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Infrastructure Development

Bihar unveils ₹5,024-cr infrastructure projects
The CM of Bihar has launched 217 road and bridge projects worth ₹5,024 crore, including the 68.5km Dumri-Sarmera section of the Bhita-Sarmera state highway. It will act as another bypass road on the southern part of Patna as heavy vehicles coming from Varanasi, Mohania and Ara would bypass the state capital and go straight towards Mokama, Bhagalpur, Purnia and Assam.

Centre speeds up ₹115-bn hydro projects in Nepal
The construction of Arun-III hydropower project in Nepal's Sankhuwasabha district is fast-tracked as five Indian banks and two Nepal-based banks have committed to lend debts for building a 900 MW mega power project. Nabil Bank, one of the lenders for the project from Nepal, has signed a pact with India's Satluj Jal Vidyut Nigam (SJVN), setting a record for the largest ever foreign direct investment to the Himalayan nation. Anil Keshari Shah, CEO, Nabil Bank informed that Arun-III is Nepal's largest hydro project and is being built with India's assistance.

Govt. lists ₹111 lakh-cr infra projects under NIP
The government has identified and listed 6,835 projects under the ₹111 lakh crore National Infrastructure Pipeline. The ministry has launched an information repository of all projects identified under the NIP. Investors can use the India Investment Grid to access information on infrastructure projects and form public-private partnerships with the government.

Tamil Nadu takes up projects worth ₹2,368-cr
The state CM in Tamil Nadu has laid the foundation stones for eight projects entailing a combined investment of ₹2,368 crore, which includes the construction of an International Tech Park Chennai (ITPC) promoted by the CapitaLand group at a cost of ₹1,500 crore. The firm will commence construction for the first phase of the 23.3-acre IT park. ITPC, Radial Road, has 4.6 million sq.ft of development potential for premium Grade A office space.

Stricter safety norms for construction equipment on anvil
The government has proposed stricter norms on highways which include features like machine-mounted audible travel alarms, non-metallic fuel tank and wider operator visibility for the CE machinery. The transport ministry has given a draft notification for the CE vehicles that address issues of safety requirements. The notification aims to introduce AIS (Automotive Industry Standard) 160 to introduce requirements like machine mounted audible travel alarms, visual display requirements, requirements for operator station and maintenance areas, non-metallic fuel tanks and on the proposed safety norms. CE vehicle means a self-propelled machine with rubber tyres, rubber padded or steel drum wheel-mounted compactor, wheeled hydraulic excavator, wheel loader, backhoe loader, skid-steer loader, dumper, motor grader, mobile crane, dozer and pavers.

Roads & Highways

Govt plans ₹8,000-cr NH along border in J&K
Chief Secretary BVR Subrahmanyam, J&K, informed that the Union government has decided to build a 600 km-long highway connecting Gulmarg with Kargil and Drass in Ladakh regions of J&K connecting attractive tourist spots like Keran, Gurej and Machhal, at a cost of ₹8,000 crore. The road will connect all unexplored tourist spots and open them for tourists.

UP fixes funds for ₹36,000-cr Ganga expressway
The UP government has decided to generate ₹2,900 crore from the Housing and Urban Development Corporation (HUDCO) for the construction of 628-km Ganga Expressway, involving an investment of ₹36,000 crore, UPEIDA, CEO & additional chief secretary Awanish Kumar Awasthi, informed. The expressway will include the acquisition of 6,556 hectares land and it traverses through Meerut, Amroha, Bulandshahar, Budaun, Shahjahanpur, Farrukhabad, Hardoi, Kannauj, Unnao, Rae Bareli, Pratapgarh and Prayagraj districts.

PNC Infratech wins ₹6,731-cr highway contracts
PNC Infratech has signed the concession agreements for three HAM projects and contract agreements for two EPC ventures with NHAI, involving an investment of ₹6731.8 crore. These contracts include four-laning of Aligarh-Kanpur (Mitarasen-Kanpur) Section from Km 373.085 to 433.728, Package-V of NH- 34 in UP under the Bharatmala Pariyojna - with bid cost of ₹2052.0 crore on HAM model.
MoRTH disburses ₹18,700-cr to road contractors
Offsetting the impact of Covid-19 on road and infra developers reeling under cash crunch, the transport ministry and NHAI has adopted faster payment mechanisms and disbursed ₹18,700 crore to the developers between April and May this year. The disbursements are up 46 times from the ₹400 crore released during the corresponding period in last year. NHAI disbursed ₹10,295 crore between 22 and 31 March and ₹15,000 crore in April-June.

SPV in place to build, fund & operate Delhi-Mumbai e-way
NHAI formed the Special Purpose Vehicle to finance, construct, and operate the Delhi-Mumbai Expressway. It has been registered as DME Development and will be owned by the NHAI. The SPV aims at diversifying its resource base and developing a sustainable and self-liquidating approach to generate finances. NHAI is implementing about 28,000 km highway length under the Bharatmala Pariyojana Phase-1 in which the Delhi-Mumbai e-way and other e-ways are being built.

Gujarat plans ₹3,500-cr four lanes expressway
The Gujarat government has started development of the Ahmedabad-Dholera four-lane 110 km long expressways at an investment of ₹3,500 crore. The state has approved orders for 700 MW solar power generations in the Special Industrial Region (SIR). Manoj Das, ACS of the CM informed that the power generation and expressway projects of ₹8,500 crore will kick off after the monsoon.

BRO invites bids for ₹101-cr road project in NE
The Border Roads Organization (BRO) has invited bids for the road upgradation in Arunachal Pradesh, involving an investment of ₹101 crore. The scope of work includes the construction and upgradation of Tato-Menchuka road (design ch 23.800 km to 33.100 km and existing ch 24.800 km to 36.000 km) to two lanes with hard shoulders in AP on EPC model.

MoRTH clears ₹4,000-cr Chandigarh-Ludhiana NH project
MoRTH has cleared a ₹4,000 crore project that includes faster connectivity to Chandigarh from Ludhiana. This project will be part of the upcoming Delhi-Amritsar-Katra Expressway and is being developed under the Bharatmala Pariyojana. It will reduce travel time between Ludhiana and Chandigarh to less than one hour from 1.5 hours currently, while also reducing travel time from IGI Delhi to Chandigarh Airport to two hours via the Urban Extension Road-II (UER-II), Delhi-Katra Expressway.

IRB Infra to get ₹1,755-cr highway project
IRB Infrastructure Developers Ltd (IRB), in a joint venture with Dilip Buildcon Limited (DBL), has emerged as a preferred bidder for the construction of eight lanes of the Vadodara – Mumbai Expressway in Gujarat, on the Gandeva–Ena highway stretch of length 27.500 km and involving an investment of ₹1,755 crore.

Govt. kickstarts ₹3,000-cr highways in Manipur
Union Minister Nitin Gadkari has laid the foundation stones for 13 highway projects at an investment of ₹3,000 crore in Manipur. The projects, which involves the construction of 316 km of highways, will provide smooth transport facilities leading to convenience and economic growth in the state.

Dilip Buildcon bags ₹1,140-cr highway contract
Dilip Buildcon has bagged a road and highway project of ₹1,140.50 crore in Telangana. The company has been declared as L-1 bidder in the tender floated by the NHAI for the project.

Sadbhav bags ₹1,572-cr NH projects in Gujarat
Sadbhav Engineering has been declared the lowest bidder for two EPC highway projects of ₹1,572 crore in Gujarat by National Highways Authority of India. Both the twin projects fall under the Bharatmala Pariyojana.

NHAI launches ₹4,500-cr Gurgaon-Mahindergarh NH project
Union Road Transport and Highways Minister, Nitin Gadkari, has laid the foundation stone for the 4-lane Gurugram-Mahindergarh road costing ₹4,500 crore. It will be a part of the NH 352-W and will help ease traffic pressure on the Delhi-Jaipur NH-8. The 46.1 km long Gurugram-Rewari road is also a part of it. The project will have 99 culverts, 12 small bridges, 13 under-passes, two flyovers and one road over bridge.

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DBL-HCC in JV wins ₹1,900-cr road contract
Hindustan Construction Company Ltd. (HCC), in a joint venture with Dilip Buildcon Limited (DBL), has been awarded a ₹1,900 crore contract by NHAI for the design and construction of a 22-km long road to link Jharkhand with Bihar. The contract includes the construction of a four-lane bridge over the Ganga River. The road will connect Sahibganj bypass in Jharkhand to Manihari bypass in Bihar.
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Lintec & Linnhoff re-enters India market with a new global business strategy

Lintec & Linnhoff has announced its re-entry into the Indian market, which has been one of the Group’s stronghold markets for the Linnhoff brand for over two decades. Under a brand-new global business strategy, the Group is committed to provide support to all their local clients, not only in managing their existing fleet of plants, but also in meeting their future project needs.

The Group’s long-term strategic plan is geared towards supporting infrastructure projects in India and at the same time, growing together with their clients. It will manufacture and distribute the latest range of Linnhoff asphalt mixing plant models with cutting edge technology; the full range of Eurotec concrete batching plants; Lintec containerized asphalt and concrete mixing plants, and concrete cooling solutions. This will expand the Group’s range of offerings in India from the limited range of first generation Linnhoff asphalt mixing plants, which will continue to be available for a limited time.

“We are amongst the first few global asphalt mixing plant manufacturers to enter the Indian market in the late 90s,” said Daniel Chan, Executive Chairman & Director of Lintec & Linnhoff. “With the building construction industry in India expecting to reach Rs. 35,220.8 billion (EUR 410 billion) by 2024, we have made new investment plans to expand the product portfolio offered in India through a new business strategy to provide high quality and improved plants to our customers.”

Since the acquisition of the German trademarks and IP rights of the Lintec and Linnhoff brands from its previous partners (Lintec GmbH & Co. KG) in late 2017, the new executive committee helmed by the Chairman, has led the company through a significant business transformation, notably a reinvigorated brand identity. In less than three years, the Group has further expanded its sales distribution network to 20 more countries across Asia, Middle East and Latin America – and beyond its traditional markets in Southeast Asia, Russia, Eastern Europe and China. New satellite offices have also been set up in Lebanon and Brazil to support this growth. Today, the Group operates in more than 80 countries.

