

INFRASTRUCTURE CONSTRUCTION **&** Asia

SUSTAINABLE INFRASTRUCTURE

**Nehemiah
Reinforced Soil:
Doing
Something
Different
in Malaysia**



The software solution for design, detailing, manufacturing and erection



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Editor's Note

As the West (notably America and Europe) endure their cold temperatures and slowing economies, South and East Asia continue to thrive economically in the mild end-of-the-year weather which are reflected in this issue's articles.

More specifically, this last issue of ICA for the year 2010 showcases Nehemiah Reinforced Soil (NRS). The company started small but had lofty ambitions. It's main objectives was to be to survive as a successful business in the Malaysia construction industry that did not give or receive bribes.

Features include South Korea's huge Songdo Project to make use of over 1,500 acres of reclaimed land, Singapore's iconic and beautiful eco-friendly Gardens by the Bay, and some prestigious steel industry and engineering awards.

Royal Philips Electronics participation in the "i Light Marina Bay Festival" is this issues Special Feature in addition to informative energy and BIM-related articles.

This issue's transportation section features India's first privately funded, promoted and soon-to-be operational Rapid MetroRail Gurgaon Limited (RMGL) which is planned for full operation in January 2013.

We at ICA magazine wish our readers a prosperous and happy new year.

Steven Ray Wemple

Consulting Editor

The Story Of NRS

Nehemiah Reinforced Soil (NRS) started small, like a seed struggling to sprout from hard ground. Right from the beginning, the company's founders wanted to do something different in Malaysia. They had two pressing questions:

Would it be possible to start a business in the construction industry that did not give or receive bribes? Would it be possible to survive?

The Dream

The year was 1993. Dr. Nehemiah Lee Chee Hai, who was then working as general manager in a multinational firm, dreamed of starting a new company in the construction industry. This company, he thought to himself, would not offer bribes to obtain jobs. Nor would it receive bribes. In fact, this company must not be involved in any form of corruption. Would it be possible to do business in the construction industry with these principles in mind?

With this question in mind, Dr. Nehemiah Lee teamed up with his business partner Eugene Oh to incorporate Nehemiah Reinforced Soil on May 12, 1993. They had no capital, no marketing skills, and no track record. They hoped to carry out small projects building walls for bungalows. They hoped to play a small part in the infrastructural development of Malaysia by providing a cost-effective, durable retaining wall. And they hoped to earn a decent income without being involved in corrupt practices. That would be enough.

Early Beginnings

NRS first started out of Penang with Mr. Eugene Oh as its first employee. Shortly after that, both men decided to set up another office in Kuala Lumpur, where they rented a single room with one table and one telephone. The office looked so unimpressive that when they held interviews to recruit staff, the potential candidates would end up interviewing the company's founders. The candidates feared that the company would collapse even before it began.

One day, as Dr. Nehemiah Lee sat in his office looking out of his window,



Reinforced Soil: A Primer

The reinforced soil technology employed by NRS has been continuously improved and developed in-house by NRS since the technology was first introduced by Henri Vidal of France in 1963.

The principles of reinforced soil are simple: soil in compression is very strong (you can place heavy objects on top of packed earth). However, soil has weak tensile strength, so it falls apart or crumbles very easily under tension. By burying the steel bars (which has high tensile strength) in a mass of soil, a new composite material is produced that is both strong in tension (because of the steel) and compression (because of the soil). This composite material is called "reinforced soil."

By applying these principles, NRS walls are constructed to hold back the earth behind the wall. Large scale projects like highway interchanges, flyovers, bridge abutments, river and marine structures, slope stabilisation, housing development and quarry plants are carried out using the NRS walls.

his gaze fell upon the Damansara Utama flyover ramp. He thought to himself: "If I could just build a ramp like this, I would be more than happy. It would be so satisfying to see the ramp materialise, and to be able to say that I had built it."

Their first project in 1993 began with building a wall for a bungalow in Penang. The six-meter high wall was completed successfully (it remains standing today), but in order to build a track record, they did it at a loss.

The first big break for NRS arrived in early 1994 when the company was asked to build a retaining wall for JKR for a flyover project in Pantai Dalam, Kuala Lumpur. Despite stiff opposition from a rival company, and many sleepless nights, NRS received approval from JKR within three weeks. "This was our first big job. We expected to build walls for houses. We never expected a flyover project," Dr. Nehemiah Lee said.

Facing Challenges

The company gained further momentum when they successfully completed the subsequent project in building walls for the Kuala Lumpur Middle Ring Road II Project. But in carrying out these projects, whether major or minor, NRS frequently encountered ethical issues. Some jobs never materialised because the company refused to compromise with various stakeholders. Or they would face many obstacles in the course of completing the work.



Upper Serangoon Road, Singapore.



Upper Serangoon Ramp, Singapore.

The East Asian financial crisis in 1997, which devastated construction companies throughout the region, strangely enough, turned out to be a blessing in disguise. Despite the contraction in the Malaysian economy, NRS projects continued apace. Meanwhile, the company benefited from the drop in the price of materials such as steel and sand. "We were having a good time during the financial crisis but we didn't dare to say it!" Dr. Nehemiah Lee said. (In fact, the biggest challenge came in 1999, when Mr. Eugene Oh, one of the co-founders, was diagnosed with cancer and died four months later.)

"In our early days, we lost staff, lost jobs and often lived a hand-to-mouth



About the Company

Nehemiah Reinforced Soil Sdn Bhd was incorporated in Malaysia as a private limited company on 12 May 1993 under the Companies Act 1965 and commenced business on 1 September 1993.

The Founder and Managing Director, Ir. Dr. Nehemiah Lee, B.E.; M.Sc.; Ph D; P.E.; M.I.E.M. and his partner, the late Eugene Oh founded the company at a time when the country was still dependent on foreign technology for earth retention. However, today, Nehemiah has emerged as the market leader for the retaining wall system in Malaysia.

The Company specialises in the design, supply and construction of its own patented proprietary reinforced soil retaining wall system known by its brand name, Nehemiah Wall. Since its inception in 1993, Nehemiah has grown by leaps and bounds, and has exported the technology overseas to Singapore, Sri Lanka, Bangladesh and India.

In addition to Nehemiah walls, Nehemiah is also involved in the slope stabilization work using GreenMur which is a type of geotextile reinforced soil system. Patent application for GreenMur has also been granted. Nehemiah is also involved in the promotion of Segmental wall which is a geogrid reinforced wall with decorative finish. The Segmental wall is ideally suited for landscaping.

The company has been ISO9001 certified by Lloyd's since 2001, and has been a proud recipient of numerous awards such as the Brand Laureate, Red Bull, Ernst & Young, and Star Outstanding Business Award. The Nehemiah Group of Companies includes Nehemiah Reinforced Soil Sdn Bhd, Cribwall (Malaysia) Sdn Bhd, and Nehemiah Alliances Sdn Bhd. Each of these companies focuses on a specialised sector of the construction industry.

existence," Dr. Nehemiah Lee said. But in retrospect, certain events that appeared to be setbacks turned out to be blessings in disguise. Time and again, the seemingly lucrative jobs that they failed to secure turned out to have a sting in the tail. Had NRS taken on those projects, the company would have collapsed.

There appeared to be an unseen hand guiding the founders. This unseen hand can only be attributed to the gracious hand of God. "We don't always see the big picture. Lost projects aren't necessarily a setback. Now that we've been in business for some time, I can see that there are a lot of advantages in honoring God by upholding integrity. Over a long term, practicing integrity is very good for business."

Expanding Locally and Abroad

While NRS projects and order book continue to grow in Malaysia, the company has also found opportunities to expand overseas. Beginning with Singapore, NRS then successfully completed its first major joint-venture project in India, in 1998. Largely through word-of-mouth, NRS has grown from strength to strength, finding opportunities for expansion in Bangladesh, Sri Lanka, Australia and most recently Pakistan. **ICA**

Carrier Corp. Hosts Singapore Green Building Seminar Showcases Expertise in Sustainable Building Solutions

Carrier Corp. hosted a Singapore Green Building Seminar, with a focus on sustainable building solutions, at the Sands Expo and Convention Center, Marina Bay Sands, Singapore. Eight speakers presented solutions for improving energy efficiency to an audience of more than 300 building professionals, demonstrating how to drive sustainability and environmental stewardship forward in Singapore.

Carrier Corp., a unit of United Technologies Corp. (NYSE:UTX), is the world's leader in high-technology heating, air-conditioning and refrigeration solutions, improving the world around us through engineered innovation and environmental stewardship.

At the event, Carrier experts showcased sustainable building solutions in several customer case studies, including the Bosch Southeast Asia Regional Headquarters, where the innovative Evergreen® 23XRV chiller with its outstanding performance in efficiency and non-ozone depleting refrigerant enabled significant energy savings and contributed to the building obtaining the Singapore Platinum Green Mark for Buildings Award. Carrier also highlighted its newly launched AdvanTE3C Solutions Center, a global group of Experts in Efficiency and Environment focused on developing sustainable

building solutions, applying today's technology in an innovative fashion to capture even greater energy and environmental benefits.

Expert speakers at the event included representatives from the Singapore Green Building Council and from the Green Mark Department of the Building and Construction Authority (BCA).

"Carrier extends its leadership to the global green building community. We are the only company in the world to be a founding member of the USA, China and India

Green Building Councils, and we are proud to be recently named as a founding member of the Singapore Green Building Council," stated John Mandyck, Carrier's vice president for Sustainability & Environmental Strategies.

Mandyck briefed the audience on Carrier's sustainability advancements in its operations, culture, products and services. From 2006 to 2009, Carrier lowered its company greenhouse gas emissions by 33 percent, and from 2000 to 2009, lowered factory water usage by 52 percent and air emissions by 76 percent. "Green products must start at a green company," said Mandyck. "We look forward to serving as a global resource to advance green buildings in Singapore." **ICA**

Osaka Businesses to Help Build Urban Railways in Vietnam

The Vietnamese Government and some Japanese businesses in Osaka are considering the possibility of constructing urban railways in Vietnam with loans from official development assistance.

Vu Tien Loc, Chairman of Vietnam Chamber of Commerce and Industry, said Vietnam is facing the thorny issue of traffic jams in large cities such as Hanoi and Ho Chi Minh City.

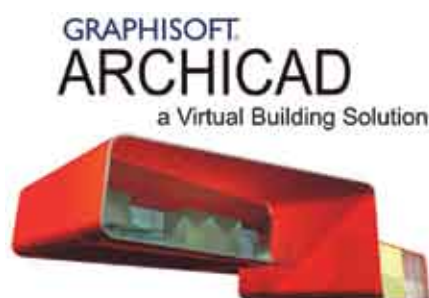
The country wants to build short range railways linking economic centres to eliminate the transport stagnation in Ho Chi Minh City, Dong Nai and Binh Duong in the south and Hanoi, Hai Phong and Quang Ninh the north, he added.

