors and employees, greets them with a rolled out carpet into the interior realms.

VIRTUOSO QUOTE

Dr. Vasant Kelkar
Director, Dr. Kelkar Designs Pvt Ltd

"We are proud to be associated as Structural Consultants for this building which has a unique design with sloping glass facades, central atrium, scissors and spiral staircases. Its construction done with steel columns, steel beams and RC Slab on metal deck is so far not commonly used in India for commercial buildings, and will give impetus to construction of many more such buildings in structural steel in India"

At the central atrium interiors, celebrate facilities that are created to force social and visual interaction in work environment, where visitors get to know the company and the employees. JSW Headquarters will be a much needed respite for the employees among the chaotic urban context of Mumbai.

Intelligent Design

Burt Hill had a vision to make this project as an exemplary project in the area of environmental design and energy optimization, setting a benchmark at an international level. JSW Headquarter is a highly engineered and integrated design, with no compromise but an optimization of the union of social, economic and environmental benefit. Designed as a finely tuned musical instrument that dynamically responds to sun, wind, rain and occupant comfort. Consistently resonating the value of sustainable spaces through use of technological advancement and building management systems that make it energy efficient, responsive, safe and secure. The project will yield a case study in intelligently integrated design methodology.

Paradigm of Technological Innovation

JSW Headquarter is an illustration of assurance and enthusiasm for sustainable practices. Justified LEED Platinum stature, it serves as the physical embodiment of corporate ethos, host of technologies, and progressive future of greater potential. The integrated design approach focuses to make it an energy efficient building. The salient features in energy efficiency are innovative design features like high performance ventilated double skin glass façade and multi-storey central atrium space, scientifically engineered to rejoice natural day light in the workspaces right at the centre of floor plates to reduce artificial lighting and air-conditioning loads are minimized by reduced solar gain. Innovative energy efficient hybrid air-conditioning system, energy efficient MEP equipments designs reduce peak HVAC load by fourths. Few other salient features of the building that support the theory of innovation are the exemplary performance achieved in water efficiency by waste water management strategies, rainwater storage and harvesting, recycling and reuse of the treated water for flushing, gardening and air-conditioning, by using waterless urinals, low flush fixtures, and automatic controls.

Structural Alteration

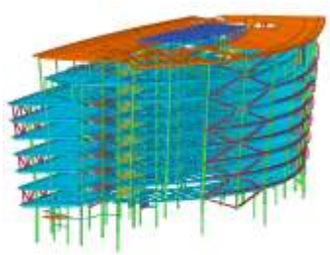
Burt Hill approached Structural Consultancy firm LERA from New York to work upto basic schematic design and design development stages for the steel structure. To take care of the daily routine work, LERA recommended Dr. Kelkar Designs Pvt Ltd to be the local Structural Consultants for this project. All the detailed analysis, designs, drawings, approval of fabrication drawings and periodic supervision at site were done by Dr. Kelkar's team. Wherever necessary, they also did some changes from the original schematic design to suit the conditions in India.

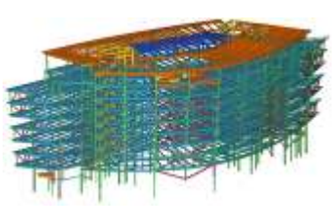
For instance, at its North and South edges the building cantilevers out 9.5 m at second floor to 11.5 meters at top. Heavy cantilever plate girders with 175 mm thick flange plates and each weighing about 16 to 20 tonnes with anchor span plate girder of similar weight were proposed in the schematic design. But, the capacities of cranes at site to lift such girders upto nine floors were not more than 2 tonnes. Hence, these girders were changed to lighter floor to floor trusses which were easy to fabricate and lift. This was accepted by the architects and also resulted in a saving of over 200 tonnes of steel.

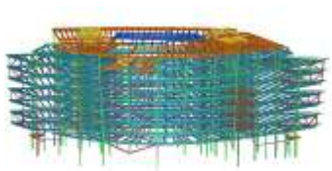
Structural System & Analysis

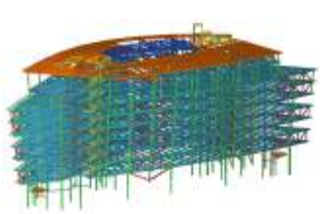
The building has two basements plus podium floor plus nine upper floors. The total built up area is approximately 6,20,000 sq. ft. Structures of the basements, podium and first floors are in RCC flat slab or beam-slab construction whereas the upper nine floors are with steel columns, steel beams and RCC slab on metal deck. At first floor level, there are deep transfer girders in RCC to support some of the upper steel columns which are floated from this floor. There is a central atrium from first floor to roof. The structural steel-concrete deck system, though commonly used for buildings in USA, is still not very common in India as yet. The metal deck slabs were not commonly used around three years back and there were not too many suppliers available, but now there are many companies supplying metal decking solutions. Now more buildings are being proposed in India with steel columns and beams and RCC slab on metal decking.