- New global business strategy to better serve the South Asian market
- Launch of full Lintec portfolio that includes containerized asphalt and concrete mixing plants, and concrete cooling solutions.
- Introduction of selected and new Linnhoff asphalt mixing plant models, adding on to its existing 400 plant population in India.
- Launch of full Eurotec range of concrete batching plants, specially designed for India market.

About Lintec & Linnhoff
Lintec & Linnhoff is a global manufacturer and distributor of leading-edge solutions for production of asphalt and concrete materials. Solutions include asphalt mixing plants, concrete batching plants, and specialist concrete cooling solutions (ice plants) that meet industry standards for environmental impact, recyclability, and reusability. Highly experienced experts in the Group help to troubleshoot and offer pre- and after-sales customer service.

Lintec & Linnhoff blends the craftsmanship, precision and durability honed over a century of German heritage with the exacting standards that come with global manufacturing to deliver purpose-built solutions. The Lintec brand, being the first in the world to build its asphalt and concrete plants in 100% ISO sea containers, will carry on the legacy of its flagship design. Lintec & Linnhoff’s machinery and equipment have been deployed in the construction of the prestigious Hong Kong-Zhuhai-Macao bridge, Abu Dhabi’s Yas Marina F1 Circuit, The Palm Islands, and the Storebaelt Bridge Denmark, among many others.
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MoRTH speeds up 401-km four-lane new NH project
The NHAI has fast tracked the construction work of the 401-km long four-lane highway project crisscrossing Andhra Pradesh and Chhattisgarh. The new road covering 90 km of length in Vizianagaram district will pass through Visakhapatnam, Chinthalavalasa, Vizianagaram and Salur, Odisha’s Koraput, Umarkot, Baheda and Dighil to Raipur via Likhma, Boral, Nagri, and Kurud. Of the total road length, 164 km falls in Chhattisgarh of which 132 km will be developed as a two-lane road while the remaining 32 km as a single lane road.

PNC Infratech wins ₹1547-cr highway contracts
PNC Infratech has secured two highway contracts, part of Delhi-Vadodara Expressway, involving an investment of ₹1,547.80 crore from NHAI. The projects have been secured on EPC basis under the Bharatmala Pariyojna and the company confirmed the acceptance (LOA) for the projects.

MRIDCL unveils six-lane RoB in Reay Road
The Maharashtra Rail Infrastructure Development Corporation Limited (MRIDCL) has decided to build a six-lane road over bridge (RoB) between Reay Road and the Dockyard railway stations. The bridge will have a width of 12 metres on both sides. The corporation will undertake the construction and reconstruction work of 11 RoBs and one road under bridge (RuB) in the city.

Metro & Rail

Railway unveils 4,000-km new cross-country industrial corridor
The Railways has unveiled a 4,000-km long new DFC corridor to connect the industrial belts across eastern and western parts to southern India through major ports in Odisha and Andhra Pradesh. The new DFCs are part of big-ticket infra projects including 115-km East Coast from Kharagpur (West Bengal) to Vijayawada (Andhra Pradesh); East-West comprising 1,673 km connecting Bhusaval-Nagpur-Kharagpur-Dankuni (near Kolkata), and 195-km Rajkarswan-Kalipahari-Andal (West Bengal) route. The third is 975-km North South sub-corridor Vijayawada-Nagpur-Itarsi (Madhya Pradesh).

RITES readies DPR for ₹10,599-cr metro rail in J&K
Railways consultancy firm RITES has submitted the final detailed project reports for the light transit metro train service in Srinagar and Jammu. The metro systems are expected to be completed by the end of 2024 at an investment of ₹10,599 crore. Once the projects are completed, Srinagar and Jammu will become the first two non-major cities in the country to have a functional rapid transport network.

GMRC ready to award ₹942-cr metro contract
Gujarat Metro Rail Corporation (GMRC) is set to award the contract for the design, construction and completion of underground stations and a tunnel entailing ₹942.16 crore investments. The scope of work includes the finishing work from Surat Railway station to Chowk Bazar Ramp from chainage 7160.6m to chainage 10720m, comprising twin bored underground tunnel between Surat Railway station and south ramp, all cut and a cover portion.

Dilip Buildcon bags HAM model project in Karnataka
Dilip Buildcon has been declared as the L-1 bidder for a new HAM project. The scope of work includes four laning of the road from 42.000 km to 80.00 km of Dodaballapur Bypass to Hoskote section of NH-648 (Old NH-207) in Karnataka on Hybrid Annuity Mode under the Bharatmala Pariyojna (Package-II).

India unveils new road in Bhutan bordering China
The Union government has decided to build a road in Bhutan to enable New Delhi to access Tawang in Arunachal Pradesh. The road will reduce the distance between Guwahati and Tawang by 150 km. It will allow India to deploy troops in the eastern region of Bhutan in response to any military moves by China. India has entrusted the task of road building to BRO as the new road is important for Bhutan too, as it will connect Lumla near Tawang with Trashigang.

Railway takes up ₹1,782-cr Belapur-Uran rail line
The Central Railway has started construction work for the new suburban railway corridor between Belapur and Uran railway stations at an investment of ₹1,782 crore. The construction activities have been undertaken between Kharkopar and Uran railway stations with the scope of work including the upgradation of the platforms at the new Rajanpada railway station, along with foundation and sub-structure work of Nhava-Sheva, Dronagiri and Uran stations.

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**SCR starts work on ₹3,000-cr Duvvada-Gudur rail line**

South Central Railway has launched construction work of the third railway bridge on Penna river. The Ministry of Railways has sanctioned the line connecting Duvvada and Gudur at a cost of ₹3,000 crore and allocated funds for it. Railway authorities had started work- on the third line in 2018 between Gudur and Vijayawada as part of Chennai and Howrah Mainline.

**BMRCL launches ₹30,695-cr Phase-II of metro rail venture**

The Bangalore Metro Rail Corporation has launched the tunnelling work on the Phase-II of the metro project involving an investment of ₹30,695 crore and the CM has set in motion the work by one Tunnel Boring Machine (TBM). There is a plan to extend the city’s metro line network from KR Puram to Kempegowda International Airport via Hebbal and Nagawara and with the lowering of tunnel boring machine (TBM) Utja in Shivajinagar.

**KEC International wins ₹1,192-cr multiple contracts**

The RPG firm KEC International has won contracts worth ₹1,192 crore across its business segments in both domestic and international arena, MD and CEO Vimal Kejriwal informed. The engineering firm has secured ₹821 crore contract in the transmission and an order of ₹146 crore from the Kochi Metro Project for the construction works of viaduct along with station for the Phase 1 extension of the metro rail project.

**Railway kick starts ₹1,339-cr new line in Sikkim**

The project of rail connectivity to Sikkim involving an investment of ₹1,339 crore, is being completed on a fast-track basis. The new line will start from Sevoke in West Bengal to Rangpo in Sikkim, a distance of 45 km where the tracks will cover 13 bridges and 14 tunnels, with stations in Rangpo, Ryang, Teestabazar and Melli.

**AP unveils ₹16,000-cr metro corridor along coastline**

The state government in Andhra Pradesh is contemplating to launch a metro rail on the Visakhapatnam coast at an investment of ₹16,000 crore. The DPRs for light metro rail and modern tram corridors is being prepared by Urban Mass Transit Company while Amravati Metro Rail Corporation will evaluate the cost of the project.

**Tunnels & Bridges**

**DMRC starts works on Phase-IV underground corridor**

The Delhi Metro Rail Corporation (DMRC) has started construction work on the underground section of the 28.92 km-long Janakpuri West–R K Ashram Marg corridor of the Phase-IV project. It is an extension of Delhi Metro’s Magenta Line consisting of 7.74 km-long underground lines. The work commenced for the construction of D-Wall at the Krishna Park Extension Metro station. The tunnel segments will be used for tunneling with the Tunnel Boring Machines (TBM) on a 1.4-km stretch between Janakpuri West and Keshopur.

**HRIDC floats tenders for ₹212-cr elevated corridor**

The Haryana Rail Infrastructure Development Corporation (HRIDC) has floated tenders for an elevated railway line worth ₹212.73 crore. The project is to be developed within the Thanesar city on Kurukshetra-Narwana at an investment of ₹212.73 crore. The work will start in the next three months and will be completed in 30 months.

**Railway floats tenders for ₹142-cr bridge in UP**

To ensure smooth flow of train traffic on the Jhansi-Manikpur section in UP, North Central Railway has floated tender for the construction of bridges on this stretch costing ₹142 crore. The scope of work involves the construction of two bridges at Betwa river (Br No 1141/1) and Dhasan river (Br No 1206/1) and two major bridges (Br No 1135/1 and 1207/2).

**Maligaon in Assam gets ₹420-cr four-lane flyover**

To decongest the Maligaon area in Guwahati city, transport ministry will start the construction work on the four-lane flyover involving an investment of ₹420 crore. The city suffers from a lot of traffic snarls and congestion during peak hours and the 2.4-km long flyover will address the problem.

**CMRL floats tenders for ₹2,671-cr elevated corridor**

Chennai Metro Rail Limited (CMRL) has floated tenders for an 8-km elevated line between Porur Junction and Poonnammaliee bypass. The stretch is a part of the 26-km corridor-4 from Light House to Poonnammaliee Bypass being funded by the Asian Infrastructure Investment Bank involving an investment of ₹2,671 crore. The Phase-2 of the mega project will have 118.9-km across three corridors with 128 stations, to be built at a cost of ₹69,000 crore.

**Telangana takes up ₹523-cr elevated road corridor**

To facilitate hassle-free traffic movement from Nalgonda X-roads to Owaisi Hospital junction in Hyderabad, Municipal Administration and Urban Development (MAUD) Minister KT Rama Rao, has laid the foundation stone for an elevated corridor costing ₹523.92 crore.
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MoRTH approves ₹4,125-cr projects including a tunnel in U’khand

The Union transport ministry has approved the construction of a 2.74-km tunnel to be built in Mussorie at a cost of ₹450 crore and other road projects worth ₹4,125 crore. The tunnel would start from Cart Mckenzie Road and culminate at the Kempky Fall Road. The other approved projects include the construction of elevated roads and broadening stretches in the state at a cost of ₹3,675 crore.