Osaka is a prefecture with many high-tech businesses that have paid special attention to investing in small and medium sized Vietnamese enterprises. Therefore, they also concerned with infrastructure in Vietnam to provide the most convenient means of transport for their workers. Shigetaka Sato, Chairman and CEO of Keihan Electric Railway Company and also Chairman of the Osaka Chamber of Commerce and Industry, said that in addition to railways building, the prefecture wants to strengthen its economic cooperation with Vietnam. **ICA**

ArchiCAD Sweeps Build Live Tokyo 2010 Competition

Team Safari Tour, led by Yasuo Ichii, and representing the giant general contractor firm Obayashi Corp., captured the Best Project Award by a corporate team at Build Live Tokyo in October using ArchiCAD. Competing corporate and student teams were assigned the task of creating a new media art centre. Participants had to ensure that the new centre would be an exceptional space for people to gather and experience art, nurture creativity among visitors, and function as an exhibit space and research centre.

"We achieved the challenging mission by making full use of ArchiCAD and its various applications, and were very happy with the prize-winning results," said Yasuo Ichii, Team Safari Tour leader. "BIM cut down the design time, and enabled us to



use the design in the construction planning," he added.

Four of eight of the corporate teams, and six of the eleven student teams created their designs with ArchiCAD. In total, 10 teams using ArchiCAD won awards, making this one of the most successful competitions for ArchiCAD users at Build Live Tokyo. In addition to the Best Project Award, ArchiCAD users also



won 2nd place, as well as the Incentive Award, Engineering Award, BIM Technology Award, EcoDesign Award, and Design Innovation Award.

In total, 16 out of 32 teams used ArchiCAD at all of the competitions thus far; and, for the third time in a row, a team using ArchiCAD has won the top prize at Build Live Tokyo. **ICA**

Singapore Sets Up National Solar Repository

The Solar Energy Research Institute of Singapore (SERIS) in collaboration with Singapore Polytechnic recently launched the national solar repository (NSR).

The NSR captures data from solar photovoltaic (PV) systems installed in Singapore, ranging from commercial and industrial to residential buildings.

To date, more than half of Singapore's installed solar systems are being monitored under the NSR. With the aim of accelerating solar adoption in Singapore, SERIS will analyse the systems performance data, and share the best practices and know-how in solar system installation and integration through a handbook for optimised PV system-design in the tropics.

The repository's website displays the location of each PV system on an interactive map of Singapore, as well as photographs of the various PV systems across the island.

"Singapore, with its dedication towards clean technology, has the unique chance to lead the pace for the dissemination of solar power in tropical climates," said Joachim Luther, CEO of SERIS. **ICA**

Sembawang Engineers and Constructors Wins Lower Seletar Waterworks Project Contract worth S\$180.6 million awarded by PUB Singapore

Sembawang Engineers and Constructors (Sembawang), one of the leading engineering and construction companies in Southeast Asia and a subsidiary of global conglomerate Punj Lloyd Group, is pleased to announce that it has clinched a major contract worth S\$180.6 million from PUB the national water agency of Singapore.

The Lower Seletar Waterworks (LSWW) project, awarded through a public tender by PUB, is to construct the new 60 Million Imperial Gallons of Water (MiGD) waterworks at Lower Seletar at the junction of Western Road Link (also known as Seletar West Link) and the Seletar Expressway (SLE).

Mr Richard Grosvenor, President and CEO of Sembawang said, "We are pleased to be awarded this important contract by PUB. Sembawang has an established track record in handling major waterworks projects and is one of the few companies in Singapore capable of providing comprehensive solutions for environmental projects such as the Lower Seletar Waterworks, ranging from design and construction to management services."

The scope of work includes construction, testing and commissioning for the waterworks and ancillary facilities. In addition, Sembawang will also provide a year's maintenance service after the completion of the construction work for some of the plant and equipment/systems. The LSWW will receive and treat water from the existing Lower Seletar Reservoir (LSR) and will deliver drinking water to PUB's Island Service Reservoir along the SLE. The site for the proposed LSWW is a 7.2-hectare plot of land along the newly constructed Western Road Link off the Seletar Expressway.

A new Raw Water Pumping Station (RWPS) is to be constructed adjacent to an existing RWPS at Lower Seletar Reservoir. The LSWW waterworks project is scheduled to be completed by April 2013. Sembawang has completed several past projects for PUB including contracts for Changi Water Reclamation Plant, one of the world's biggest wastewater complex, in 2008 and 2007; Jurong Sewage Treatment Works (Civil Works with M&E - Phase 3) in 2004; NEWater Service Reservoir at Tampines in 2004 and Chestnut Avenue Water Treatment Works in 2003. **ICA**

On 10 November 2010, Arup signed a Memorandum of Understanding with the Beijing City Plan

Municipal Institute of City Planning & Design (BMICPD) to undertake a 'Study on the Carbon Emission Inventories of the Beijing City Plan'. This is the first benchmark study to assess and evaluate the overall carbon emissions of the Beijing City Plan.

The signing took place at the China World Hotel, Beijing. Signatories of the agreement were Mr. Shi Weiliang, Director of the Beijing Municipal Institute of City Planning & Design, and Michael Kwok, Director of Arup. The signing of the agreement was witnessed by Gao Hucheng, Vice Minister, Ministry of Commerce, China; Vince Cable, the UK Secretary of State for Business; and members of the British Trade Delegation to China including Philip Dilley, Chairman of Arup.

Arup will undertake the study to identify carbon emissions sources,

their contributions, and the different levels of emissions under different planning scenarios for the Beijing City Plan. The study will identify low-carbon planning strategies to reduce carbon emissions as part of the statutory plan for Beijing from now to 2020 and beyond. Arup's strategy will focus on managing urban growth, economic development and transformation, green building codes, clean industries, green transportation, low impact infrastructure and renewable energy.

Signed during the British Prime Minister's Trade Delegation to China, this project demonstrates growing co-operation between UK and Chinese governments, businesses and research institutions to jointly tackle climate change issues. This technical study will serve as a best practice example for other cities in the country.

Philip Dilley, Chairman of Arup,

said: "This is another vivid illustration of the importance that China is placing on sustainability. I am delighted that Arup and Beijing will be working together to set out how a low-carbon approach to city planning can help a major and growing world city dramatically reduce their carbon emissions."

Vince Cable, the UK Secretary of State for Business, said: "Arup's expanding presence in China is testament to the strong economic relationship between China and the UK, and to the benefits that trade and overseas investment can bring to UK companies. I am pleased to see more and more companies capitalising on the opportunities offered by China's development. I hope that this week's visit will serve to open doors for more UK firms, and I wish Arup every success in their future business." **ICA**

Opportunities in Malaysia under ETP

The Economic Transformation Programme (ETP) launched by the Malaysian Government recently presents enormous opportunities to the steel industry, which can reap the benefits by participating in the various mega projects. This advice came from Dato' Sri Judin Abdul Karim, the Director-General of Public Works when addressing about 250 delegates attending the Malaysian Structural Steel Association (MSSA) International Convention 2010, held in Kuala Lumpur on 2 Nov 2010.

"With the support and initiative provided by the Government, and with various key projects identified, players in the steel industry will benefit in the ETP by contributing to projects like Greater Kuala Lumpur / Klang Valley (Greater KL/KV)," Dato' Sri Judin told the convention.

The ETP is a comprehensive roadmap that aims at transforming Malaysia into a high-income nation by 2020. It seeks to lift Malaysia's per capita gross national income (GNI) from about US\$6,700 or RM23,700 per annum in 2009 to

more than US\$15,000 or RM48,000 per annum in 2020, propelling the nation to the level of other high-income nations.

The Greater KL/KV vision is to simultaneously achieve a Top-20 ranking in terms of city economic growth rates while being among the global Top-20 most liveable cities by 2020 by attracting the dynamic international and regional companies to locate their global or regional headquarters in Greater KL/KV and growing its population to 10 million by 2020 through internal and external immigration programmes with a focus on higher-value jobs.

Explained Dato' Sri Judin, the initiative also presents various infrastructure projects for industry players to tap from. Under the Greater KL/KV plan, regional connectivity will be accelerated by deploying a high-speed rail system to connect Greater KL/KV and Singapore. At the same time, intra-city connectivity will be improved with a mass rapid transit (MRT) system.

Meanwhile, high potential destinations within Greater KL/KV would

be identified and upgraded to enhance liveability for residents and draw tourists and migrants looking to visit or relocate. Gaps in basic services will be addressed to ensure a well-functioning and liveable city, including establishing a comprehensive network of pedestrian walkways within the KL city to boost tourism and commercial potential.

He said the steel industry must move forward to ensure that Steel remains the preferred material in various industries based on its benefits in terms of superior quality and time-saving, even though its cost can be a concern.

Other notable speakers include Prof Dr Ir Mick Eekhout of the Delft University of Technology, and President of Octatube International in the Netherlands; Sheng-Jin Chen of the National Taiwan University of Science and Technology; Keiji Ando of Nippon Steel Corporation, Japan; Mingxuan He of Baosteel Metal, China; Bernard Chung of Tata Steel International, Singapore; and Tam (Malaysia).

ICA

Malaysia to Collaborate with India on Infrastructure

Malaysia, a pioneer in highway construction, will collaborate with Indian companies to give a new look to the country's expanding road network, special envoy on infrastructure, Samy Vellu has said.

Vellu, Malaysia's special envoy, with ministerial rank, on infrastructure to India and South Asia, told PTI that Malaysian highway toll company PLUS is going to have a joint venture with Nagarjuna company in Hyderabad and would together go for a tender in Andhra Pradesh.

He suggested that like Malaysia, India too should have a single company to collect tolls and said Malaysian company HOPETEC had collaborated with India's Punj Llyod to submit a proposal of the system to the Indian government.

Vellu said another partnership could be in the offing between United Engineers of Malaysia and Punj Llyod of India as the two

were in talks and could go in for a MoU to jointly bid for bigger tenders in highway construction.

"If the current rate of road development work continues India's roads and highways will see a complete change in a decade's time," Samy Vellu, who headed the Malaysian Indian Congress (MIC), the premier political party representing the ethnic Indian community in Malaysia, for 31 years before he stepped down last month said.

Vellu, who left for India to attend the Pravasi Bharati meet in New Delhi, would be meeting with various chief ministers to discuss on how to approach various projects.

"My view is that India, being a large country, should one day or another make a serious decision to have an all India expressway connecting all cities

"It should be a central government's expressway so that more

development can take place with interchanges coming up and becoming new hubs providing facilities to people," he said.

Vellu (74) felt the only problem to this scheme would be the rights of people on land. "It is not easy to get through. The government of India is aware and careful, that is why they are widening the highways first".

"India is much larger but it is very serious now in providing the right infrastructure to its people and in a 10-15 years the roads will see a dramatic change," he said.

Asked why Malaysian companies were preferred partners in road construction in India, Vellu said his country had the best technology in infrastructure building in southeast Asia.

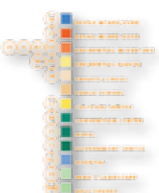
Source: The Economic Times (<http://economictimes.indiatimes.com/news/>)

ICA

Songdo International Business District (IBD)

Incheon
South Korea

Photo: Esch, H.G.



Songdo International Business District (IBD) occupies over 1,500 acres of reclaimed land on the West Coast of Incheon, Korea. This waterfront master plan includes a diverse array of programmatic elements and is designed to be a pedestrian friendly city with walkable streets and an urban density that allows for an active street life. The city will offer a quality of life unlike that of any

other Asian city.