Façade steel columns are sloping outwards and are spaced at about 11m c/c. The next row of interior columns is spaced at 10-13 meter distance from the façade columns. This gives a large column free area which increases on upper floors due to sloping facade columns. The long span steel beams span between the columns and support RCC deck slab. The lateral loads of the superstructure are resisted by suitably located braced frames in two directions. The two braced frames at the entrances to the atrium are in architecturally exposed steel and have pin-ended connections.









The entire static and dynamic analysis of the structure, designing of steel members and columns were done using 3D ETABS modeling under various loading conditions and their combinations. High grade steel with Fy=345 N/mm2 was used for steel beams and columns. Due to sloping columns of façade, dimensions changed from floor to floor. This resulted in a larger number of fabrication drawings numbering about 3000 to be checked by the Consultants.

The planning of this building is such that there are about 10-11 meter spans between columns on each floor in both directions giving a large column free space. Since the building has an outward slant design, the span goes on increasing on every floor, and the maximum span on the top floor is about 13 meters column free. The steel beams and concrete slabs over it are designed as composite sections, which makes them more economical. Steel beam and concrete slab with stud shear connectors between them give the advantage of having a composite section of much greater depth.

ISMB 600 is the maximum size that is available in Indian rolled sections. Hence, for the large spans, UB sections were used. They are available upto 900mm depth, if required. Higher strength 355 grade steel was used for most of the steel members. All the deflections of the beams were restricted to most stringent values so that it minimizes any problems in walls or false ceiling.

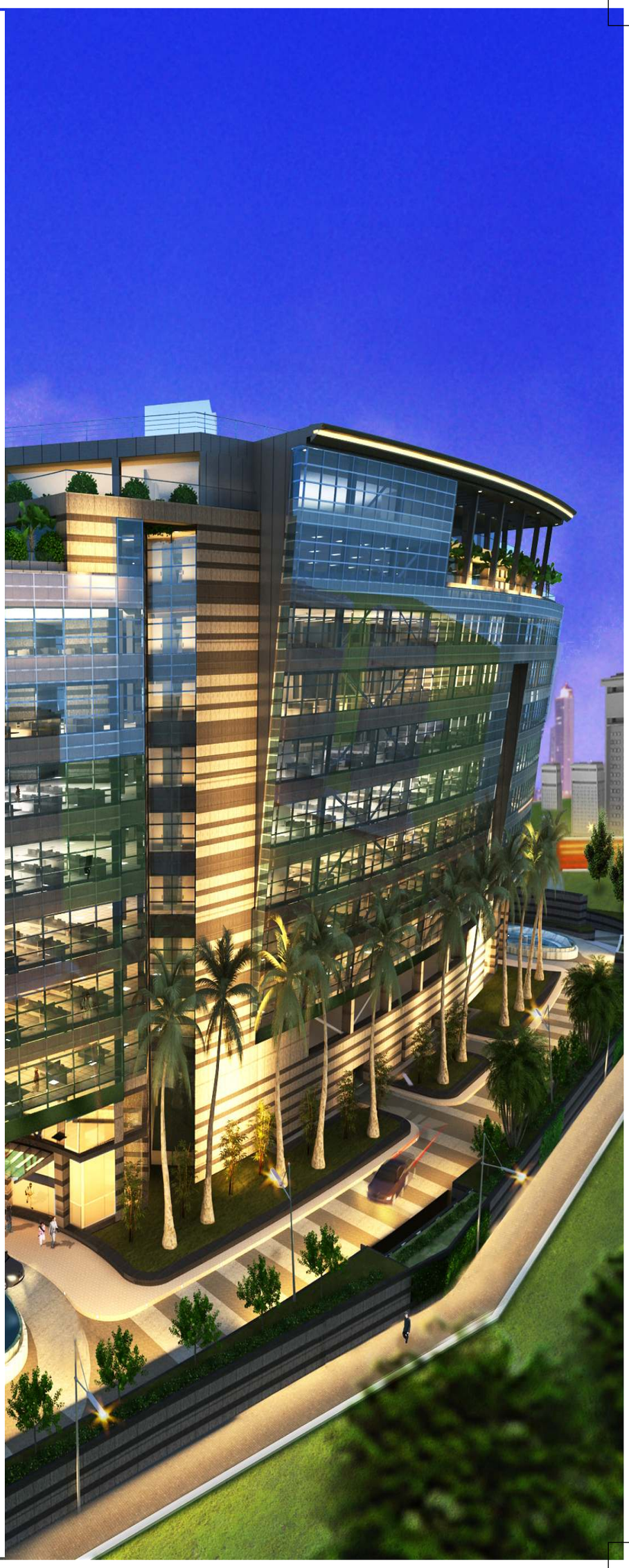
The columns used in the building are similar to the British sections, which are thicker and can carry higher loads without increasing the sizes. In this building, wide range of column sizes were used to make it economical for the given spans and loadings. For earthquake resistance, suitably located diagonally braced frames are provided from top to atrium floor.