KMDA kick-starts ₹600-cr flyover at Ruby crossing

Kolkata Metropolitan Development Authority (KMDA) has hastened work of the 12m high flyover on an elevated corridor at Ruby crossing at an investment of ₹600 crore. The design for the six-lane Ruby flyover, which promises to ease daily commute along EM Bypass, is almost ready.

Real Estate

L&T takes up ₹2,500-cr construction contracts

Larsen & Toubro has bagged orders worth ₹2,500 crore across segments covering buildings, factories and sewage treatment plants. It has been awarded an order by IRCON International for the construction of a viaduct substructure up to the pier cap level, for about 3 km as part of the Agartala-Akhaura New Rail Link Project at Agartala, Tripura.

Embassy Parks to invest ₹1,500-cr realty space on radar

Embassy Office Parks REIT has decided to invest ₹1,500 crore over a period of time to add 2.6 million square feet of commercial space in its portfolio of 26 million square feet of operational office space. This additional 2.6 million sq ft of space is in the early stages of construction and will be a part of its existing integrated business parks and campuses, and the earliest delivery will be in June 2022.

Ahluwalia Contracts wins ₹290-cr construction contract

Ahluwalia Contracts (India) Limited has secured a new order of ₹290 crore in the Chamba district of HP. The scope of work includes the construction of new building of Pt. Jawaharal Medical College and Hospital, Chamba.

SCCL plans to build ₹210-cr housing units

The Singareni Collieries Company Ltd (SCCL) has decided to take up the construction of new housing units for its staff entailing an investment of ₹210 crore. The Board of Directors has approved the proposal of the state government whereby the first phase of the construction of quarters has already been taken up in Sattupalli area. The board has approved the construction of 994 double bedroom type spacious quarters at Bhupalapalli area.

Govt. approves ₹8,767-cr for housing sector

The Finance Ministry has approved a sum of ₹8,767 crore for 81 projects, enabling completion of almost 60,000 homes across the country under Special Window for Affordable and Mid Income Housing (SWAMIH). There is a need for speedy efforts to complete the construction of projects for which last mile funding has been sanctioned. This special window is an initiative that has provided support to the real estate sector and poised it at the cusp of a turnaround despite such turbulent economic times.

Centre sanctions ₹6,399-cr for stressed NBFCs & HFCs

The Union Finance Ministry has sanctioned 15 proposals worth ₹6,399 crore for stressed NBFCs and HFCs under the Special Liquidity Scheme announced as part of the ₹20.97 lakh crore ‘Atmanirbhar Bharat’ package. FM Nirmala Sitharaman informed that the SLS of ₹30,000 crore aims to improve the liquidity position of NBFCs and HFCs.

Govt mulls 100% FDI in rental housing scheme

Urban development minister, H S Puri informed that the government is all set to allow 100% foreign direct investment (FDI) in affordable rental housing as it focuses on economical dwelling solutions for urban poor where their population is estimated to be around 600 million by 2030. The government has approved the Affordable Rental Housing Complexes (ARHCs) as a sub scheme under the Pradhan Mantri Awas Yojana (Urban) to provide ease of living to the poor urban migrant.

BMRCL floats tenders for ₹1,905-cr elevated corridor

Bangalore Metro Rail Corporation has floated tenders for the Bengaluru Metro Rail Project Phase-2B. The scope of work includes the construction of elevated structures (viaduct & stations) of length 15.011 km from Ch 21,500,000 mtr to 36,511,000 mtr and two elevated metro stations like Bettahalasuru and Doddajala, including road widening utility diversion and allied works of the Bengaluru Metro Rail Project. The length includes about 718.18 mtr cut and cover portion in front of Yelahanka Air Force Station entailing an investment of ₹620.88 crore.

Sunteck Realty sharpens plans for ₹2,000-cr project

Realty developer Sunteck Realty has formed a partnership to jointly develop around 50-acre sea-facing land parcel in Vasai on the outskirts of Mumbai. The builder will develop the project with a total development potential of 4.5 million sq ft involving an investment of ₹2,000 crore and a revenue potential of ₹5,000 crore.
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Equipment

JCB Group appoints Deepak Shetty as Deputy CEO & Managing Director in India

The JCB Group has announced the appointment of Deepak Shetty as Deputy CEO & Managing Director of JCB India Limited. 48-year-old Deepak has been with JCB for over 10 years in various leadership roles. He makes this transition after having been the Executive Vice President Sales, Marketing, Product Support and Business Development for India and the South Asia region - a role that he held for two years. Prior to this, he was the Managing Director of JCB’s Global Excavator business in the UK for four years.

Beginning next year, Deepak will take over as MD and CEO from Subir Kumar Chowdhury, who has announced his retirement after having been with JCB India for close to 15 years. Subir has played a significant part in JCB India’s growth journey, expanding from one factory to five today.

Commenting on the appointment, JCB Group CEO Graeme Macdonald said: “India continues to be an important market for the Group. As part of our succession planning, we are pleased to appoint Deepak in this very challenging role. His experience in various leadership positions in India and the UK, will help JCB India enter a strong and sustained phase of growth in the Indian construction equipment market. On behalf of the JCB Group, I wish Subir well for his retirement at the end of this year.”

Komatsu Excavators help carve a new route to Kailash Manasarovar

At over 17,000 ft high altitude, a new 80 km mountainous road to Kailash Manasarovar, constructed by Border Roads Organization, was opened recently. The new route extends from Ghatiabgarh-Uttarakhand to Lipulekh Pass, close to the Line of Actual Control. This new route will greatly help the pilgrims as it reduces the travel time from three weeks to one week, and ushers a new era in border connectivity.

As many as 20 units of Komatsu PC210-8M0 Hydraulic Excavators worked arduously in this inhospitable terrain. Some of these machines, fitted with Rammer Rock Breakers, were used for breaking and excavating blasted hard rock, often disrupted by snowfall, landslides, and flash floods.

Komatsu PC210 machines played a critical role in the construction despite engaged for only six-seven months in a year, owing to snowy conditions for the balance period. The project was executed by Garg & Garg based in Ropar-Punjab and was engaged by BRO to complete a major portion of this road construction project. L&T supplied the Komatsu machines and provided the service support to the customer at site.

LiuGong India Appoints New President & Sr. Vice President

LiuGong India has announced the appointment of A. Krishnakumar as the new President India effective from July 2020 and Alok Jha as the new Sr. Vice President – Sales & Marketing, effective August 2020. A. Krishnakumar brings with him 35 years of experience and a wealth of knowledge in Sales, Marketing and allied functions in the construction equipment industry. He holds a bachelor’s degree in mechanical engineering from IIT Mumbai and a master’s degree in Management Studies (MMS) from Mumbai University. Prior to this, he held key portfolios with JCB India and Tata Hitachi. Jha brings with him 28 years of experience and domain expertise in Sales, Marketing, Product Development and allied functions in the construction equipment industry. He holds a bachelor’s degree in Mechanical Engineering from BIT Mesra and a master’s degree in Management from IIM Bangalore. Prior to joining LiuGong, he held key portfolios with Tata Hitachi, Metso, and Hyundai Construction Equipment. His last assignment was with JCB India.
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Ammann India now a 100% subsidiary of Ammann Group Switzerland

Effective June 19, 2020 Ammann India has become a 100%-owned subsidiary of Ammann Group, Switzerland. Starting August 1, 2020, Ananthanarayan (Anand) Sundaresan has assumed the position of Managing Director and Member of the Board of Directors at Ammann India. Ammann India representatives, products and services will remain unchanged.

“We are convinced that adding Anand Sundaresan to our senior management team will help us in further strengthening our partnership and the company’s success in India,” said Hans-Christian Schneider, CEO & Vice Chairman Ammann Group & Chairman of the Board of Ammann India. “The Ammann Group has been serving customers globally for 150 years and its efforts in the areas of technology and sustainability have been the driving forces behind its years of success.”

Ammann has its core competence in road construction equipment with over 100 years in asphalt plants technology (since 1908), in Compaction (since 1911) and in Pavers (since 1951), thereby offering products and solutions to all types of road construction all over the world.

Right from the start of operations of the joint venture company in 2013, Ammann India has continuously developed a market leadership with its extensive range of products under the Ammann and the Apollo product brands, working closely with customers on all the projects and offering end-to-end solutions. The company owes it prominent market position in the Indian market to its modern production facility at Ditasan, near Ahmedabad, that has a special focus on the Make in India philosophy promoted by the government; and the support of 15 de-centralized sales, service and parts outlets across India, backed by the company’s strong customer service.

Thanking Ammann customers for their continued support over the years, Anand Sundaresan said, “Ammann’s commitment to provide customers with products that offer solutions is due to the tireless efforts of Ammann’s dedicated teams, who carry out a lot of innovations in the field of construction equipment. Ammann firmly believes and is committed to Productivity Partnership for a Lifetime - a business philosophy that has made Ammann a leading partner company in India. Ammann India believes in skill development and has established the Ammann Academy where it has already trained over 1000 operators of our valued customers in all the areas, including asphalt production, paving and compaction.”

Putzmeister’s Experts App with new features

The Experts App developed by Putzmeister makes you an expert for Putzmeister equipment. The App summarizes the global know-how of the pump manufacturer in helpful videos, documents, and calculators, especially operators and service technicians, who profit from the App and get help in their daily work with the machines. They can access round the clock detailed information on machine functions, instructions for correct installation and operation of Putzmeister machines, tips on maintenance and problem solving as well as information on accessories.

With the new update there is now the possibility of a full text search to find content easy and fast. In addition, the update allows you to select the required local unit (imperial units for the US market, metric units for the rest of the world) for using the calculator. Detailed information about your own machine, such as data sheets and support variants, are now available directly in the App.

iQuippo announces strategic partnership with Kobelco

iQuippo, India’s first digital marketplace for infrastructure equipment, has announced a strategic partnership with Kobelco Construction Equipment India, to market and sell construction and mining equipment manufactured by the OEM. It will allow customers of iQuippo to choose from a wide range of equipment manufactured by Kobelco; avail finance from financial institutions for purchase of equipment; negotiate rates online and receive real-time offers customised according to their financing needs.