The residential portion of the plan will include buildings ranging from 4 to 65 stories providing over 20,000 high-quality living units for 60,000 residents. The residential neighborhoods have large green areas and all parking is below grade. A new 100-acre recreational park features strongly at the city's center.

A 70-storey mixed-use landmark



Quick Facts

Name: Songdo IBD
Location: Songdo IBD, Incheon, Korea
Client: NSIC (Gale International and POSCO E&C JV)
Type: Master Plan, Mixed-Use
Size: 65 million ft² / 6.1 million m²
Awards: ULI/Financial Times Sustainable Cities Award (2008), HKIA People's Choice Award for Urban

tower will be constructed at one end of the Central Park adjacent to the 1.2-million-square-foot Convention Center. The tower will contain retail, residences, and office space with an observation deck on the 70th floor. Between the tower and the convention center will be a civic plaza. Additional facilities included in the master plan are a K-12 International School, a central park, and numerous residential, cultural and commercial

buildings.

About KPF

Kohn Pedersen Fox Associates (KPF) is one of the world's pre-eminent architecture firms, providing architecture, interior, programming and master planning services for clients in both the public and private sectors. Operating as one firm with six global offices, KPF is led by 20 Principals and 14 Directors.

The firm's 500-plus staff members come from 43 different countries, speak more than 30 languages, and include over 70 LEED accredited professionals. KPF's diverse portfolio, which features over 70 projects certified or pursuing green building certification, comprises corporate, hospitality, residential, academic, civic, transportation, and mixed-use projects located in more than 35 countries.

ICA



Photo: Esch, H.G.



Photo: Esch, H.G.

Launch of Singapore National Solar Repository and Solar Pioneer Awards Ceremony



The National Solar Repository (NSR) was launched recently by the Solar Energy Research Institute of Singapore (SERIS) in collaboration with Singapore Polytechnic at an industry event co-organised by Clean Energy Programme Office (CEPO) members EDB and EMA, as well as SBF and SEAS. The NSR captures data from solar photovoltaic (PV) systems in-

stalled in Singapore, ranging from commercial, industrial to residential buildings.

The repository's website (www.solar-repository.sg) displays the location of each PV system on an interactive map of Singapore, as well as photographs of the various PV systems across the island.

"Singapore, with its dedication

towards clean technology, has the unique chance to lead the pace for the dissemination of solar power in tropical climates. Testing and systems optimisation is still more focused on moderate climate zones, predominately in the Northern hemisphere. The conditions here are much more diverse, and we have to understand the implications on the technology. A comprehensive database across Singapore is a crucial next step as we move into the 'solar age'.

This is especially so in a few years time, where having reached grid parity, we will have to smoothly integrate thousands of solar PV systems into the electric power grid. By then, we will see the true value of the National Solar Repository," said Professor Joachim Luther, CEO of SERIS.

At the event, CEPO also awarded a second wave of private sector projects with the Solar Pioneer Award, supported under the S\$20 million Solar Capability Scheme.



Winners of the Solar Pioneer Award with Mr. Lawrence Wong (CE, EMA)



Renewable Energy Corporation plant

The six projects are GKE's Warehouse cum Office; Keppel Land's prime Grade-A commercial development, Ocean Financial Centre; REC's Integrated Solar Manufacturing Facility; SOLID Asia's project at United World College's (UWC) Tampines Campus; Standard Chartered Bank's Building at Changi Business

Park and Woh Hup's Headquarters Building.

Commenting on the awards, Dr Beh Swan Gin, Managing Director of EDB and co-Executive Director of CEPO said, "These private sector projects are part of Singapore's 'Living Laboratory' initiative to help com-

panies develop, test bed and demonstrate innovative products and solutions. These test bed projects will enable the solar industry ecosystem in Singapore to build up important capabilities, which can then be scaled up to capture opportunities in global markets."

ICA

Summary of Opening Remarks by Mr. Lawrence Wong, Chief Executive, Energy Market Authority, at the Solar Awards Ceremony (30 November 2010)

Mr. Lawrence Wong stated that "Today solar electricity is going mainstream, with more than 20 GW of solar PV installed worldwide. We are all excited about the potential to decarbonise our fuel mix with solar and other renewable energy."

He pointed out that one major constraint is in the available land, especially given Singapore's small geographical size: "Renewable energy sources are low in power density, which means that you need large amounts of land to generate meaningful amounts of power."

For example, solar PV power requires about 20-30 times as much land as a gas plant to produce comparable amount of power".

"Even if we were to cover all the accessible space in Singapore with solar panels, we do not expect it to contribute more than 10% of our electricity consumption" so "realistically, solar lacks the scale to replace more than a small proportion of fossil fuel use. Nevertheless,



within the limits of these we see the potential for more solar energy to be deployed in Singapore".

"At present there are 3 MWp of solar installations in Singapore and the grid can easily accommodate more solar power – up to 350 MWp, but beyond this threshold, intermittency becomes a problem", he added.

Mr Wong noted that the take-up of solar power has been slow due to cost mainly. Solar power is still

around two times more expensive than electricity generated from the grid. But the costs of solar PVs have been declining steadily over the years, and this trend is likely to continue.

Other factors have contributed to this trend also such as falling silicon prices and advances in wafering have contributed to lower module costs; cost savings from economies of scale and efficiency improvements in the balance of plant; conversion efficiency of solar modules (percentage of sunlight striking the solar device that is converted into electric current) is also improving; and Efficiency rate has increased by a few percentage points per year to around 15-19%.

In the solar business, a key reference point for players is when grid parity will be achieved – that is when the cost of solar energy is as competitive as grid-supplied electricity (with a shadow carbon price).

Gardens by the Bay



Source: Gardens by the Bay and National Parks Board



In order to give its members a first-hand experience of the construction of what will become one of Singapore's iconic steel structures, Singapore Structural Steel Society's Mr Anthony Tan had organised a site visit to The Gardens By The Bay at Marina South (GBMS). When completed, it will feature two huge steel-glass structures to house plants and trees from all over the world.

BACKGROUND

Singapore Gardens by the Bay is the largest garden project ever undertaken in Singapore, and a landscape project of world significance intended to raise Singapore's profile and cement its image as the leading garden city in the east. This project is integral to the future planning of Singapore as a major global hub and business centre. The master plan takes its inspiration from the form of the orchid flower, and has an intelligent infrastructure that allows the cultivation of plants that would not otherwise grow in Singapore.

This project was won in an international design competition as part of a team led by landscape architects Grant Associates.

When completed, the Cool Dry and the Cool Moist Conservatories will showcase Mediterranean, tropical and temperate



Source: Gardens by the Bay and National Parks Board



annual plants and flowering species. The Cool-Dry Conservatory will explore issues related to plants and people, whilst the Cool Moist Conservatory will focus on plants and the planet.

The structure will be integrated with the façade system and shading system to minimise the overall silhouette that obstructs natural light entering the conservatory. More specifically, the envelope itself consists of a grid-shell-arch steel structure with a double glazed skin that sits directly on the grid shell.

The façade system is an integrated part of the steel arch and grid shell system and is considered as an integral component of the overall envelope.

As the main contractor for this prestigious project, Woh Hup (Pte) Ltd hosted the SSSS visitors during the site visit on 14 August 2010. The visit was arranged by Senior Technical Manager Mr Wong Kean Tong; Senior Site Manager Mr G. Gunasekaran (Guna) gave an introductory presentation about this project to the visitors.

STRUCTURES IN WO H HUP (PTE) LTD'S SCOPE OF WORKS :

- Cool Dry Glass Dome
- Cool Moist Glass Dome
- Visual Mock-up Unit (VMU) of a small area of the final steel-glass roof
- Visitor Hub connecting the two Domes
- Services Tunnel
- Three artificial 'Super Trees' at the Lake cluster.





The entire Gardens will house total 18 Trees, ranging in height from 25 to 50 metres. Project start date: March 2009. Target completion date of the project: December 2011.

COOL DRY GLASS DOME (under construction)

This structure spanning north-south will consist of 16 Steel Arches and a grid-shell structure made of S355 high grade steel and finished to a high architectural quality. Glass panels will be mounted on this grid-shell. The arches are numbered starting from the centre, West side – W1 to W8; and on the East side – E1 to E8. The length of these arches ranges from 137.3 metres to 100.5 metres, and have a maximum height of 39 metres. The arches are designed as fixed at north base and partially fixed flexible connection at the south base. The grid-shell structure is designed as a 'Partially Fixed Flexible' connection at perimeter

base.

The arches are fabricated and delivered to site by Yongnam Engineering & Construction Pte Ltd in segments of up to 22.5 metres length. These segments are joined and welded at site on top of a temporary support. Two numbers of nose segments for each arch, of a total weight of about 30 tonnes, are joined at the ground and hoisted up. The fabrication of the arches and the grid-shell are done to high accuracy – maximum 8 mm variation at the three directions, mandated by the precision requirements for the grid-shell dome structure constructed beneath the steel arches, on which the glass panels will be mounted subsequently. The grid-shell is made of hot-finished triangular hollow sections.

The construction involves different levels of temporary Crash Deck to support the structure and accommodate the scaffolding which are used

for the installation of the steel structure and glass panels. The erection sequence for the arches is symmetrical, ie. starting with E1 and W1, followed by E2/W2, E3/W3 and so on, both sides continuing equally.

Installation of the glass will begin centrally and progressively continue to the sides, in order to load the structure equally. The glass panels at the grid-shell will range in sizes from approx 1m x 2m to 2m x 3m, with a weight of up to about 400 kgs.