The consumption of steel for the entire superstructure is 10.3 kg/sq ft with 2,750 tonnes of total steel usage across 2.66 lakh area. Being steel manufacturers themselves, initially, Jindal Steel did not have all the sections required for the building. They imported some jumbo sections from Corus, whereas to get the required properties and dimensions, some sections were fabricated in the shop.

The scissor-staircase used in this building is an uncommon feature in Indian projects. The owner has his office on 8th and 9th floors and wanted to have connection between these two floors internally, besides the regular staircases and lifts. The architects provided a spiral staircase which acts as a private connection between the two office floors. This sleek spiral staircase is made up of a single steel box member from which the steel steps are cantilevered with suspended strings at the ends, and this adds to the architectural feature of the building.

Since the columns on the facades of the building slope outwards from floor to floor, each floor size is different from the ones above or below. Thus, due to lack of a “typical” floor in this building, each floor had to be designed and detailed separately thereby increasing the number of details and drawings.

As per codes, one needs to have 2-hour fire resistance, and using intumescent paint for the entire building becomes very expensive. Hence, it was used only for the exposed steel members of the building, such as the two lateral load resisting frames at the entrances to the atrium. The rest of the steel members have been applied with cementitious



VIRTUOSO QUOTE

Subhasis Biswas
Sr. DGM (Mktg) & Regional Manager (Western India), Jindal Steel & Power Ltd

"We have supplied some special sections like WPB 800 & WPB 900 for this project wherein entire scope of RCC work was replaced by JSPL steel sections. Some of the general grade sections were changed to higher grades like E350 BR/S355 JR which enabled to save steel without compromising load bearing capacity. By using JSPL sections, Orbit could reduce overall steel consumption by taking advantage of lower sectional weight. The project is unique in sense that it has been built by using only our sections in its structure"

paint covered by some light weight boxing around them and there is false ceiling below the steel beams.

The glass curtain walls of the façade are connected to the steel members coming out from the building with the help of box sections. It is a complicated case of façade where Dr. Kelkar had to provide drawings for numerous sections. A lot of coordination was required for this project. Overall the architecture design is very interesting. Even for the smaller structures like the entrance and security office, there are beams in box sections, cantilevering out 5 meters as an architectural feature.

Some of the upper floor columns do not continue to the basements and needed to be floated from the heavy concrete transfer girders of about 2 meters depth at the atrium floor. At the transfer level, the upper steel columns start from base plates fixed on the RCC transfer girders. To transfer all the forces from the steel column to the concrete column below was a challenge in itself. Where the base plate sizes were not sufficient the steel columns were continued through the concrete columns below with studs to transfer the forces.

The Fabricators were sending the material quantity for the Structural Consultants to tally with their drawings and then they were procuring it. The procurement was done ahead of the fabrication drawings. In some cases, to change some sections additional plates were used to suit that section. Some sections had to be changed at a later stage due to some design or loading changes.