The partnership will enable Kobelco to showcase its portfolio of products to more than 90,000 customers of iQuippo. The programme will enhance Kobelco’s reach and allow it to capture and monitor leads of potential customers through the entire lifecycle using the iQuippo platform.

Anant Raj Kanoria, CEO, iQuippo, said, “This partnership will be a vital step for the digital transformation in the CE industry, as a lot of services will be available to the customers online and they would be able to interact with the Kobelco dealers digitally. This will enable the entire Kobelco dealership to offer more services through our platform and it will also assist them in managing customer relationships online. In this period of pandemic, equipment buyers can choose, purchase and avail finance on the iQuippo platform without stepping out of their homes and offices.”

Koji Nakagawa, MD & CEO, Kobelco Construction Equipment India, said, “Kobelco brand is known for its high-end technologically advanced excavators. Our new initiatives have been well accepted by Indian customers. This new agreement with iQuippo is made in the direction to reach out to all potential customers across India and offer our product solutions along with the funding options provided by iQuippo through their digital platform. In this new era of advanced communication, it is essential to use technology to reach out to customers and create brand awareness. I am confident that this will be a win-win agreement for both Kobelco and iQuippo.”

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The first Sandvik DT922i, a computer controlled fully automatic tunneling jumbo, has been introduced by Sandvik Mining and Rock Technology in India with a vision to achieve high levels of safety, productivity and precise tunneling.

The first Sandvik DT922i, a computer controlled fully automatic tunneling jumbo, has been introduced by Sandvik Mining and Rock Technology in India with a vision to achieve high levels of safety, productivity and precise tunneling. Fully Automated Jumbo Revolutionizing Tunneling in India

Sumit Jain, Project Director, RVNL, informed that due to the ‘young’ nature of the rock being encountered, the tunneling work is facing many challenges. One of the challenges is gauging the geological conditions and the hardness of rock in order to assess the required drilling and blasting patterns. The actual rock encountered during tunneling was mainly purple sandstone / quartz arsenite. In addition to the rocky terrain, operator safety was a prime consideration keeping in mind the tough geographical conditions. The stricter completion deadlines of the project required the use of equipment with a high level of automated features for better utilization for greater productivity.

Added Jain, “In a conventional hydraulic underground drill rig, the tunnel profile is based on the judgement of the operator on where to drill, and at what angle or depth. In traditional solutions, the tunnel profile is not always accurate due to human error, and drilling holes may not be accurately placed or at the desired angle. This often results in over breaks or under breaks on the tunnel, which is expensive and requires the driller to fix the arising issues as well as provide further expensive roof support. These problems slow down the entire construction work, and the project gets delayed, often with cost overruns.”

The introduction of the fully automated Sandvik DT922i completely changed the rules of the game. The entire drilling cycle is automated, hence, operator drilling judgment is eliminated. This means more accuracy and precision in drilling.

The first Sandvik DT922i machine in India was supplied to Rail Vikas Nigam Limited (RVNL) appointed contractor, APCO Infratech. The advanced automated tunneling jumbo has been used to drill the first ADIT for access to the main tunnel, which is part of the 125-km Rishikesh–Karanprayag Railway line, for which the work began in 2019 and the entire line is expected to be operational by 2024/25.

Sohil Das, Managing Director, Sandvik Mining and Rock Technology, informed, “The Sandvik DT922i marks the beginning of computer controlled automated drilling in India. This next generation tunneling jumbo, based on Sandvik patented iSURE® technology (Intelligent Sandvik Underground Rock Excavation software), has a unique intelligence to visualize the geological aspects of rocks and automates the entire drilling cycle. Today, over five DT922i machines are being used at different project sites of RVNL and this number would be as good as 20 by this year end.”

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Tunneling for infrastructure projects is becoming more and more mechanized by use of TBMs and other methods. However, the Drill and Blast method is more flexible as it is easier to adapt to varying profile requirements as compared to a TBM, which gives a circular cross section, especially for railway tunnels, resulting in a lot of over excavation in relation to the actual cross section needed.

The Rishikesh to Karanprayag Railway, once completed, will provide a broad-gauge railway, linking Rishikesh with Karanprayag. It is Indian Railways’ chosen route for the Char Dham Railway to connect to the Chota Char Dham Railway, and is one of the major initiatives of the Indian government to improve transport and communication in the area. The 125-km route starts at the newly built Rishikesh railway station located 380 meters above sea level, and terminates at Karanprayag, 825 meters above sea level. The project will reduce the travel time between Rishikesh and Karanprayag from the current seven hours (approx) to about two hours.

Challenges: geological conditions, rock hardness & stricter deadlines

The railway line is being constructed in the Himalayas, running parallel to the river Ganges. The main tunnel will have a parallel escape tunnel and ballast-less track that will run inside. The project has a total of 10 packages, out of which 8 have already been awarded to various contractors, including L&T, Navayuga, Rithwik, HCC-DBL and Megha.
Sandvik DT922i fully automatic twin boom jumbo: Intelligent yet flexible and adaptable

The fully automatic Sandvik DT922i machine comes equipped with Sandvik’s intelligent iSURE® and iSURE® GEO patented software for underground rock excavation. It is making the tunneling excavation safer and more productive. As with all Sandvik ‘i’ Series rigs, the DT922i effectively provides automated multipurpose face drilling with the capability to drill one complete round accurately, with a high level of repeatability according to a pre-designed drill plan, and with minimal intervention by the operator. This is because the iSURE® system for data collection analysis and process control improves the work cycle and processes. It assists in geological interpretation, thereby providing considerable savings in the drill and blast operation. It also generates critical reports on drilling operation, efficiency, and utilization of the DT922i rig, and provides drilling parameters in order to assess blasting vibration and pull-out.

According to Prabhat Mittal, Business Line Manager, Tunneling division, Sandvik Mining and Rock Technology, tunneling jumbos and the underground drill rigs for drill and blast are seeing some of the most interesting developments in recent years. These machines are becoming more and more automated, bringing high drilling precision and accuracy, and high fuel efficiency. The flexibility, relatively compact size, and other features that enable environment-friendly performance have made these drill jumbos increasingly popular in tunneling projects throughout the world, especially if the rock hardness/geological composition and other factors prevent effective use of TBM.

Rock analysis & project management software

The application of DT922i and its iSURE® MWD (measure while drilling) system has ensured that the drill and blast process has been optimized since the template-based drill plan has considered rock blast-ability, tunnel profile, target and explosives used. This has resulted in controlled blasting with a good pull-out, restricted fracture zone, and greater rock strength around the ~1 km tunnel. Furthermore, the blasting round’s length and detonation are tuned to the allowed vibration level and geology. iSURE® helps achieve the best possible result from the blast as it provides a set of templates for editing and feedback functions, with blast patterns being easily edited to match the design parameters.

The iSURE® GEO in DT922i is a rig-integrated, high precision, online rock mass analysis and visualization system designed for optimization of tunneling processes, and is fully integrated with the iSURE® tunneling project management software. It has proved to be highly effective in improving the overall Devprayag and Lachmoli tunneling process by providing geological information on the Himalayan rock, onboard analysis of the rock mass, advanced reporting, and helped in the assessment of rock reinforcement or injection requirements, in the charging and blasting control, and in geological mapping. In effect, the iSURE® GEO system acts as an analyzer as all information is provided on the drilling rig itself through the software, and effective sensors have helped users to provide accurate and repeatable results.

Sandvik DT922i: Designed to be tough

The rugged Sandvik DT922i has been designed to operate in the toughest of working conditions in India’s diverse terrains and regions. Its unique design comprising of a small number of hydraulic hoses, minimizes oil spillage (a key environmental concern of the Indian Railways), which cuts down the frequency of maintenance and downtime of the machine.
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Since the jumbo is required to work in some of the harshest conditions and continuously for hours, due care has been taken to ensure the safety and comfort of the operator. The DT922i has a sound-proof iCAB operator cabin, which conforms to ROPS (roll over protection system) and FOPS (fall over protection system) certifications, while state-of-the-art ergonomics with joystick controls ensure comfortable and safe working environment. To improve drill and blast performance, Sandvik Alpha rods and bits ensure higher rate of penetration and a longer life (an estimated increase of ~20%).

Training and hiring operators with the right skill set

Sandvik believes that a jumbo or any machine is only as good as the people who use it. To get the best efficiency and productivity through sourcing workers with the right skill set, in February 2020, the company along with RVNL officials, inaugurated a drill simulator training facility at the RVNL campus in Rishikesh, where it trains operators on its simulator - Sandvik Digital Driller™ as per the specifications of the rig. Moreover, Sandvik is also providing round-the-clock support, regular servicing and maintenance, genuine parts, and rock tools from its local warehouse to make sure that its customers get hassle-free operation all the time.
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Horizontal Directional Drilling is a technology in pipe and utility installation that allows greater accuracy and flexibility in placement and ends the need for costly digging, large crews, road closures and other complications of traditional digging and pipe installation.

By Safar Mohammad Khan, Deputy General Manager, HDD, Apollo Techno Industries

Horizontal Directional Drilling is a steerable guided method of installing underground utilities (viz OFC, FC, Gas Pipeline, Water & Sewerage Pipe Line etc) in a prescribed bore path using surface launched HDD Machines.(Apollo, Vermeer, Ditch Witch, XCMG, Driito, Goodeng, Dilong, American Augur, herrenknecht, etc). Apollo has created a niche in the small and mid-size segment and is doing rigorous and extensive work in the technical upgradations with the quality components in manufacturing of MAXI RIGS (>45-ton Rigs). Recently, Apollo developed an outstanding Maxi Rig model A1200 which is gaining popularity especially for drilling in rocks by using the Mud Motor and other advanced tools. A prescribed boring is used when an open trench or open excavation is not possible.