COOL MOIST GLASS DOME (base under construction)

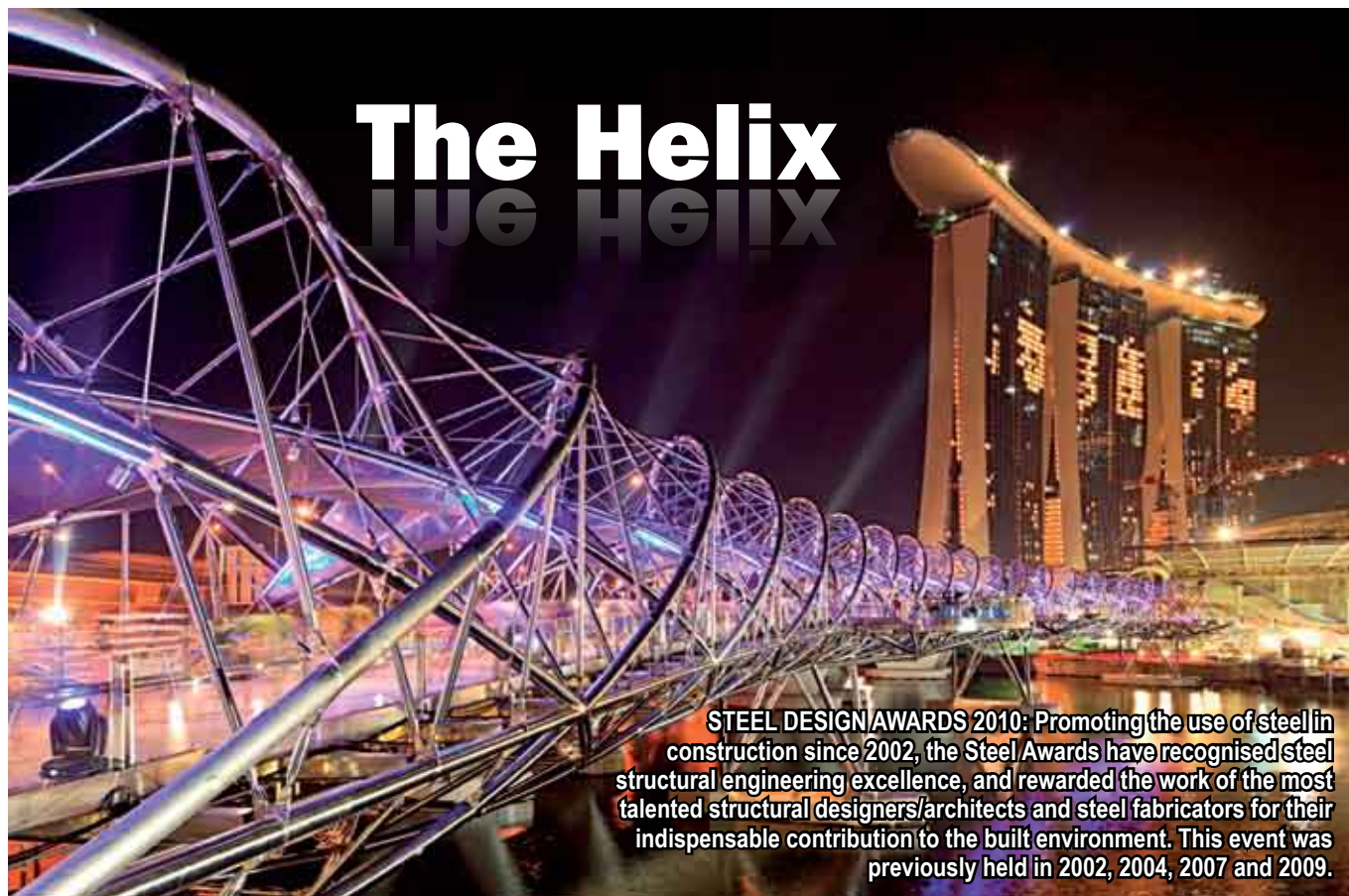
The construction sequence for the 'Cool Moist Glass Dome' will be identical to that of the 'Cool Dry Glass Dome'. The crown of the arch will be a height of 59 metres. The unique aspect though is that this dome will enclose a 39 metres high mountain-shaped RC structure (under construction shown in the picture, left), with a waterfall at the centre of the dome. The concrete surface of this mountain will have a Green Wall. Additionally, there will be a 31 metres high "Cloud Walk" plus a 13 metres high 'Canopy Walk' for the public to stroll around.

Structural steel design was done by Meinhardt (Singapore). Prof S L Chan of The Hong Kong Polytechnic University and Prof Richard Liew of NUS provided independent review on second-order buckling and recommended bolted connections at certain locations of the grid-shell to better accommodate the temperature load case.

VISUAL MOCK-UP UNIT (VMU)

In order to ensure that the Domes are constructed to meet stringent criteria, a mock-up structure was erected to actual size and to test the architectural finishes. **ICA**





STEEL DESIGN AWARDS 2010: Promoting the use of steel in construction since 2002, the Steel Awards have recognised steel structural engineering excellence, and rewarded the work of the most talented structural designers/architects and steel fabricators for their indispensable contribution to the built environment. This event was previously held in 2002, 2004, 2007 and 2009.

The architectural and engineering marvels behind The Helix provide nothing short of a magical and intriguing experience for bridge users. As the bridge is designed to curve to connect seamlessly with the pedestrian promenade at the Bayfront and Marina Promenade, bridge users can see the entire structure of the bridge while crossing it. The 280m bridge, comprising five spans (three internal spans, each 65m and two approach spans, each 43m), forms part of a 3.5km waterfront promenade that loops around the Marina Bay.

Crossing the 6m-wide bridge is

a unique experience as fitted glass and steel mesh canopies dotted along the inner spirals, providing shade from Singapore's tropical climate. Four viewing pods extend out over the water. Positioned in strategic locations, these platforms let visitors enjoy the expansive skyline vista while watching events by the water and shoreline. Glass panels on the floor also provide a visual connection to the water below.

The design inspiration behind The Helix is entirely forward-looking: its resemblance to DNA as a symbol of continuity, renewal, and everlasting abundance, reflects Singapore's aspirations for Marina Bay. **ICA**

Submitted by:
Arup Singapore Pte Ltd

Client:
Urban Redevelopment
Authority of Singapore

Architects:
COX / Architect 61

Contractor:
Sato Kogyo (S) Pte Ltd

Structural Engineer:
Arup Singapore Pte Ltd

Steel Fabricator:
TTJ Design & Engineering Pte Ltd



Marina Bay Sands SkyPark



Sands® SkyPark® is one of the iconic features of the Marina Bay Sands® Integrated Resort (MBSIR) located in the Marina Bay area. The 1ha SkyPark® sits atop three 55-storey hotel towers and includes facilities such as landscaped gardens, signature restaurants, infinity pools and a 65m

cantilevered viewing platform which offers visitors a 360° view of the city. The SkyPark® is the world's largest cantilevered public observation deck – it measures 38m wide, 340m long and used over 7,000 tonnes of steel in its construction. The extraordinary SkyPark® is now a landmark, and a symbolic icon for Singapore, similar to what the Sydney Opera House is to Sydney.

The superstructure is likened to a bridge that sits atop three 55-storey hotel towers. Notably, the most challenging aspect of is the 66.5m long SkyPark® cantilever that overhangs from hotel tower 3. As the experts behind the engineering works of Sands SkyPark, Arup spent considerable time to conduct various stress tests. Much time and analytical effort was spent by Arup's bridge and dynamics specialists to ensure we understood the complex behaviour under wind and human excitation (dancing etc).

Arup had to overcome a number of structural challenges, the first of which was

Submitted by:
Arup Singapore Pte Ltd

Client(s):
Marina Bay Sands Pte Ltd

Architect(s):
**Moshe Safdie Associate
in association with AEDAS Pte Ltd**

Contractor(s):
JFE-Yongnam JV

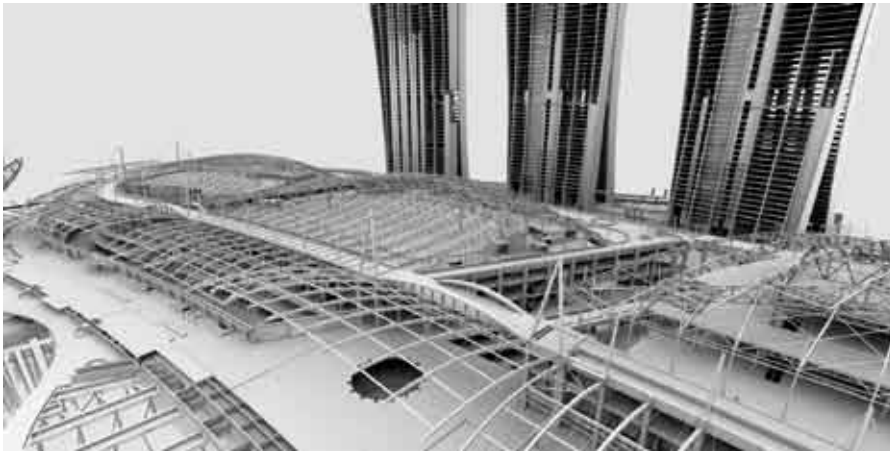
Structural Engineer:
Arup Singapore Pte Ltd

Steel Fabricator:
Refer to Contractor(s)

to formulate a design that allowed for safe and easy erection so far above the ground. This was achieved through a combination of bridge and building technology. The second was to cater for the natural movements of the towers upon which the SkyPark® was to be supported, through the composition of five distinct joined plates. The third challenge was the dynamics of the SkyPark® in response to strong winds and vibration caused by people movement. The dynamic properties of a structure are particularly hard to predict as there are many elements of the structure and architectural finishes that contribute to this. Arup thus designed large tuned mass dampers that act in a similar manner to shock absorbers within the SkyPark®'s belly and carried out large scale vibration tests to verify the design.

ICA





Marina Bay Sands Podium Roof & Canopy Structures

The Marina Bay Sands® (MBS) Integrated Resort is aimed at becoming a key element in Singapore's tourism market, and is an icon for the island's Marina Bay redevelopment. MBS integrates the waterfront promenade with civic space, shopping, indoor and outdoor spaces endowed with city skyline views, daylight and plant life, to provide an abundance and variety of activities.

This development comprises state-of-the-art Meetings, Incentives, Conventions and Exhibitions (MICE) facilities, a massive events plaza, two theatres and a multi-level retail arcade lining the waterfront

promenade. Enclosing these striking buildings are the stepped, wave form Podium Roof & Canopy Structures. Every component of this development is technically challenging.

The Podium Roof comprises long span roofs enclosing the Casino, Theatre and MICE facilities. They span up to 120m and exhibit highly-complex stepped, wave form surfaces. The retail arcade is sheltered by various lightweight canopy structures, some of which have plan dimensions of 45 x 90 metres, and are connected to pedestrian bridges spanning 60m. The canopies have a double curved geometry and are cable-stayed back to the Podium concrete structure. **ICA**

Submitted by:
Arup Singapore Pte Ltd

Client(s):
Marina Bay Sands Pte Ltd

Architect(s):
Moshe Safdie Associate
in association with AEDAS Pte Ltd

Contractor(s):
Yongnam Engineering
& Construction (Pte) Ltd,
Alfasi Construction (Singapore)
Pte Ltd,
Singapore Jinggong Steel
Structure Pte Ltd

Structural Engineer:
Arup Singapore Pte Ltd

Steel Fabricator:
Refer to Contractor(s)



Tekla Structures in Practice

Aldar Headquarters
United Arab Emirates (UAE)



The first spherical building in the Middle East, the Aldar Headquarters, was William Hare's first BIM (Building Information Modeling) engineering project on civil structures in the Middle East. Engineering and model data were used at the earliest stages of the project to take full advantage of early procurement and optimised use of material.

William Hare used Tekla Structures BIM software to develop their

clients' designs, maximise efficiency, and engineer practical solutions to manufacturing facilities.

Engineering and model data were used at the earliest stages of the Aldar HQ project to take full advantage of early procurement and optimised use of material.

As a group, William Hare has used Tekla software for the last 10 years. On petro-chemical projects BIM is a routine process for the company, but for civil structures, the Aldar HQ was

the first BIM project for them in the Middle East. The challenge in the project was to absorb minor details from the engineer's and architect's design, for which more integrated model checks had to be carried out with other trades' modeling solutions.

"In initial engineering, a 5% time saving was achieved by utilising the architect/consultant's model with similar levels of accuracy. Greater time savings in engineering were



utilised to allow a wider coverage for those disciplines concerned to access and understand the structural details." Andy Gleaves adds.