Turning Idea into Reality

Structurati Fabrication Pvt Ltd was appointed by Orbit Developers to carry out the entire fabrication work of this highly difficult yet innovative structure. When the building was in full swing, the labour strength applied was about 350. The most important thing of this building is that this could not have been erected in RCC as the size of the columns and beams would have been too large then. This is one such building which if to be made, its design had to be made in structural steel only. The design is absolutely unique as there isn't any such design in the world, and that extends not just to structural steel, but to every aspect. There is nothing similar to it been done in India ever before.

The sections which were been used in this building, a lot of the sections are not even available in India. So the fabricators had to go for a lot of built-up sections using plates of upto 125-mm thickness. Some of the plates were not even been manufactured in India, hence it was brought from Ukraine. As far as the sections are concerned, most of the sections have been brought from JSPL for which the orders were placed in bulk. The steel was provided by Orbit Developers by placing the order for steel accordingly. It was the Fabricator's responsibility to regularly update them on the material which is pending at the fabrication yard, so that lesser material can be ordered in the next batch. They were taking immense care to save as much material as possible with joints in the sections, with proper approval of the Structural Consultant, so as to save a lot of steel.

Challenges Faced

There were numerous challenges faced for fabrication as well as erection. In fabrication, the major challenge faced was subject to redesign. About 38 per cent of each and every component of this building was redesigned. Most of the components, even after the fabrication, were required to be redone because there was redesigning involved in it. In the entire building, no two same columns and beams are similar. Each and every column and beam has a different design, connection, detail and absolutely nothing is in similarity.

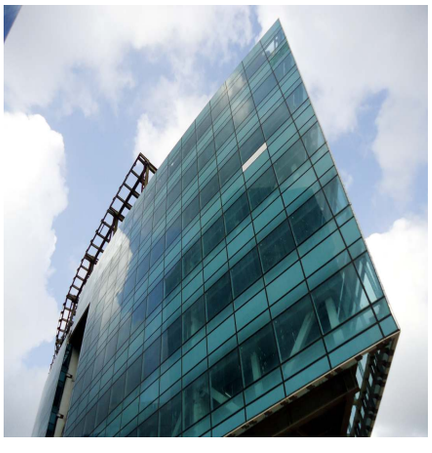
Even the variety and sizes of bolts being used in this building are immense. There are about 68-70 different sizes of bolts which are been used. There were about 65 different sizes of sections involved which are excluding the built-up sections that were fabricated. Around 30 per cent of the columns were built-up. These were all W-sections which are available only in the United States and not been manufactured in India. But since the costing was not feasible to import the material from abroad, the fabricators decided to go for the built-up sections which resulted in redesign. The fact that majority of the fabrication was carried out on-site, there were lot of complications involved from that as well.

As far as erection was concerned, the components were extremely heavy. It had columns of upto 15 MT and the tower crane capacity that they had over here was only of about 2 tonnes. Hence, a lot of sections could not be easily erected. The Fabricators continued to use the tower crane for most of the erection, but it was difficult to let go of the limit of the crane to erect them. This required getting the telescopic cranes on a regular basis to erect the components which just couldn't get erected by the tower cranes. A lot of components were erected using the chain pulley blocks.

A lot of structural steel buildings in India are been built with

JSPL Sections Used

Material No.	Order Qty
NPB 600X122.4	300
UB 305X46	100
UB 356X67	56
UB 406X67	26
UB 610X113	150
UB 610X140	26
UB 610X140	8
UB 305X46	46
UB 356X45	16
UC 305X198	60
UC 305X283	76
WPB 600X177.8	26
WPB 700X204.5	200
WPB 800X224	150
WPB 800X317	150
WPB 900X333	176
WPB 600X177.8	100
	1666



its lift core in RCC, but, in this particular building even the lift shaft is made in structural steel. The lift structure is completely mounted on structural steel columns and beams. Even The Shard of Glass, which is one of the prime structural steel buildings of the world right now, has its lift shaft in RCC because that forms the base of the building. There is no RCC involved beyond the ground floor level. All the slabs in this building are in metal deck. There are very few patches which were to be in solid slab, so metal decking was not used over there, and that too was because of the structural requirements. Otherwise all the slabs are in sheet metal decking.