The tools and technique used in the HDD method have high demanding technology in Gas Pipeline Projects (viz: LDPLP-Long Distance Pipeline Project, CCPLP-Cross Country Pipeline Project, and GPLDP- Gas Pipeline Distribution Project). The HDD machine is now commonly used for laying OFC, power cable, water and sewerage pipeline of Telecommunication companies, SEB and City Municipal, respectively. Due to expansion of CGD (city gas distribution work), LDPLP (Long distance pipeline project) and cross-country pipeline projects (CCPLP) will accelerate the technological innovations of quality HDD rigs in the near future.
Offering the best in class SCHWING SHOTCRETE MACHINE to meet the TUNNELLING industry needs
Apollo (made in India) has already taken the initiative to offer technically sound rigs with complete solutions to customers (both Retail & Corporate) across the country. Prompt delivery of indigenously developed HDD Machines with the best safety features and equipped with world-class components is a great step towards developing pipeline infrastructure - without dependency on China and other countries.

Installation of a pipeline string by HDD is accomplished in the following six stages:
• Soil Investigation
• Drill path design
• Drilling the Pilot Hole
• Pre-reaming the horizontal Boring or Reaming
• Pull back operation
• Installation of Conduits

Soil Investigation
Different types of drilling bits/drill heads (diamond bit/Tungsten bit/ VCP bit/hard face bit) are used in the pilot-bore process. Selection of drill bit depends on the type of soil strata. The purpose of soil testing is not only to determine the feasibility of HDD crossing, but also to establish the most efficient way to accomplish it. If the strata becomes very hard (>90 MPA) then one has to use the rock cutting tools accordingly - like Mud Motor, Air Hammer, ARMOR etc. The geo-tech information governs the determination of best crossing route, along with selection of drilling tools and execution methodology.

Soil strata investigation is performed by analyzing the soil sample extracted from bore-holes drilled along the pipeline route - called bore log data. For big crossings, bore logs are typically taken at 200 m intervals. For short crossings (which are less than 300 m length), as few as three bore logs may be sufficient. The borings should be near the drill-path to give accurate soil data, but sufficiently far from the borehole to avoid pressurized mud from following natural ground fissures and rupturing to the ground surface through the soil-test bore hole. A thumb rule is to take borings at least 10m to either side of bore path. Although these are good general rules, the number, depth, and location of boreholes are best determined by the engineer.

Drill path design
One of the key considerations in the design of the drill-path is creating as large a radius of curvature as possible within the limits of the right-of-way. Small radius of curvature induces bending stresses and increases the pullback load due to the capstan effect. The capstan effect is the increase in frictional drag while pulling a pipe around a curve due to a component of the pulling force acting normal to the curvature. Higher tensile stresses reduce the pipe’s collapse resistance. Curvature requirements are dependent on the site’s geometry (crossing length, required depth to provide safe cover, staging site location, etc.), but the degree of curvature is limited by the bending radius of the drill rod and the minimum elastic bending radius of the pipe.

The designed drilling profile consists of a series of straight lines and curves. The straight lines are referred as tangents. The straight sections are those in which the drilling hole curvature is ideally zero. This implies that any pipe section can be considered as a straight section if the curvature of that section is less than that necessary to make the pipe deviate beyond the walls of the hole, which is roughly 1.5 times larger in diameter than the pipe itself.
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Drilling the pilot hole

The guidable steering tool is placed within the Bore Hole Assembly (BHA). Generally, the BHA is made up of non-magnetic drill collars. The 'lead collar' of the BHA is placed on the alignment of the particular crossing. After the alignment, the steering probe is energized with electrical current (wire-line steering) and a bearing for the drill path is established and logged into the surface computer. The drilling rig is set precisely on line with a transit. The non-magnetic lead collar (with steering probe) and the directional deviation tool are started exactly at the designated entry point. In most cases, one Non-Magnetic Drill Collar (NMDC) is used behind the BHA. A 10 m non-magnetic collar shall serve as a buffer between the steering probe (in the lead collar) and the steel drill pipe. Drill pipe is often highly magnetized due to the continual making up and breaking out the tool joint connections and can affect the tool parameters.

Good grade of bentonite is continuously pumped through the reamers to flush the cuttings and stabilize the hole. Similar procedure is repeated for all stages of reaming.

Pre-Reaming the Horizontal Boring/Reaming operation

Once the drilling bit exits (punch out) the pilot hole, the lead pieces/drill pipes are unscrewed. The hole opener/reamer is then attached to the leading pipe to start reaming operation. The reaming operation consists of using an appropriate tool to open the pilot hole to a slightly larger diameter than the carrier pipeline. The percentage oversize depends on many variables including soil types, soil stability, depth, drilling mud, borehole hydrostatic pressure, etc. Normal over-sizing may be from 1.4 to 1.5 times the diameter of the carrier pipe. While the over-sizing is necessary for insertion, it means that the inserted pipe will have to sustain vertical earth pressures without significant side support from the surrounding soil.
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The pullback operation involves pulling the entire pipeline string in one segment (usually) back through the drilling mud along the reamed-hole pathway. The pulling equipment is attached to the leading end of the drill pipes string, and the prepared pipe string is fed gently into the bored hole. Proper pipe handling, cradling, bending minimization need to be followed. Axial tension force readings, constant insertion velocity, mud flow circulation/exit rates, and footage length installed should be recorded. The pullback speed ranges usually between 1 to 2 feet per minute in MAXI Rigs and 7-8 feet per minute in Mini rigs.

**Pipeline projects in India**

A lot of pipeline projects for the expansion of gas, crude oil, CNG, LPG, water and sewerage are underway, while many are still awaited or stalled due to the Covid-19 lockdown. Most of the projects are delayed and many are in the bidding and tendering phase.

**Gas pipeline project**

The share of Natural Gas in India’s energy basket is 6.2% as against 23.4% globally. Gujarat alone has 25%. The country aims to achieve 6.2 to 15% of natural gas. Gujarat, Goa and Haryana and the UTs of Delhi, Chandigarh, Diu & Daman and Dadra Nagar Haveli are fully authorized for development of CGD networks. About 53% of India’s area and 70% of its population spread over 402 districts in 27 states and UTs would have access to CGD networks for supply of natural gas.

The following winning entities will be developing the gas pipelines and gas distribution in the cities: Torrent Gas, Adani Gas, Gujarat Gas, Indian Oil-Adani Gas, Hindustan Petroleum Corporation, Bharat Gas Resource, IOCL, Gail Gas, Unison Enviros, Thinkgas, Assam Gas Company, Maharashtra Natural Gas, ESSEL, Megha Engineering & Infrastructure, Tripura Natural Gas Company, Green Gas, and IGL. These companies will be working on city gas distribution pipeline installation work with the help of HDD method and open trench, depending on the circumstances. PNG and CNG pipes will be parallelly laid beneath the soil depth up to 1.65 mtrs to 2.00 mtrs. Total distribution work will probably be for 1,12,696 kms across India.

State-owned gas utility GAIL India will invest over ₹45,000 crore over the next five years to expand the National Gas grid and city gas distribution network. GAIL currently operates 11,000-km of pipeline network and markets two-thirds of all-natural gas sold in the country. Out of the ₹45,000 crore investment, ₹32,000 crore would go into pipeline laying and another ₹12,000 crore in city gas distribution (CGD) networks for retailing of CNG to automobiles and piped natural gas to households.

Adani Gas will invest up to ₹9,000 crore in setting up city gas distribution network over the next 10 years to retail CNG to automobiles and piped cooking gas to households. Adani Gas Ltd (AGL) on its own and in a joint venture with state-owned Indian Oil Corp (IOC) has won a city gas license for 38 geographical areas spread over 71 districts in 15 states.

GAIL is looking to put up 400 CNG stations and give out a record of 10 lakh piped natural gas (PNG) connections to household kitchens in the next 3-5 years.

**Cross Country Pipeline Projects**

Some of the major players in India who are making cross country pipeline installation through the HDD method and their technology innovations include ONGC, IOCL, OIL, GSPL, IGL, GSPC, Adani, Avantika, and PNRGB.

**Recent HDD Cross Country projects executed or under execution by Apollo A1200 HDD Machines**


Gas Pipeline Dia-20” + 6” bundle pulling

Location: Bhadreshwar at Sakra River/Ch.No-37860

Driller: Bibhuti Kr. Mandal

HDD Machine used: A1200.
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2. Project: GIGL (Gujarat State Petronet Limited)
Executed by: SNS Trechless Engineering, Bharuch; Dia-30” CS
Location: Talwandi, Bhatinda
HDD Machine used: Apollo A1200, Shot Length-294 m, Soil – normal soil with sand impression.
Status: Ongoing
Challenges: None, except the site management.

HDD Machine Apollo A1200
Apollo’s A1200, a powerful made in India HDD Machine is equipped with world class specification which makes the machine fast and reliable. It is even capable of drilling in black rock bed at Sakra River beneath 14 metres. Its 800 LPM big Mud Pump makes the water flow high. It has joystick control systems and 6000 PSI operated hydraulic pumps, along with the 6000 PSI rotation. All the HDD processes have been observed to be very effective and fast due to the high quality specifications, and along with a trained driller they enable installation highly successful. The only challenges were site preparation and management. A quality mud motor along with all the site preparations are required (viz. mud mixing system, mud recycling system, rock cutting reamers, diesel etc). Some interference was found in the locating systems due to the salty nature of the rock.

Benefits of Directional drilling
• Reduced soil disturbance.
• A single location area can be used to install different pipes.
• Reduces the fractures to existing rock formations.
• Reduces the contamination of groundwater pollution.
• Protects the ecosystem and adjacent areas.
• The directional drill produces twice the amount of oil or gas being extracted.
• Reduces the excavation and shoring costs.
• It is a safer operation than open cut.
• Weather will not impact directly on the process.
• Limited traffic and landscape disruption.
• Ideal for sites sensitive to surface disruption such as heavy roadways, airport runways, golf courses, etc.
• Ability to drill beneath surface obstructions or ongoing site operations.

Some of the factors such as increasing growth of telecommunication and oil and gas industries, high underground water extraction and growing awareness about minimally invasive techniques are boosting market growth. Horizontal directional drilling is one of the most specialized methods for installing underground conduits with minimal damages to the surrounding ecosystem through trenchless methods. It involves the use of a directional drilling machine, and associated attachments, to accurately drill along the chosen bore path and back ream the required pipe. It is ideal for installing cables, conduits, and pipes for short distances as well as long-distance projects and even at deeper depths.