Voted as the Best Futuristic Design 2008 by the Building Exchange Conference, Aldar HQ represents a striking addition to the Abu Dhabi skyline, whilst also providing flexible office accommodation to corporate occupiers. In addition to the distinctive design of its structure and finishes, its floor plates retain a high level of efficiency and provide functional, open plan office space capable of accommodating a multitude of fit-out options.

achieved by importing data from follow-on trades, which interfaced with the steel structure. If we had been required to use 2D information on follow-on trades, it would have added another 20% to the detailing of the project," stated Andy Gleaves, Engineering Director at William Hare.

"In the fabrication stage, drawing details derived from the Tekla model were seamlessly used with our in-house fabrication data package to produce NC files for use with our CNC machines and to manipulate bill of material data. During erection, the drawings and reports along with the Tekla Web Viewer models were

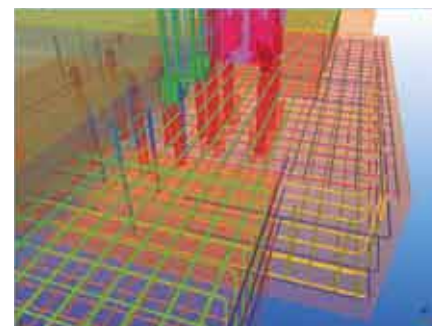
Set upon an elevated peninsula affording spectacular views of the city, canal and sea, the Aldar Headquarters building's location provides proximity to leisure and retail outlets located in Al Dana and throughout Al Raha Beach.

This building is the first spherical building in the Middle East, standing at approximately 110 metres in height with 23 floor levels. The building has a diameter of 120.9 metres; its width varies from 10 metres at ends to 36.4 metres in the middle. Its structural design consists of a central concrete core for transferring environmental lateral loads, with



Aldar Project Participants

Project Owner:
Aldar/Laing O'Rourke JV
Multi-Discipline Consultant:
Arup
Architect:
MZ & Partners
Steel Contractor:
William Hare
Facade:
Gartner/Permasteelisa



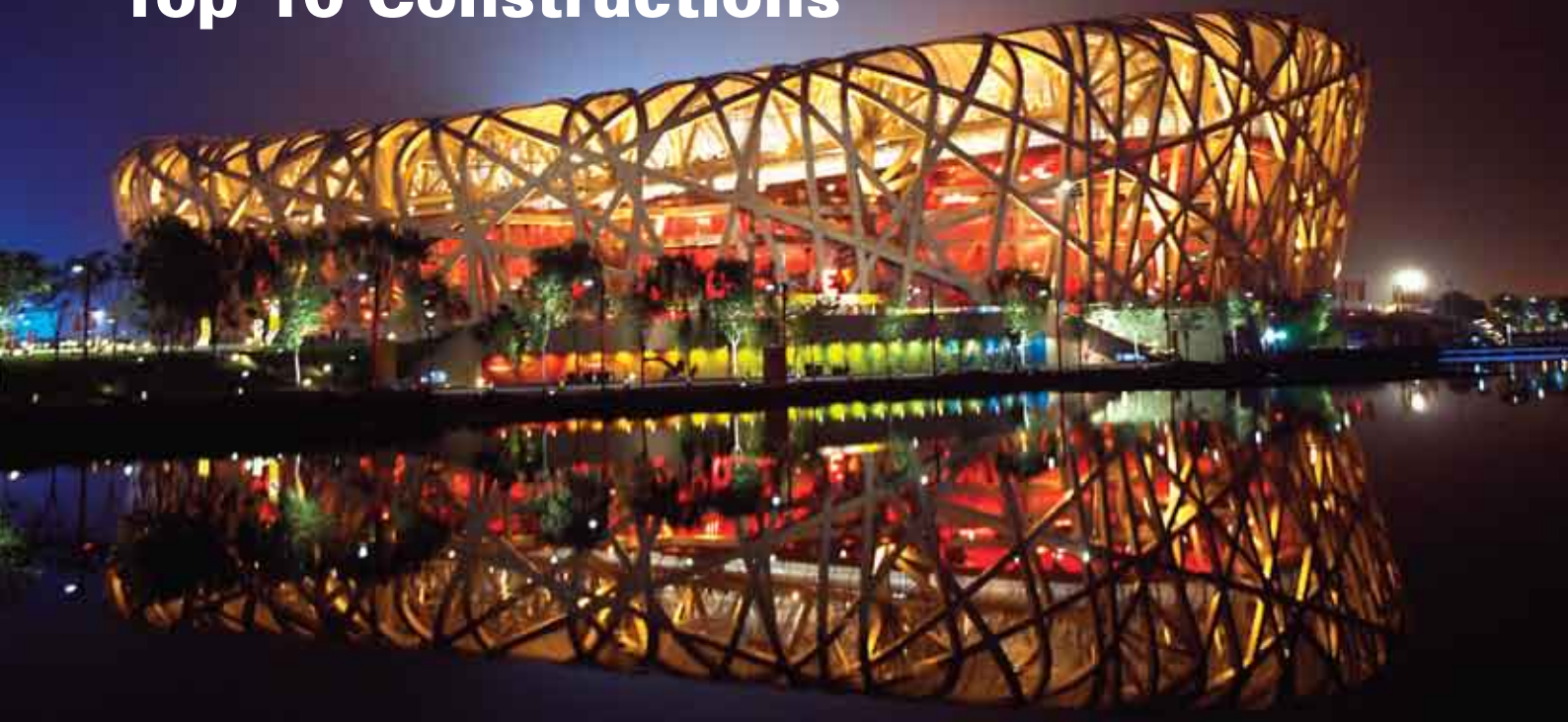
peripheral diagrid support columns forming the building's envelope.

Furthermore, the unique building comprises 6,400 tonnes of steel; 55,000 square metres of decking panels; and 25,000 cubic metres of concrete, and has an area of glass of 25,000 square metres (3200 panels of glass). It will have a total gross floor area of 61,900 square metres and a total net area of 51,361 square metres.

It includes many complicated elements, such as peripheral diagrid columns, an outer ring, internal ring, central ring columns, diagrid nodes, and an in-plane truss connecting the outer, internal and central columns at all floor levels. The roof is an integral part of the building with primary beams in line with the columns.

A varying number of detailers worked on different stages of the project at William Hare. However, only the peak point required a maximum of 40 detailers. The company estimates to have saved approximately 25% in time compared with a traditional process of client and sub-trade drawing issuance. Because of using a sub-assembly concept, the company estimates having achieved 20% cost savings for the project in drawing editing. Producing individual component drawings with the sub-assembly concept enabled dramatic savings in workshop fabrication hours, in addition to de-skilling some of the component manufacture. **ICA**

ITT China Serves the World's Top 10 Constructions



Bird's Nest Olympic Stadium



BC moma, Beijing



CCTV building

With fascinating unique designs, these are the world's top ten constructions in 2007 selected by Time magazine, the most influential Newsweek in the United States with the name the world's "Recorder of History", three of which are in China, namely, the Beijing Olympic Stadium (the "Bird's Nest"), CCTV Headquarters, as well as Beijing Moma. On the basis of ITT's excellent technical strength and over 150 years of international engineering and manufacturing experience and in close co-operation with dealers, Beijing Office of the Construction Services sector in ITT's integrated front-end organisation IFE was awarded the pump equipments project of these three buildings in the bidding competition with world famous brands such as Denmark's Grundfos, Germany's WILO, Japan's Ebara.

Beijing National Stadium – the Bird's Nest Project. Designed by the famous designer Herzog and de Meuron and selected as one of the world's top ten constructions in 2007, the National Stadium is located on the gentle slope in the center of the Olympic Park. The venue looks like a container, the appearance of volatility easing the volume of the construction and giving it a

dramatic and striking shape which is pure and perfect because the exterior is also the structure itself and the elevation and the structure achieve the perfect unity.

Structural components mutually supporting each other, a network-like structure is developed like a nest of woven branches. The spatial effect of the stadium is not only unprecedented original, but also concise and elegant, which has set a unique historic landmark for the 2008 Olympic Games.

The opening and closing ceremonies of 2008 Olympic Games will be held in the Stadium, and the athletes who participate in the 2008 Summer Olympic Games will also compete here. The project will use 12 GISO series large flow end suction pumps, about 100 submersible grinder pumps and 150 sets of centrifugal pumps produced by ITT Nanjing in order to guarantee the normal operation of air conditioning of the Olympic venue during the Games!

"Incredible" might be the right word to describe the cantilever of the CCTV new site. The two leaning towers cantilever out respectively in the 162 metres altitude and successfully "shake hand" with each other. Standing under the cantilever, the



feeling is the word: shocked. When they are joined together, the two Zs have also realised the world's most radical architectural design.

CCTV new site was designed by the famous architect Rem Koolhaas with a designed cooling capacity of 9,600 tonnes of refrigeration, which presents a challenge for the HVAC air-conditioning system of the whole building to conserve energy on the basis of normal operation.

Applying Bell & Gossett's advanced HVAC design concepts to CCTV new site, the state-level key project, IFE Construction Services employs the latest new products developed by ITT Bell & Gossett, including a total of approximately 70 VSX series air conditioning circulating pumps, HSC-S Series, and 1510 Series end suction pumps and

a total of more than 400 submersible sewage pumps, which equip the HVAC systems, thermal stations and drainage systems of this huge artistic masterpiece with a strong heart and a reliable guarantee that help designers achieve the best energy saving effect while overcoming various technical issues.

The eight towers of Beijing Moma, a dual-use commercial and residential building, will be connected together by overpass corridors.

Located in Dongzhimen, Beijing, the huge complex, the eight towers of which are connected by overpass, has been selected as one of the ten most famous constructions in Beijing. With an area of 22 hectares and a total construction area of about 660,000 square meters, the construction comprises a total of 19

residential buildings, an apartment building, two clubs and other facilities.

Designed by the world-famous architect Steven Hall (who is also the designer of another top ten construction Block Building, an expansion of Nelson Museum of Art in Kansas City, Missouri, the U.S.) and Akiyama from Japan responsible for the landscape design, Beijing Moma absorbs the current international advanced architectural art and embodies ethnic style, reflecting the characteristics of the times.

The project was named one of "China's Top 10 New Constructions" by Business Week, the world famous website in the U.S., in December 2005. In December 2006, it was named by "Popular Science" as one of the "World's Top Seven Constructions in Modern Time" and also won the "US LEED-ND Green Community" certification. While 2007 was drawing to an end, it was selected by "Time" magazine as one of the World's Top 10 Constructions In 2007.

All the air-conditioning system of the project employs world-famous brand equipments, for example, ITT Corporation provides 22 GFC, 22 SV and 5 FCE pumps to meet the requirements of the air-conditioning system of the project, winning the full trust of users.

About the Company

ITT-RCW is a high-tech engineering and manufacturing company with US\$10.9 billion in revenue for 2009. It has over 40,000 employees in 140 countries worldwide and is listed a "Fortune 300" company. The company's portfolio includes defense electronics and services; fluid technology; and motion and flow control.