Construction Methodology

For fabrication, all the cutting work was done by gas cutting and all the welding work was done using Ming Welding, Arc Welding, SMAW, SAW etc. Because of the built-up sections that were involved, it was lot more convenient to go for SAW welding. There were about 2 lakh holes that were to be drilled. There was not a single component that was allowed to leave the fabrication yard without being tested and inspected by the third party inspection agencies. All the materials which are in 355 Mpa grade were being tested to confirm to the quality standards. The building has a large open atrium which was another hindrance as far as fabrication is concerned. When the entire structure is connected to each other, the deviation in the plumpness of the column is much lesser. But because of an atrium in between, there was no connection between the primary columns, so there was a possibility of deviation of plumpness of the columns which had to be controlled in many different ways. Every different method to maintain the plumpness of the columns was being used to get the desired results.

While erection – primary columns, secondary columns, primary beams and secondary beams – was the order in which the erection was carried out. The fabricators tried to carry out fabrication in the same order, but the delays in drawings and the revisions in drawings delayed it to some extent. After the entire structure of 10 floors was completed, they erected the skylight. It is the connection between both the faces of the building and it forms the dome of the building which is covered by glass. That was again completely in structural steel with no presence of RCC. The entire welding work was inspected by Avishkar Group and the structural steel work was inspected by Access Consultants. Most of the fireproof painting was done by CDC Carboline and part of it by PFP Services.

Testing the Minutest

Each and every bolt that were used in the building were been tested and at no point of time the quality of bolts were been compromised. The minimum size of the bolts used is 16x100 mm and the maximum size is 36x270 mm. For every batch of bolts, inspite of the manufacturers test certificate, they were sent for testing to the appointed agencies by Orbit to confirm the standards.

The kind of testing process laid out at various steps ensured that even if one test is missed, then the second test does not miss that. Just for security purpose, multiple level of testing was carried out at various stages right from raw material, dimensional stabilities, welding qualities and thickness, fireproof paintings etc. In a controlled environment, everything comes in an automated manner.

The steel plates were mostly bought from JSW's local dealers at Kalamboli. All the plates were tested for their chemical and physical properties before they were purchased. An engineer would go, collect samples, get the material tested and only if it would confirm for 355 Mpa grade steel, would they take the material from the dealers. For steel plates delivered directly from JSW, it did not require any testing because the material would come from the manufacturer's test certificate. Of course, they did carry on the testing later on, but not before picking up the material because that's an assurity that people have in JSW and JSPL.

Using JSPL Sections

Every section that is there in the JSPL catalogue has been used in this building. There is hardly any section in their catalogue which has not been utilized. Even if there is only one single beam of that section, it has been used. Very rarely would it happen that JSPL would not be able to provide the sections in time, and then Orbit would go for a higher section which is readily available with them.

But, practically all the sections that JSPL can manufacture have been utilized by Dr Kelkar in the design of this building. That was the most unique bit of it because maintaining inventory of all these sections was quite a task. The maximum weight of the sections that was built up and used over here is approximately 1.3 metric tonnes per meter.

Detailing Solution

Techflow was selected to provide comprehensive steel connection design and structural steel detailing solution that can meet with the client requirement and schedule. Connections were schematically design with loads provided on drawing by the design team and sent to the fabricator for approval. All the connections are tailor-made to suit location and orientation of members. It took two months time to design all the connections. The entire design of structure is based on AISC standards. There is a circular grid and all columns from 2nd floor is 15o inclined outside and all floor peripheral edges are circular.

With significant aesthetic features designed into the steel structure, communication and coordination were essential for successful execution of the project. Cooperation between project managers involved in detailing and fabrication allowed the team to pursue the owner's aggressive schedule. Detailing of this structure was performed by efficient team of detailers. In order to efficiently and accurately produce shop drawings for the structure, Techflow utilized Tekla Structures to produce virtual 3D model.

A Learning Curve

The JSW Headquarter Building project was a learning curve for all of the project team involved in it. When it started off, from there to now there has been huge improvements. In case of high rises, the most preferred option is to go for a steel building, because in case of RCC buildings the size of concrete columns are huge, whereas in steel buildings it is of a very compact size. And in steel buildings the time of delivery, lead time, curing time and other factors which are there in concrete buildings gets eliminated as it is totally a mechanized process irrespective of the number of storeys.

Initially when this project was started it never had very specialized people on steel buildings. Basically, in India we have fabricators specializing in industrial sheds, but tall structures were never there. Since the detailing part which was provided by Burt Hill and revised by Dr Kelkar were highly detailed drawings, it was a learning process for the people working on the project. But at the end of the day with all the right intensions it has come out very well.