Amongst the machine parts, the rigs segment accounted for a significant market share during the forecast period. Rising demand for well-organized rigs in HDD projects for distant pipeline installations is propelling the growth of this segment. Mini HDD rigs are mostly used for laying of power and telecommunication lines and in installing heavy pipes for gas distribution. By geography, the North America region has dominated the market during the forecast period due to the increasing number of oil and gas industries and infrastructure development projects.

A lot of infrastructure needs to be developed in India under the urban development program for smart cities, where LPG will be supplied through gas pipelines to houses. 5G network distribution is well prepared by all the telecom companies (such as Airtel and Reliance Jio) where the OFC duct will be installed by using HDD machines. Power cable giants under the SEBs will be expanded by using HDD machines. Now, the Municipal Corporations are also knowledgeable about installing water and sewerage pipelines through non-disruptive technology.
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- Extended pressure cleaning poles
- Gantry and Ladders
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- Special Cradles (Panograph)
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- Rope Suspended Platform
- Building Maintenance Unit
Progress Maschinen & Automation: Reinforcing cages for tunnel construction and wind-energy solutions

Special knowledge is required for building tunnels and wind energy plants in order to implement demanding projects. The facilities and manufacturing processes required for such projects can be adjusted well in advance for efficient manufacture of ladders and mesh to meet specific requirements. Progress Maschinen & Automation, a Progress Group company, has complete technologically mature solutions which, depending on the customer’s requirements, are developed to the highest degree of automation. In addition to consistently high production quality, the development of mobile solutions is another aspect to which special emphasis is paid. For implementing projects in tunnel construction and for the erection of wind energy plants, the company, based in South Tyrol, Italy, banks on machines tailored to meet specific individual requirements.

Tunnel Master ladder welding machine

The Tunnel Master is designed for the manufacture of straight and bent ladders off coil. This robust and low-maintenance welding machine enables fast and cost-saving production of tunnel segments. The ladder welding machine excels particularly with its flexible grids of longitudinal and transverse wires, as well as with a flexible choice of diameters of up to four longitudinal wires. The computer-controlled welding controller enables, moreover, have precise and controlled welding without hydraulics. Apart from short conversion times, adjustable cutting angles and an automatic stacking unit are among the highlights of the Tunnel Master.

M-System mesh welding plant

Precise and controlled welding and just-in-time production of made-to-measure reinforcing mesh off coil are special outstanding features of the mesh welding plant from this latest generation. This enables manufacture of special geometric shapes, blockouts and a choice of diameters. On the bending system, the mesh can be bent both upward and downward. The M-System features a fully integrated straightening plant. It can, moreover, be expanded by various logistics solutions and is available as a mobile plant.
Mobile plants enable flexible, just in-time production, Picture rights: Firmengruppe Max Bögl

Complete solution

Special robots can fully automatically weld the processed reinforcing steel elements into complete reinforcing cages. The production output can be scaled, depending on customers’ requirements. The customized ProFit software controls production processes, order positions and machines. CAD systems supply the modular-design program with reinforcement data.

Mobile solutions for construction projects

In planning and implementing mobile facilities, the wind-energy and tunnel industry profits from this engineering company’s many years of experience. Progress Maschinen & Automation offers specific consulting services for an automated production process and individual production concepts. Through innovative technologies and specific customer orientation, the company has evolved into an internationally leading supplier in this sector.

For further details, please contact:
Progress Maschinen & Automation AG
Julius-Durst-Straße 100, 39042 Brixen/Italy
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SICOMA warns customers against unauthorized parts dealers supplying duplicate parts and counterfeit mixers in the market.

This is to bring to the notice of all our esteemed Original Equipment Manufacturers (OEMs) customers and end-users that SICOMA Mixers India Pvt. Ltd. (SMIPL) supplies genuine spare parts only through their Authorized OEM Channel Partners. It has come to the notice of SMIPL that quite a few unauthorized companies are claiming to be SMIPL Parts Dealers and are in the process of supplying spurious/duplicate parts to unsuspecting clients. Please note that usage of such spurious parts can cause serious damage to the performance of the Mixers and can nullify warranty conditions. It is an earnest appeal to all our end customers to procure genuine SICOMA parts and services only through their OEM Batching Plant providers. SMIPL does not have any “Authorized” Spare Parts Dealer anywhere in India.

It has also come to our notice that there are certain SICOMA “look alike” Mixers operating in the market under the guise of SICOMA branded Mixers. SMIPL manufactures and assembles Concrete Mixers in India purely under license from SICOMA s.r.l., Italy. SMIPL reserves the right to initiate legal actions against any such malpractices. SMIPL therefore advises all its OEM Channel Partners and End Users to be aware of such look alike Mixers. SMIPL requests one and all to bring it to our notice immediately if you come across of any such activities.

This notice has been issued in the interest of SMIPL’s esteemed customers and fair business practices by the company’s Management.
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Cement/Lime Spreader Machine

- Material Compatible - Cement/ Lime.
The teams are hard at work in Meyrin (CH) and Cessy (FR). The extensive renovations will equip CERN’s particle accelerator to continue to help decode the mysteries of the universe in the coming decade. More than 500 m of tunnels and various facilities on the surface are planned for the electrical and cryogenic plants at the two sites. Around 100,000 m³ of rock has been excavated for the new service tunnels, located a mere 10 m above the existing LHC tunnel. They are being linked to the LHC with two access points each and a number of drilled cores (for utility cables).

Complex workflow
The building work is being done during a planned two-year maintenance shutdown of the accelerator since vibrations during operation of the LHC could affect the experiments. The construction site team is therefore under considerable time pressure to complete the work before the planned restart of the accelerator in early 2021. The specialist in conventional and mechanical tunnel advance, Marti Tunnel AG, has built a custom steel formwork carriage for the 300 m main tunnel. For the formwork for the cross passages, connecting components and stairwells, however, the Marti Tunnel specialists called in Doka’s expertise.

The formwork engineers developing these solutions scored points partly thanks to the international cooperation between the engineering teams at Doka’s branches in Zurich and Bern and the tunnel experts in Amstetten. Various elements made the project challenging: the high complexity of the various structures, a need to ensure that formwork elements could be reused and were correctly matched with each other, and the elaborate construction workflow. This meant it was vital for all the engineers in the project to pool their extensive expertise and knowledge and work together to ensure the client could be offered the right solution at the right time for every structure.

Far from traditional tunnelling
Usually, the biggest unknown at a tunnel construction site is the geology. At CERN, though, the construction site team faced rather different challenges. Natalie Schweizer explains further: “This isn’t a typical tunnel construction site. We faced a special challenge when it came to coordinating and planning each construction stage, the construction process and the materials, machines, and human resources available.” Reinforcement might be already underway in one passage while rock was being excavated 200 m away. What made this site particularly challenging was that, although usually there is access at both sides of a tunnel, at CERN the access was constructed as a 60 m deep shaft with a diameter of 12 m. It’s not just the tunnel spoil and 17,800 m³ of in-situ concrete that have to pass through this one bottleneck – the tunnel formwork carriages are also lowered up and down through this shaft.

Doka developed the vault formwork for the four 50-70 m long cross passages, using both standard formwork methods and three formwork carriages. The largest of these SL-1 tunnel formwork carriages is 10 m long, with a diameter of 6.30 m. This carriage had to be designed so that it could be separated longitudinally, or it would not have been able to reach its destination – something that would not have been an issue on a standard tunnel construction site. The Doka engineers accordingly planned four discs 2.5 m wide, with extra attachments that could be secured to the crane. Element by element, the 50 t gantry is lowered through...
The smaller of the two SL-1 tunnel formwork carriages was fitted with wooden shuttering; the larger was given a steel shuttering. Copyright: Doka

Only one way down: All the materials and equipment – including elements for the tunnel formwork carriages – have to be lowered by crane 60 m into the access shaft. Copyright: Doka

matter and the fundamental interactions between elementary particles. Various experiments and detectors have been set up along the length of the 27 km circular accelerator running beneath the Swiss canton of Geneva and part of France. The most well-known of these are ATLAS and CMS, known for their contribution to proving the existence of the Higgs boson in 2012. CERN researchers François Englert and Peter Higgs won the Nobel Prize in 2013 for this discovery.

The LHC has been extended and upgraded in the past. Now, in the course of a two-year shutdown ending in spring 2015, plus a further maintenance shutdown from 2019 until the start of 2021, the collision energy is being increased from its original 7 TeV to 13 TeV. A kinetic energy of 7 TeV from a proton corresponds to 99.9999991% of the speed of light. One important result of the planned upgrade is that the collision rate (or, more correctly, “luminosity”) will be increased by a factor of 10, making it possible to measure new particles more precisely and observe rare interactions that it has not so far been possible to see. Supersymmetry and dark matter are just two of the universe’s mysteries that scientists hope to be able to learn more about from the LHC in the not-too-distant future.

The LHC is expected to be closed down in 2035. However, various extensions and modifications are also being discussed that might be implemented before then.

**LHC: the big numbers**
- LHC circumference: 26,659 m
- Tunnel diameter: approx. 3.80 m
- The average depth of the tunnel below the earth’s surface: 100 m (min. 50 m, max. 175 m)
- Operating temperature: 1.9 K (-271.3 °C).
  The LHC is the biggest cooling system in the world and one of the earth’s coldest places
- Electricity consumption: approx. 120 MW, equal to around 1/3 of the electricity consumption of all the households in the canton of Geneva
- Annual data volume: 50,000,000 GB (=50 PB). ATLAS generates approx. 1 GB/s
- Total construction costs: approx. CHF 6.5 billion
CRCHI TBM at work in Hangzhou Genshan East Road Crossing River Tunnel

Innovation of mega Slurry TBM
On June 28, the ‘Qiantang Jixiang’ 15-meter mega Slurry TBM rolled off the assembly line at CRCHI. The excavation diameter of the equipment is 15.01 m, its total length is about 130 m, total weight is about 4300 t, installed power is about 9755 kW, rated torque is 42784 Nm, and the maximum excavation speed is 50 mm/min. It will be used for the construction of crossing river tunnel of Genshan East Road in Hangzhou, China.