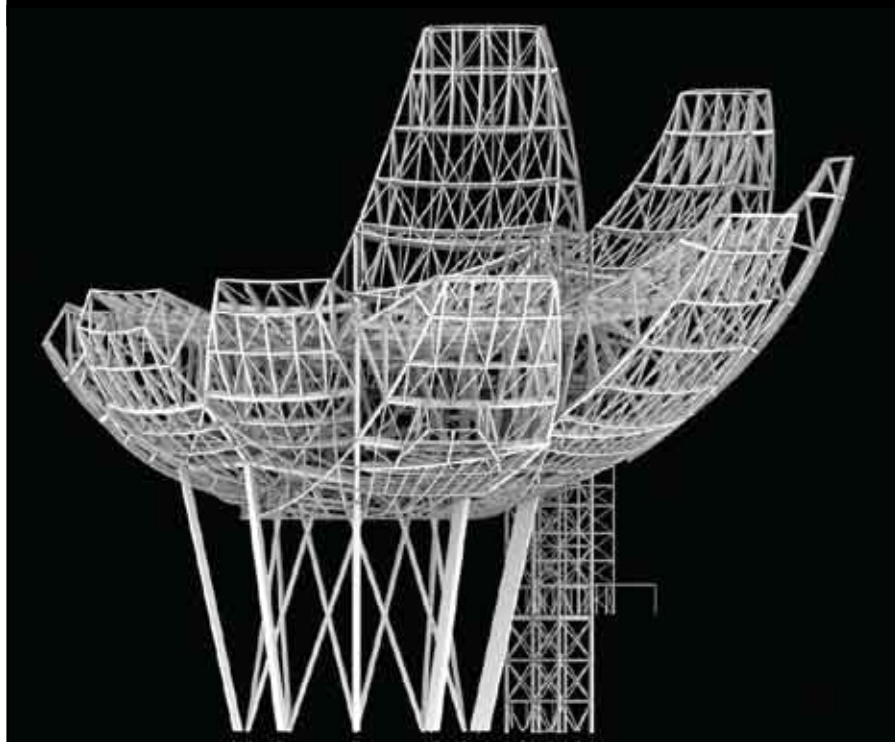
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Marina Bay Sands (MBS).

Marina Bay Sands and Arup win **Be Inspired Award**



Singapore's newest integrated resort, Marina Bay Sands, has won another international award for its innovation in structural engineering. Since its opening six months ago, Marina Bay Sands has quickly become one of the world's 'must-see' spots, capturing the imagination of travelers from around the world with its unusual and stunning building design and architectural features.

The US\$5.7 billion Marina Bay Sands, conceived by Sheldon Adelson, Chairman and Chief Executive of Las Vegas Sands Corp, and designed by world-renowned architect Moshe Safdie, has recently emerged as the winner in the "Innovation in Structural Engineering" category of the recent Bentley Systems' 2010 Be Inspired Awards.



MBS night view.

The award recognises projects that have demonstrated excellence in planning, modeling, analyzing, designing, or delivering structures. Selected from a pool of 20 other entries, Marina Bay Sands and its consulting engineer Arup shone for their

experts, selected the 19 winners from 320 nominations submitted by 249 organisations in 45 countries.

Arup has had to overcome a number of structural challenges in the project which is characterised by three cascading hotel towers topped

allow for safe and easy construction at 200 metres above ground – the height of the SkyPark – and in the deep marine clays at basement level was needed. Arup achieved this successfully with a combination of innovative engineering approaches. It also adopted innovative 3D modelling technologies, which were especially beneficial in the engineering of the project's complex structural steelwork in a short time frame.

Earlier this year, Marina Bay Sands – through Arup – also received two awards at the 2010 Singapore Structural Steel Society (SSSS) Steel Design Awards for its design of the project's podium roof, canopy structures and Sands SkyPark.

The construction of Marina Bay Sands, a monumental feat involving 15,000 construction workers at its peak since 2007, has drawn keen interest from broadcasters from all over the world. One particular construction milestone involved the hoisting of the Sands SkyPark in one of the highest strand jacking operations ever undertaken in the world. This involved 14 individual lifts, with each component weighing up to 790 tonnes. The 340-metre superstructure, which weighs more than 7,000-tonnes, was designed using a unique combination of bridge and building technology. Since its opening on 24 June, the Sands SkyPark, which boasts an infinity pool, landscaped gardens and signature restaurants, has welcomed over 350,000 visitors to the Public Observation Deck alone.

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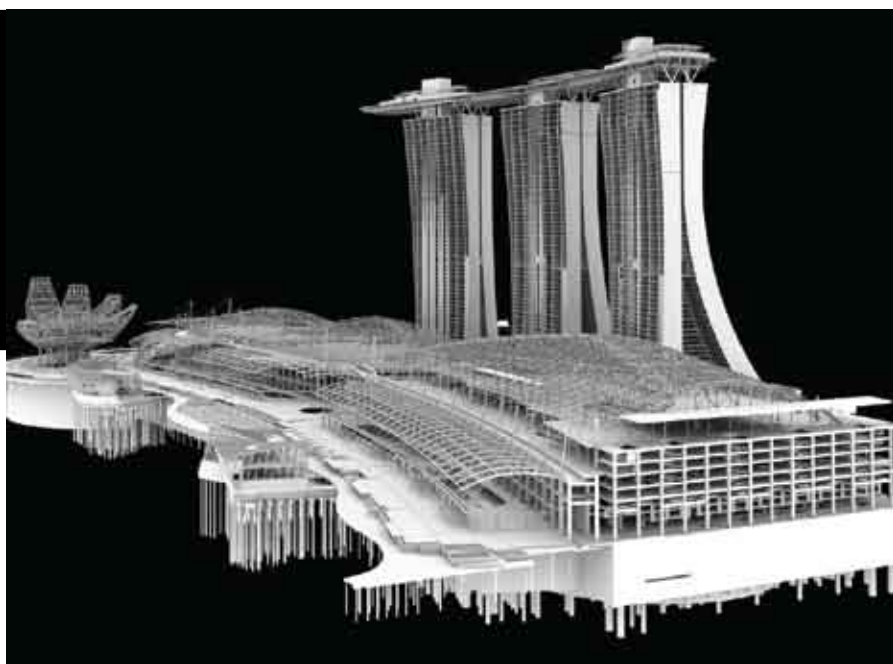


Photo credit – Arup

3D model of MBS.

use of technical innovation to deliver the stunning structure that stands in the heart of the new Singapore downtown.

The Be Inspired Awards program has recognised over 1,000 of the world's most outstanding infrastructure projects since its 2004 inception. An independent panel of jurors, which included accomplished Bentley users and distinguished industry

with a 1.2ha Sands SkyPark; two crystal pavilions and a lotus-inspired museum. Notably, the most challenging aspect of the project was the SkyPark cantilever, the longest of its kind in the world. Arup designed the structure to withstand strong winds and vibration caused by people movement; and to provide optimal comfort for guests.

The design was formulated to



Animal Tree by Pitupong Chaowakul Thailand



A Blue Mirage in the City of Light by WY-TO

Philips illuminated Asia's First Sustainable Light Art Festival



The light within by Vellachi Ganesan Singapore

Royal Philips Electronics was proud to be the principal sponsor at the "i Light Marina Bay Festival", Asia's first sustainable light festival that commenced on 15 October and concluded on 7 November 2010. Presented by the Urban Redevelopment Authority (URA) and organised by Smart Light Singapore (SLS), the i Light Marina Bay Festival is a unique light festival that creates a dynamic visual night-time environment in Singapore's newly developed Marina Bay area.

As a light art festival in an urban setting, i Light Marina Bay aimed to raise awareness for energy-saving lighting technology in the commercial environment, public spaces and within homes; as well as to effect behavioral changes towards energy consumption and long-term sustainability of the city. Philips' participation in the Festival reiterated its commitment to the creative lighting community and is in line with its vision to showcase how lighting solutions can transform urban spaces, shape identities and create new experiences for local communities.

A key highlight at the i Light Marina Bay Festival was a unique 3.5 km long 'Light Walk' around the Marina Bay waterfront promenade which is illuminated by Philips Lighting. The 'Light Walk' comprised 26 dynamic light art installations and sculptures designed by 20 international and 14 Singaporean artists. Their beautiful light artworks were created using energy-efficient lights and lighting techniques. Powered by Philips, this specially designed 'Light Walk' showcased how lighting can help transform urban environments in a sustainable and environment friendly manner while simultaneously creating new spaces for local communities to interact in and enjoy their cities.

"Philips is excited to be participating in the first sustainable light art event in Asia that creates a dynamic visual presentation through the unique application of light. We are committed to collaborate with the creative lighting community to drive sustainable lighting. Our participation in this event support our vision to show how sustainable lighting can transform environments, create



Flight To Light by Mary-Anne Kyriakou, Australia. experiences, shape identities which enhance the health and well-being amongst a city's residents while reducing carbon footprint for the city, communities and individual," said Rowena Lee, Vice President and Head of Marketing, Philips Lighting Asia.

"Through our participation at i Light Marina Bay Festival, we and our creative lighting partners jointly aim to demonstrate how lighting technologies can be used in a sustainable way to illuminate city landscapes and skylines, rejuvenate cultural hubs and business centers and make cities more livable," she added.

On the sidelines of i Light Marina Bay Festival, Mr. Rogier van der Heide, Vice-President Philips Design and Chief Design Officer of Philips Lighting, participated as a panel speaker at the Smart Light Symposium on Light Art: the making of a movement. At this forum, Mr. van der Heide shared Philips' vision of enhancing life with light and showcased how innovative lighting leverages urban interaction, enhance community and promotes well-being and safety.

"Light plays an essential role in the positive experience of the urban landscape and our well-being in buildings," said Rogier van der Heide, Vice President and Chief Design Officer of Philips Lighting. "Energy efficient lighting, such as LED, now offers tremendous opportunities for designers to create the future of light, in the public space, architecture and in artworks alike. As an example, imaginative lighting of iconic landmark buildings adds to a city's identity and brand value."

Philips also supported an initiative by SLS to create awareness for sustainable energy utilisation. The largest installation in the Festival was powered with bio-fuels from used cooking oil. Working closely

with businesses around Marina Bay, 4,500 litres of waste cooking oil was collected for conversion into bio-diesel to run generators to power up the Festival's largest installation – My Public Garden by TILT.

This installation comprised 29 artworks ranging from 3 to 11 metres tall. On 23 October 2010, from 7.30pm to 9.30pm at The Promontory@Marina Bay, members of the public also contributed used cooking oil in exchange for a Philips energy-saving light bulb. The initiative aimed to create awareness for better waste management, and underscored how communities can positively impact the environment in which they operate. It also highlighted how the use of energy-efficient lighting can help individuals, communities and cities improve their sustainability quotient.