It took much more long time than initially it was expected as it was a totally new process by itself. But after the learning process was completed, then the proceedings were rather fairly quick. In this particular case, to attain precision in such a two-dimensional variation, as the building was sloping outwards and curving outwards, it was quite a difficult building to deal with.

One of the major challenges was the lack of skilled people initially in the sense who were aware to the process that was there. Since the Consultants gave enlarged details, for engineers it was much easier to learn, but to translate it into the working at site by labourers, it called for much of mind set. The movement of material was another challenge in itself.

Factors Assisting Green Certification

As far as the structural steel work of this building was concerned, there was no hindrance created in providing the Platinum LEED rating to the building. The only thing that was needed to be careful about was the scrap. The steel scrap was not to be mixed with the other debris, and that is something was paid attention to since the onset. Even in the fabrication yard and at the erection site, it was a conscious effort to separate the structural steel scrap from the debris as much as possible. The Developers had record of every bit of scrap that was generated at the site and it was kept and discarded separately. They were also quite clear and careful that none of the steel scrap gets mixed.

As far as electricity consumption is concerned, they provided the latest welding machines which require minimum amount of electricity consumption. All the latest machines with barely any electricity consumption were involved. These are some the basic things that all the structural steel agencies need to take care of in any project.

Normally, a building of this size would require air conditioning of about 1500 tonnes, but this whole project has been managed in about 500 tonnes. There are so many innovative things which one may not observe primarily by the look of it. The entire external façade is produced with very high performance glass. Almost 50-60 per cent of the heat that comes in is reflected out. It is not allowed to transmit in.

This building has two layers or skins of glass, and whatever hot air that is trapped inside these two layers a sense of cavity is created and the hot air's tendency is to rise up to the cavity. So naturally without any power, the entire hot air gets sucked up in the vergolas which are present at the top. Apart from that, these glasses allow most of the natural light to come in. So the functioning of the office to a larger extent is planned on natural day lighting. Only when the daylight is substantially down, the light will be required or in certain islands the lighting may be required for the entire day.

In terms of water discharge, the whole building has been planned to give zero discharge to the municipal drain. The black water is recycled and the sewage is treated. The entire water is either used for gardening, air conditioning, etc. One will hardly find any consumption and wastage in this building. Whatever is consumed and whatever is balance resolute, it is again being recycled and used. There is a water tank of about 15 lacs litres created for rain water harvesting. During the rainy season, the rain water gets collected here which serves as backup water source for the services part like housekeeping etc. And whatever overflow water is coming out from it, again that goes into another well which recharges the ground well present in the underground. It has been taken care that even the surface drain water, only after the subsoil is full recharged, goes into the storm drain of the BMC.

In terms of working comfort inside, one needs to have more of natural light coming into the office. Whatever fresh air is taken, the same amount has to be thrown out. So whatever air that gets thrown out, it takes out all the coolness and energy from that air through Heat Recovery Wheel System. The fresh air is re-chibbed using the energy in the cold air which is been taken out, so that the amount of energy required to cool this fresh air is substantially reduced.

There are CO_2 sensors placed in case of carbon dioxide level going up than what is marginally desirable, and the air conditioning detectors allows more fresh air to come in. At no point of time one will find there is any kind of staleness in the air. In the basement, they have put inline fans which are normally found in tunnels which are very energy efficient. Here, CO_2 sensors are also incorporated.

Being a very environmentally conscious group, JSW did not wanted to waste any energy, water, resources etc. The moment any employee enters this office, only his area gets lightened. Also sensors and detectors are put in place so that in case nobody is there in that area for some stipulated period of time, then the lights automatically cuts off.

The use of glass is also atypical, owing to the area's extreme heat. The innovative combination of high-performance tinted glass and double-walls, a first for an office building here, reduces heat loads to a sustainable level. By maximizing day lighting opportunities, the predominantly glass envelope lowers energy consumption even more, while washing the interiors of one of the largest completely open office environments in Mumbai with natural light.

Adding to the building's performance is a hybrid air conditioning system that cuts peak load energy use by 25 per cent. A security system fully integrated with Building Management System provides security awareness for security and protection employees' and visitor throughout the building.

The structural steel work for the building got completed in December 2010 itself. Only the little things which could not have done at that time were done at a later stage. The interiors of the building, well designed by Burt Hill and Edifice, are going to take quite some time. Right now glass work is just completed and the mockup work for interior work is going on. The opening is slated to be sometime in mid 2012. ■