Project Overview
The Genshan East Road Crossing Tunnel Project in Hangzhou is designed as an urban expressway, including a cross-river tunnel, a comprehensive pipeline gallery, a ground connection line project and supporting auxiliary projects. The total length of the project is 4,725 m (including ground connection roads), and the total length of the tunnel is 4575 m. About 3160 m of the tunnel will be using a TBM. The length across the Qiantang River is about 2.3 km. It has a double-tube circular structure and six lanes in two-way. The design speed in this tunnel is 80 kilometers per hour.

Engineering Challenges
The tunnel section advancing with TBM passes mainly through soft soil layers, such as silty soil, mucky soil, and cohesive soil, with a maximum buried depth of up to 44.2 m. The main difficulties in the construction process are as follows:
• The tunnel excavation section has a diameter of 15.01 m, and the stability of the tunnel face is difficult to control. The TBM should have the ability to accurately control the stability of the tunnel face to prevent it from collapsing.
• For advancing in soft soil, poor stratum bearing capacity and poor permeability will cause the TBM to sink, and the segments to float up. Therefore, it demands high precision and control of the TBM and high quality of segment box culvert assembly. In addition, due to the high content of viscous particles in the formation, a large capacity of the ground slurry treatment system is required. Since the problem of mud cakes often occurs for the cutterhead, the TBM should have the ability to prevent mud cakes and efficiently process them.
• Long-distance crossing of the Qiantang River, and construction at the bottom of the river has high requirements on the reliability of the TBM and the balance of the excavation face, avoiding the breakthrough of the river bottom.
• The length of the section is 3.2 km, which requires high reliability for TBM seals, including main drive seal and tailskin seal, and high requirement for wear resistance of the cutterhead, cutters, and slurry pipelines.
• Since there may be harmful gases in the formation, the TBM should have reliable harmful gas detection devices and be equipped with a high-power ventilation system to discharge the gases on time.

Engineering Feat
The CRCHI R&D department has tackled all the key problems with the Qiantang Jixiang 15-meter mega Slurry TBM. The machine was designed to have soft soil cutterhead which features cutter change in free air, frequency conversion motor for the main drive and a retractable cutterhead. Cutting-edge technological advancements include main drive seal which is automatically pressurized, high precision gas-liquid pressure balance control, simultaneous lifting and assembly of segments and box culvert. Therefore, the performance reliability and geological adaptability of the shield machine have been improved dramatically. The development of this TBM has strongly promoted the development process of China’s mega Slurry TBM.

Project: Hangzhou Genshan East Road Crossing River Tunnel
Location: Hangzhou City, Zhejiang Province, China
Customer: China Railway 14th Bureau
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The river has its source at over 3000 meters high in the snow-covered Andes. It reaches the Pacific Ocean after 250 km. On its way, it overcomes a considerable gradient and is, therefore, ideally suited to generate electricity. Santiago’s need for energy is great as the conurbation has over 7 million inhabitants. Around 44% of Chileans live here, making it the political and economic heart of the country.

The Alto Maipo hydroelectric power plant with a capacity of 530 MW was planned around 10 years ago. It is currently the largest construction project in the country. The European construction group Strabag (with 73.000 employees) based in Vienna, Austria, was awarded a first partial contract for the construction of the power plant in November 2012. It is located about 50 km southeast of Santiago in San José de Maipo in the province of Cordillera. The mega project, which was started shortly afterwards in 2013, has a volume of well over one billion euros. According to Strabag, it will secure over 4.700 jobs in Chile.

Largest construction project in the country

The project also includes the construction of tunnels with a total length of 74 km. These tunnels will carry water not only from the Rio Maipo but also from the Colorado River to the turbines. The elevation range of the construction site alone is considerable - ranging from 820 to 2.500 meters ASL.

In order to deliver absolutely reliable work in this strategically important construction phase, those responsible decided to use machines from the German manufacturer...
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BONDS BUILDS BUSINESS
GHH, among others. During the initial negotiation of 12 GHH MK-A20 dump trucks, for the construction with drilling and blasting method, the criteria used by Strabag to make the purchase was based on the excellent reputation of this machine. Strabag already has used them in other projects around the world - a reputation acquired through the robustness, simplicity and reliability demonstrated by this model. Subsequently, the project progressed, and the fleet was increased to 28 units of this model, also adding a LHD loader model LF-10, four mixers TM05 and one shotcrete IS26.

This project has also generated a strategic alliance between Strabag and GHH in aftersales matters, such as technical assistance in the field, consulting, machinery repair, component repair, among others. Strabag’s trust has been answered with GHH’s commitment and professionalism. Such reliable specialists are required, because two caverns alone with more than 40,000 m³ of excavation material each were built. Three Hard Rock TBMs, one Double Shield TBM and two Simple Shield TBMs were used, providing for about 40 km of tunnelling.

Three million cubic meters moved away
A total of three million cubic meters of excavated material were moved. Here, the GHHs performed magnificently: no severe failures were recorded. The manufacturer attributes this to the particularly robust, reliable and - in the best sense - simple design of the articulated dump trucks: all relevant components are easily accessible for maintenance.

The MK-A20 can carry 20,000 kg or up to 12.5 m³ hard or soft rock with an operating weight of 18,955 kg. The vehicles are around 9.4 m long and a maximum of 2.2 m wide, with an overall height of around 2.5 m. At GHH, they represent a medium-sized model used in both mining and tunnelling applications - the manufacturer also has much larger variants. In general, GHH supplies practically everything in the field of rock logistics that drives on wheels. The company, which is part of a larger group of companies, is considered a total solution provider and is represented on all continents.

The Alto Maipo project is scheduled for completion in the summer of 2022. For the dump trucks in use, this will probably not be the end of their lives: many of them will be used on other construction sites after they have been refurbished. Only recently, a similar vehicle returned to the manufacturer’s factory for overhaul; after lying idle for five years at a remote site - only the battery had to be replaced.

In addition to dump trucks, German manufacturer GHH supplies practically everything in rock logistics that drives on wheels (Photo: GHH)
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Tan Shunhui, Chairman, CREG, discusses the competitive advantages of the company’s tunneling equipment and solutions, emerging opportunities in developing countries, factors driving its growth and success across the world, and its strategic partnership with French company Metalliance, with Maria R.

With China becoming the world’s largest tunneling equipment market with around 45% market share, how are Chinese tunneling equipment manufacturers and contractors advancing technological developments for sustained growth of the industry?

In the past 40 years, since China’s reform and opening up, large-scale infrastructure developments such as transportation, water conservancy, and urbanization have been carried out continuously, among which, many underground space development projects, mainly tunnels, have been successfully constructed. Because of the continuous promotion of mechanized construction in these tunnels, covering tunnel excavation, support and reinforcement, China’s tunnel equipment manufacturing industry has been greatly appreciated worldwide.

Tunnel equipment manufacturers and contractors, as important participants in the tunnel construction process, serve the tunnel construction with their own products and technical advantages to make the tunnel construction safer and more efficient. At the same time, during the construction, many complex and emerging problems, such as the geological and hydrological conditions, surrounding environment, new engineering structure, etc, have to be solved. Our engineering construction standards have been upgrading as tunnel equipment manufacturers and contractors are constantly carrying out technical innovations and equipment developments to improve the safety and efficiency of tunnel construction.

In view of CREG’s vast experience in manufacturing tunneling equipment, along with undertaking infrastructure construction projects of your principal company (one of China’s largest), how has CREG’s market share grown over the years?

As a specialized subsidiary of one of the major construction contractors in China, CREG serves the huge infrastructure construction in China. From a professional tunnel construction contractor with the most engineering achievements in China, dealing with many types of tunnel construction equipment, it has now become a tunnel...
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equipment manufacturer. No doubt, it has the natural advantage of “rich experience from numerous practices”, which makes it distinctive from its peers. At the same time, we embrace the idea of customer-orientation by combining the technical advantages of equipment manufacturing with our rich construction experience.

With advanced and reliable equipment technology and efficient after-sales service, we’ve become a solution provider for clients. We insist on working together with our customers throughout a project’s duration. While constantly solving engineering and technical problems, we are continuously accumulating, optimizing and upgrading our equipment innovation and technology in a bid to make our equipment better, and customers more satisfied.

CREG is known as a professional equipment manufacturer with adequate construction experience and a leading service provider with manufacturing know-how. Based on our core competitiveness in manufacturing and customer service, CREG has become the largest TBM manufacturer in China within 10 years. The market share of its TBMs has been topping for 8 consecutive years, since 2012; while its production and sales volume have stood first for 3 consecutive years, since 2017.

**It is now 7-8 years since you started to explore world markets; what business potential do you see in developing countries like Asia, the Middle East and Africa?**

In 2012, the third year since its establishment, CREG started its international business and entered the Malaysian market. Since then, CREG has been vigorously promoting its overseas strategy. Up till now, we have entered 20 countries and regions in the world, including Malaysia, Singapore, Dubai, Italy, Denmark, Australia, etc., with more than 50 sets of equipment. In 2019, our products entered the heart of the European market --- Paris/France.

The developing markets have a huge potential, especially in recent years as the economy of Asian and Middle East markets is recovering. A lot of infrastructure is being implemented, including the track project, which is a very good opportunity for us. In the African market, we pay more attention to people’s livelihood projects such as water diversion projects, hydropower projects, and a small number of rail transit projects. We already have a project in Algiers, the capital of Algeria, which will continue to increase in the future, so we are optimistic about its potential.

**What advantages does CREG’s tunneling equipment have over German and Japanese brands?**

In the past 10 years, CREG has grown from scratch and become the world’s first in terms of production and sales volume for three consecutive years. In fact, each manufacturer has its own unique advantages and competitiveness. When compared with the German manufacturers, CREG has the same level of technology, but it has a competitive advantage with respect to pricing and customer service. Compared with Japanese manufacturers, especially in the middle and high-end market, CREG has a great advantage in technology, quality and service. CREG always embraces the idea of customer orientation and is willing to provide customized services.

In our equipment design, we adopt a combination of relevance, reliability and specialized manufacturing to ensure the highest quality of equipment, along with timely, efficient and professional services to our customers. Our aim is to constantly enhance the efficiencies of engineering construction and to create value for our customers. Due to this approach, we find that engineering contractors are more willing to work with CREG.