The latest award-winning LED lighting systems from Philips ColorKinetics, as well as energy efficient lighting solutions from Philips Selecon, which specialises in lighting entertainment and architectural displays, were used in 14 light art installations and sculptures in the 'Light Walk'. Combining the many advantages of LEDs with advanced digital control technology, without the cost and complexities of traditional lighting methods, Philips' lighting systems brought to life the artists'

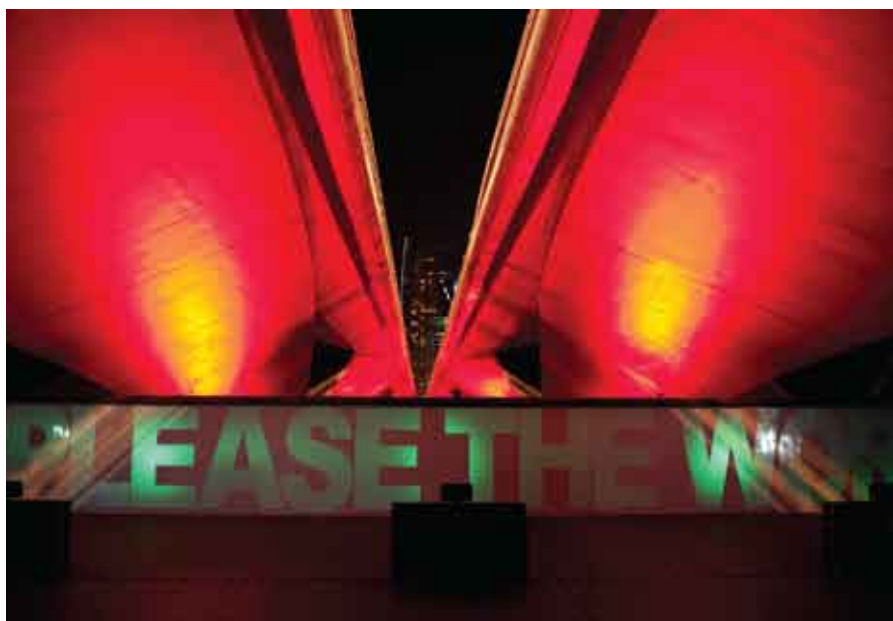
vision for their masterpiece through the generation of millions of colours and high-quality white light. Some installations included A Blue Mirage in the City of Light by local artists from WY-TO Architects; Animal Tree by Thai artist Pitupong Chaowakul; I C U Stand: punkt by German artist Ingo K Bracke; Flight to Light by Australian artist Mary-Anne Kyriakou and many more.

As a global leader in lighting, Philips champions the use of cutting-edge LED lighting technology and has provided energy-efficient lighting solutions for cities worldwide, successfully aiding urban planners and municipalities in implementing sustainable city beautification programs. As part of such initiatives, Philips has transformed iconic landmarks in cities such as London (London Eye and Buckingham Palace), Philadelphia (Avenue of the Arts), Egypt (Cairo Tower), Hangzhou in China (the Grand Canal), Hong Kong (Stonecutters Bridge), Philippines (People Power Monument) and the Singapore Flyer with brilliant displays of lighting design and technology.

About the i Light Marina Bay Festival

The i Light Marina Bay Festival celebrated the urban Singapore nightscape. It showcased the newly-developed Marina Bay area by decorating it with vibrant and unique visual installations. More importantly, the use of energy-efficient lighting promoted awareness for energy reduction in lighting. i Light Marina Bay Festival was jointly organised by Urban Redevelopment Authority (URA) and by Smart Light Singapore (SLS).

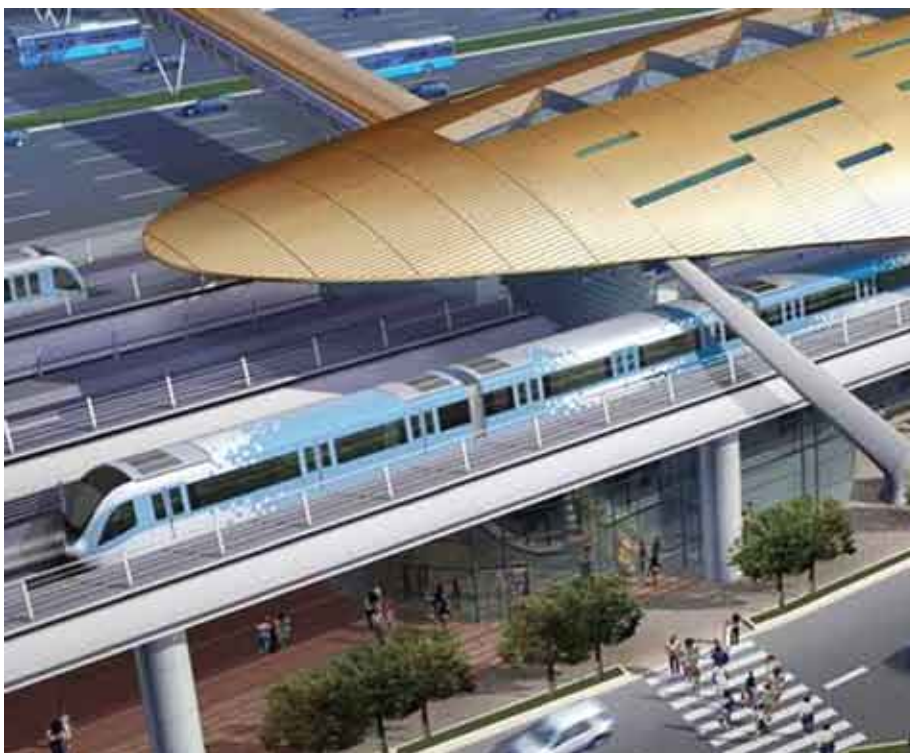
ICA



Touch. Do Not Please The Work Of Art by Michael Lee & Cornelia Erdmann



Gurgaon metro tracks.



Dubai Metro.

Gurgaon Rapid Metro Project (RMGL) to be Operational by January 2013



India's first privately funded, promoted and soon-to-be operational Rapid MetroRail Gurgaon Limited (RMGL) would be a pleasing sight, along with being a state-of-the-art mode of transportation.

Slated to begin in January 2013, the service meanders through DLF City and touches corners at DLF Cybercity that has a horde of multinational companies. Promoters say they have designed it with world-class aesthetics.

Starting from Sikanderpur Metro station, the RMG would meander through the posh DLF City (II) and touch Belvedere Park and Towers, DLF Cybercity, National Media Centre, Ambience Lagoon apartments before turning towards DLF SEZ in DLF City III. Other locations include Hotel Leela Kempinski, Ambience Mall, Hotel Trident Hilton and border Toll Plaza on Gurgaon Expressway.



BRIDGES ASIA

Strategies to Ensure the Sustainable Funding, Design, Construction and Maintenance of Asia's Bridge Network

Main conference
23 - 24 February 2011

Pre-conference site visits
22 February 2011

Post-conference workshops
25 February 2011

Venue
Harbour Grand, Hong Kong

Advisory Board



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ARUP



Ted Lawton
Engineering Development
Manager
GAMMON CONSTRUCTION



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PPP Expert
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Chief Engineer,
Department of Rural
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TRANSPORT, THAILAND**



Lim Sidanine
Secretary of State
**MINISTRY OF
PUBLIC WORKS
AND TRANSPORT,
CAMBODIA**



Iwan Zarkasi
Chief - Design &
Supervision (Roads &
Bridges)
**MINISTRY OF
PUBLIC HIGHWAYS,
INDONESIA**



Fang Wen-Chih
Deputy Director General
**MINISTRY OF
TRANSPORTATION &
COMMUNICATIONS,
TAIWAN**



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**ROAD DEVELOPMENT
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Mohamad Rafiqul Islam
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7

**Governments
presenting
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projects being
presented include:

- River Padma Bridge, Bangladesh
- Incheon Bridge, South Korea
- Hong Kong-Zhuhai-Macao Bridge, Hong Kong
- Minpu Bridge, China
- Bandra-Worli Sealink Bridge, India
- Penang II Bridge, Malaysia

Image courtesy of Arup.
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Project Details

Project Route:
Sikanderpur on Delhi Metro Line 2 to Mall of India in Gurgaon

Length:
6.1km

Owner:
Consortium of IL&FS (74%) and DLF Metro (26%)

Operator:
Rapid Metro Rail Gurgaon

Estimated Investment:
US\$195.3 million

Main Contractor:
Siemens Mobility

Sub-Contractor:
CSR Zhuzhou Electric Locomotive Works

Passenger Capacity:
30,000 passengers an hour

Rolling Stock:
Five three-car trains

Sources:
www.hindustantimes.com and dubaimetro.eu.

Besides features such as the Automatic Train Operation (ATO) system, that does not necessarily require human drivers, the aesthetics of the entire 6.1 km long metro service would be on the lines of the Dubai Metro, officials of the special purpose vehicle (SPV) company Rapid MetroRail Gurgaon Limited (RMGL) claimed.

The aesthetic designs of 47 stations (nine underground) on the 75-km long Dubai Metro network is said to be the latest and most attractive in the world. Sanjiv Rai, managing director of RMGL said, "Our consultants would design RMG stations in such a way that they merge well with the 'swanky buildings in the area,' Rai added.

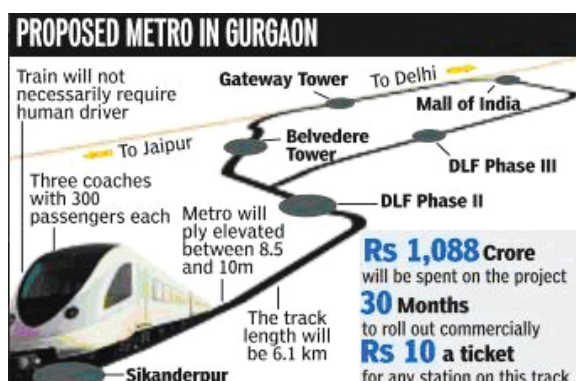
In July 2009, the Haryana government had awarded the Rs.1088 crore-project of setting up 6.1 km-long to RMGL. However, it is yet to

receive formal nod from the union ministry of urban development. This service would also act as a feeder system for DMRC's main metro service. Rai said RMGL would sign lease agreements with the Haryana Urban Development Authority (HUDA) as well as with DLF.

VK Kaushik, MD of Maytas Infra stated: "We need 50-60% of the land from HUDA that is median of the roads where the pillars of the elevated tracks would come up. There are minor encroachment issues that we believe would be sorted out by HUDA soon. The rest of the land comes from DLF."

Furthermore, VK Kaushik explained that DMRC would be the Prime Maintenance Consultant for the project. The civil contract has gone to Maytas Infrastructure that promises to finish its work of erected elevated track within 24 months. "We would kick off the civil work next week after receiving work notice from RMGL. We plan to finish it within 24 months, after which, the work on electrification, signaling would be started by other contracting companies," he said.

ICA



RUNNING ON TRACK

What the proposed metro rail project will offer



Route Length	6.1 km
Number of Stations	6
Cost	Rs 1,000 crore
Features of the Project	Natural lighting, less air B sound pollution, landscaping and plantations, exhaust, silent generators, dust catchers, water treatment, Rain water harvesting etc.
Safety and Security	CCTVs, security, special screen doors on platforms, walkway throughout the track for evacuation.
Interval frequency	approximately 3 minutes.
Maximum Speed	80 kmph
First Time in India	First privately fully financed metro system
Period of Completion	Commencement: May 2011; completion: May 2012

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1120 Park Avenue, Malaysia

1120 Park Avenue consists of five blocks of 16 storey condominium built on nine acres of land nestled in Petaling Utama, south of Petaling Jaya. Consisting of 1120 units, fitness facilities there include a swimming pool and jogging track. Other facilities at the condominium include a multi-purpose hall and landscaped gardens. A tiered security system is used at 1120 Park Avenue to ensure privacy as well as the safety of its residents. **ICA**



Sulaman, Malaysia



One Sulaman is a prestigious landmark for the city of Kota Kinabalu. Introducing a water theme park within the grounds of the residence, One Sulaman located in Jalan Sulaman is the first in Sabah to have this unique combination: living and leisure within the comfort of your own home.

Integrating European-inspired designs, the grand entrance of One Sulaman features an impeccable facade, with eight specially commissioned sculpted brass stallions with regulated musical water fountain and special effects.

With the total 109 units, modern and contemporary have elegant de-



signs with 2 to 3 bedroom units ranging between 700 sq ft and 1,100 sq ft. Water Themed Park, 5-Star clubhouse with extensive facilities for swimming, jogging, gym, basketball, badminton, squash, table tennis, a multi-purpose hall and others are available for its residents. **ICA**

Park Residences, Indonesia

Park Residences is strategically located in the South-West part of Jakarta prime residential area, Kebayoran Baru.

Built on approximately 1.2 Ha land, the development comprises of three Condominium Towers which consist of 18, 22, and 26 levels with total units of 366. The Commercial Area on the Ground Floor of Tower A will provide all the facilities to cater the residents' needs such as restaurant, cafe, supermarkets and laundry

services.

Other facilities include a swimming pool, tropical garden, jogging track, barbeque area, yoga corner, children's playground, tennis court and many others. 420 Parking Spaces will be located on the two Basement Levels.

Designed with the concept of open air private lift lobby, greenery on each unit, it creates a natural ambience for a comfortable, harmonious and healthy living environment. **ICA**



Sentul, Malaysia



One Sentul are high-end residences on a prime location in downtown Kuala Lumpur. Developed by Sentul Perdana Sdn Bhd, One Sentul comprises of two residential towers that are specially designed so that every unit is a corner lot, giving utmost privacy to its occupants which is further accentuated by the fact that there are only eight exclusive units to a floor. There are four layouts to choose from with built-up sizes ranging from 1,081 sq ft to 2,709 sq ft making it well tailored to the needs of young couples and even families.

Every unit has a living room that extends out to a private lanai where one can unwind and get breathtaking views. At the roof top of tower B is a tropical themed sky terrace that is exclusive to residents. **ICA**

Incheon Asia Stadium, South Korea

Incheon Asiad Main Stadium is a planned multi-use stadium in Incheon, South Korea. It is developed by the 17th Incheon Asian Games Organising Committee. Once completed in 2014, it will be used mostly for athletics gatherings and will be the main host of the 2014 Asian Games by Populus and Heerim Architects & Planners Co Ltd.

The stadium will be designed with an initial capacity of around 70,000 spectators. After the 2014 Asian Games, capacity will be reduced to 30,000 spectators. **ICA**





Adria, Singapore

Developed by Far East Organisation, Adria is a 22 storey residential building with 105 units. This freehold property will be located in Derby Shire Road, near Novena MRT.

Adria has luxurious 1, 2, 3, 4 bedroom apartments with compact and good layout, and quality finishes and fittings.

Designed by Ong & Ong Architects, Adria will resemble life-style resort with contemporary design spaces. Facilities and amenities include swimming pool, gymnasium, BBQ, basement parking, security 24hr and spa pavilion.

ICA



PROJECT NAME	LOCATION	TYPE	VALUE
330MW Hydro Electric Project, Jammu and Kashmir	India	Energy	US\$588 million
Cho-Ray Phnom Penh Multi Specialty Hospital	Vietnam	Hospital	US\$42 million
General Hospital	Indonesia	Hospital	US\$17.76 million
Canadoil Metal Plate mill	Thailand	Industrial	US\$600 million
DKSH Vietnam's Distribution Centre	Vietnam	Industrial	US\$12 million
376 MW Captive Power Plant at Paradip Refinery Project, Orissa	India	Oil and Gas	US\$749 million
4 well platforms at the Mumbai High North Redevelopment Project, Mumbai	India	Oil and Gas	US\$214.66 million
Aromatics Complex at Mangalore SEZ	India	Oil and Gas	US\$431.2 million
102-storey PVN Tower	Vietnam	Residential	US\$1.2 billion
Banyan Tree Jiuzhaigou	China	Hospitality	US\$1.9 million
Tongzhou Beijing International Aviation City	China	Ports –Airports, Sea Ports	US\$4.5 billion
Colossal Projects	India	Buildings – Mixed Use	US\$5.3 million
Abenobashi Terminal Building Tower	Japan	Building – Mixed Use	US\$895 million
Macau Light Transit System	Macau	Infrastructure – Road and Rail	US\$938 million
Bangalore high-speed rail link	India	Infrastructure Road and Rail	US\$1.2 billion
Private Railway	Indonesia	Infrastructure – Road and Rail	US\$1 billion
Besraya Eastern Extension	Malaysia	Infrastructure - Road & Rail	US\$96.2 million
Air Cargo Terminal at Hong Kong	Hong Kong	Ports- Airport	US\$0.5 billion
New Port South Mumbai	India	Port- Sea port	US\$225 million
Phase III of Cuntan Port Working Zone in Chongqing	China	Port- Sea Port	US\$14.75 million
Sembcorp Marine Shipyard	Singapore	Port-Sea Port	US\$568 million
Trung Son Hydropower	Vietnam	Energy	US\$373 million
1200MW Thermal Power Plant in Chhattisgarh	India	Energy	US\$567 million
1600MW Supercritical Power Project, Karnataka	India	Energy	US\$1,340 million
Nabawan Health Clinic, Sabah	Malaysia	Hospital	US\$7,360 million
Banyan Tree Hue	Vietnam	Hospitality	US\$283 million
Banyan Tree Jiuzhaigou	Singapore	Hospitality	US\$1.8 million
Nano calcium carbonate Plant, Chau Hoa Commune, Tuyen Hoa District, Quang Binh	Vietnam	Industrial	USD\$56 million
AAI's Terminal, Goa	India	Industrial	US\$59 million

For more information, log onto: www.rfaguide.com

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Soccer City Stadium

Twenty-five year old company, bocad Software GmbH has far exceeded satisfaction and pride to have not merely aligned itself with the common or the ordinary, but knowingly went their own way. They are proud to support their customers with software that leads to actually required results. The company has continuously found new ways to realise these concepts, which have been subsequently imitated by competitors.

Case Study: Soccer City Stadium (Johannesburg, South Africa)

On 15 May 2004, South Africa, with Nelson Mandela at its head, celebrated her own nation entertaining proclamation for the Football World Championship 2010.

The existing FNB Stadium in Johannesburg was selected to represent South Africa in the whole world. Thus began the challenge to restructure and to widen the stadium increasing its capacity from the initial

80,000 to 90,000 spectators and in the meantime transform the existing into something able to attract the attention.

The most significant design was chosen from various submitted proposals. It's the design for which the Soccer City Stadium is now renamed as the "Calabash" (traditional African clay jug) or the "African Bowl" as the symbol able to represent the whole African continent.

The work

The restructuring and amplification work began in 2007 with the trust to the association of enterprises between the local Grinaker-LTA and the Dutch Interbeton BV, while the realisation and assembly on-site of the steel roof and the covering was submitted to Cimolai S.p.A. of Pordenone, Italy.

The roof and the façade represent the characteristic elements of the stadium both from an aesthetical and structural point of view. Such struc-

tures were studied, re-projected and realised in Italy by Cimolai S.p.A. in their own workshop of Pordenone.

The covering of the façade, unique in its type, is a mosaic of panels in light fibro-cement in the colour of the ground and the fire while the roof is covered by PTFE membranes in a sand colour similar to that of the surrounding mines.

Main data

- Weight of steel construction: 8,000 tons
- Coverings: 53,000 m² of PTFE membranes and 40,000 square metres of panels in fibre-cement
- Period of transport: from March 2008 to January 2009
- Beginning-end of the erection of the steel structure on site: June 2008 – March 2009

Go to www.bocad.com for more information. **ICA**

Enquiry No. 0416/201



Soccer City Stadium at night



Soccer City Stadium under construction

Soanar EcoTech: 45 Years of Renewable Energy Products



Soanar EcoTech is a division of Soanar, an Australian Company Headquartered in Melbourne with over 45 years of experience. The company distributes a broad range of renewable energy technologies and related products.

Their range of products include components such as solar cells, modules, panels, kits, wind generators, batteries and other storage technologies; and also charges and charge controllers inverters, regulators and system controllers. Lighting products include meters, leads, cable, connectors, junction

boxes, and a host of accessories.

What sets Soanar EcoTech apart from other distributors is the company's local, dedicated and experienced team's ongoing commitment to servicing their customers and supply partners alike.

With offices located throughout Australia, New Zealand and

South East Asia, customers can deal locally with one of Soanar EcoTech's experienced sales staff. They can also be contacted via website: www.soanarecotech.com or www.soanarplus.com.

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Cummins Power Generation (China) Co., Ltd: Breakthrough Accomplishment with Domestic-made Q60 Serial Products

Cummins Power Generation (China) Co., Ltd. recently struck a milestone achievement with the launch of domestic-made Q60 serial generator sets in June 2010. This marks a significant success in Cummins global manufacturing strategy, which could only mean that Cummins Power Generation (China) Co., Ltd. is integrating into the global supply.

Power generation customers in China are now able to have a direct transaction- this not only enables a reduction of cost but is also time efficient and facilitates convenience in dealings, benefiting them in their sales transaction with Cummins Power Generation in China.

With Q60 serial now being manufacture domestically, marks a significant expansion in the development of Cummins Power Generation (China) Co., Ltd., boosting the confidence in their expertise in providing prime power generation and exemplary service.

As the government and local industries increase their invest-



ments in commercial property, grand data center, infrastructure, technology and power plants, China's rapid recovery in the economy also provides an opportunity for Cummins Power Generation (China) Co., Ltd. to compete in the high-range power supply segment. This also secures the demand of high-range power generation sets, such as the C2250 D5, which has a prime rating of 2000 kVA and a standby rating of 2250 kVA.

Backed by a comprehensive warranty and worldwide distributor network – providing top-notch quality service, excellent after-sales support and instilling confidence in the client in Cummins Power Generation's products and capability have always and will continue to be what sets Cummins Power Generation apart from its contemporaries.

About Cummins Power Generation

Cummins Power Generation, a subsidiary of Cummins Inc. (NYSE: CMI), is a global leader dedicated to increasing the availability and reliability of electric power around the world. With more than 90 years' experience, its global distributor network of distributors in over 190 countries delivers innovative solutions for any power need – commercial, industrial, recreational, emergency and residential.

Products include alternators, generator-drive engines and pre-integrated power systems, combining generator sets and power control and transfer technologies. Services range from system design, project management, operations and maintenance contracts to development of turnkey power plants.

For more information, contact Scott Murphy, Director of Global-Marketing, Cummins Power Generation Limited. Phone +1 763 574 5670. Or visit the website at www.cumminspower.com

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