CREG Ø15.80m Slurry TBM for Chunfeng Tunnel
What are the challenges, opportunities, growth prospects, and key factors driving the South East Asian Tunnel Boring Machine markets?

Opportunities and development prospects are on the rise as the economy is recovering and a large number of infrastructure projects are under consideration in countries like South Korea, Singapore, and India, where rail transit projects are booming. The key market drivers are ongoing demand for underground space development, promotion of the “Sponge City” concept, and recovery of the infrastructure market, including gradual improvement of urban rail transit, construction of large tunnels across rivers and seas, to name a few.

However, competition is becoming more and more fierce. While old competitors are still there, emerging competitors are constantly entering the international markets, raising higher requirements for product quality, equipment selection and configuration, timely service, etc.

Please share a case study of a challenging project in Malaysia where CREG tunneling solutions were deployed and completed within the stipulated timeline?

During the construction of the Kuala Lumpur Metro Line 1 in Malaysia, the geological information encountered was inconsistent with the geological information in the bidding document. One section of stratum had the highest hardness of 298mpa (about 300mpa). The two TBMs provided by CREG successfully overcame these unexpected geological conditions, making the average daily excavation about 10m and a maximum monthly excavation of 341m. Within 15 months, CREG successfully completed two launches and completed the excavation of a total length of 2203m. This was highly praised by the customers, local owners, and the community.

What are the latest innovations in Tunneling technologies at CREG and what does its partnership with Metalliance entail?

CREG is committed to technological innovation and research. In recent years, we have achieved a series of innovations such as intelligent TBM, new rock breaking technology, cutterhead intervention manipulator, miniaturized TBM for mining, shaft TBM, etc.

Metalliance is a well-known French company specializing in research and manufacture of industrial equipment and mobile machinery. Its business scope mainly covers tunnel engineering machinery, underground engineering, track laying machinery, industrial equipment, mechanical welding structure, etc. Its products and CREG’s TBM equipment are supporting products in tunnel construction, with a high degree of complementarity.

The cooperation between CREG and Metalliance can not only provide customers with complete packaging services of tunnel equipment, but also help promote technical advances of our products on both sides to better serve customers. We value such strategic alliances and hope to cooperate with excellent companies from all over the world.
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As Project Fuelling Consultants, we take pride in offering the following to our customers:-

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All components used by TankUp is regularly checked and fully tested for fire safety on a regular basis. Our tech-equipped PESO-approved Diesel Bowsers are environmentally friendly and our Fuel managers are well trained to maintain our impeccable safety record.

The fuel delivery industry is identified as one of the growing industries with a lot of potential. Our company brings this service to a range of customers, having bulk consumption for their heavy vehicles/machinery, generators, stationary equipment, etc. We have enjoyed steady organic growth since 2017 based upon quality and customer satisfaction. At its present level TankUp is at a size where personal attention to all team members is ensured by the management. We believe that TankUp Petro Venture LLP enjoys lowest turnovers of staff in the refueling industry. Our employees are the key to our successful and growing business. Careful selection, training and support are of utmost importance at TankUp.

Sustainable Development Goals given by the UN has helped us understand risks and define and prioritize our plans to align our strategy to the SDGs to make the biggest positive difference on our part. We have successfully delivered over 98 lakh litres of High Speed Diesel with an average of 2.5 lakh per month. We also manage more than 12000 assets - as of now.

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Ammann: Green Roads for India
Initiative Towards Swatch Bharat

The success of Ammann Asphalt-Mixing Plants is driven by innovation, backed by massive investments in R&D for developing sustainable and cost-effective solutions for the road building industry. For instance, the company’s ACC 90 CounterMix asphalt plant is a combination of energy-efficient, minimum carbon footprints, and pollution control designed to meet the stringent pollution norms.

Ghaziabad-based JRD Infratech, an experienced Indian road construction company, turned to Ammann to help it meet the increasingly strict environmental standards. JRD primarily concentrates on roadbuilding and civil projects, but also handles residential, industrial and commercial work. “We are a focused, service-oriented firm that has a lot of experience in construction projects,” said Jitendra Yadav, Director of the company. “Our recognition as a fast growing, dependable organization comes from our strength in traditional construction methods combined with our capability to leverage cutting-edge technologies and delivery systems for residential and commercial projects.”

JRD Infratech recently purchased an Ammann ACC 90 CounterMix Asphalt-Mixing Plant. “It is an environmentally friendly plant that utilizes green technology. It meets the National Green Tribunal (NGT) and Central Pollution Control Board (CPCB) guidelines and their stiff pollution norms. In fact, it is the only plant that has met NGT conditions,” said Yadav.

The ACC 90 CounterMix is producing asphalt mix for the Noida-Greater Noida Expressway, which connects Noida in Uttar Pradesh – an industrial suburb of Delhi – to the new suburb of Greater Noida. It is also being put to work on other sector roads. Recycled plastic is being used in some of the mixes manufactured for the project. Producing about 600 tons per day, it is a counter flow asphalt drum-mix plant, which has become to be known as a highly productive and environmentally-friendly plant. It combines the simplicity of existing continuous drum-mix plants with the added efficiency achieved through counter flow technology. Lesser energy requirements for heating lead to reduced emissions. It also produces the mix at a lower cost than traditional parallel flow drum-mix plants and can easily incorporate recycled asphalt (RAP) and other additives.

The plant’s green features, particularly its lower emissions and recycling capabilities, were just what JRD wanted. “Tough environmental norms are the biggest challenge we face today,” said Yadav.

Ammann Group’s commitment to technology was a key factor in JRD’s purchase decision. The plant utilizes Ammann’s proprietary recycling technology and is engineered for implementation of future innovations. “Overall, the ACC 90 CounterMix is a cost-saver. It is fuel efficient as it consumes less energy when compared to other plants. So, we save money on fuel, plant maintenance and parts consumption, plus the plant is reliable and easy to operate. Its installation was fast and straightforward and was completed in about 10 days. What’s more, the Ammann India service team is always ready to support our plant and has a fast response time. The customer service is very supportive and helps to ensure that all maintenance is completed on time,” he added.

A forum “Initiative Towards Swatch Bharat” was launched by Ammann India along with the Indian Road fraternity to work on major aspects of Sustainable Asphalt Pavement Technologies.

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The Kaleshwaram Lift Irrigation Project is a gigantic project around the Godavari River in the state of Telangana. The aim is to supply this region, which has been extremely short of water for years, with a reliable source of water for drinking and for agricultural purposes. The work to build the holding ponds and the waterways between them has been running since 2018. The essential feature here is compaction of the substructure of the waterways and the dams. It was for this purpose that HAMM compactors were used for part of the project along the Komaravelli Mallana Sagar dam.

Fleet of **HAMM** Compactors help build Komaravelli Mallana Sagar Reservoir

34 HAMM Compactors Achieve Top Performance

34 HAMM machines of the 300 series were in action during construction of the Sri Komaravelli Mallanna Sagar Reservoir, compacting layer upon layer of different construction materials: soil, murrum soil and black cotton soil. The large number of machines is explained by the scale of the construction project – the reservoir dam is approximately 400 m wide at the base and is still 8 m at the very top. To complete the outer skin of the dam, the compactors had to cope with an incline of approximately 36%, whilst compacting at the same time. The 311D compactors from HAMM were convincing products in this situation as their drum drive gives them an impressive ability to climb.

**HAMM 311D: A Reliable Powerhouse**

The engine with a rated output of 74 kW (100 hp) supplies the HAMM 311D with plenty of power to ensure a sustainable, stable amplitude output when compacting steep slopes. Its static linear load of 30 kg/cm is every bit as impressive as its centrifugal force of 240 kN. This power leads to good compaction performance.

**HAMM 311D: Outstanding Safety**

Working with construction machines on a slope exceeding 35% involves potential safety risks including rollover or slipping, which may injure machine operators and other workers on the job site. So, it was lucky for everyone that the HAMM 311D offers a high level of safety because it can be fully self-locked by braking. This eliminates incidences of slipping on the slope and thus avoids potential safety hazards.

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Driven fully hydraulically (original Rexroth parts), the self-locking differential of the HAMM 311D guarantees excellent climbing ability, with gradeability consequently as high as 53% on soft soil.
CDE Asia Participates in DiECE 2020

CDE Asia is participating as Technology Sponsor at DiECE 2020 - Digital Exhibition for Construction Equipment, organized by CII. DiECE is being held from 18 August to 17 November 2020.

In the current challenging environment, adopting digital solutions has become a key strategy of industries across the globe. CII’s virtual exhibition platform is addressing business continuity needs by showcasing a wide range of products and services and enhancing participants’ exposure to a larger audience. The virtual event was launched by Shri Nitin Gadkari, Hon’ble Minister for Road, Transport & Highways and Micro, Small and Medium Enterprises (MSME), Government of India.

CDE Asia is committed to bringing smart, eco-friendly, and sustainable solutions to the construction industry. “Our attendance at DiECE as Technology Sponsor underscores our dedication in helping industries to reshape their strategies and adopt best practices to adapt to the dramatically-changing business environment,” said Manish Bhartia, MD, CDE Asia.

CDE Asia is a leading manufacturer of wet-processing equipment serving 24 countries in the Indian subcontinent and in South-East Asia. The company has been providing breakthrough solutions for the growing shortage of natural sand; recovering value from low-grade minerals through beneficiation; and solving the problem of C&D waste disposal by offering novel recycling techniques to recover useful construction materials.

With some of the most innovative products in the market and an enviable global reputation, CDE Asia is at the forefront of the wet processing industry with its latest revolutionary wet processing solution ‘Combo Multi’ which helps to produce superior quality manufactured sand and clean washed aggregates from a mixed feed grade - using a single machine. This smart machine is equipped with IoT sensors that enable users with contact-free remote monitoring capability during these Covid times. It combines feeding, grading, washing, water recycling and stockpiling onto one compact chassis with an impressive capacity range of 100-200tph. Like all other models of CDE Asia, it is an eco-friendly machine that recycles up to 95% water and is extremely energy efficient.

“We are presenting a number of exciting innovations along with the Combo Multi that targets the changing needs of the CE industry,” said Manish Bhartia. “We are completely focused on providing tailored solutions to our customers to help them achieve their business goals, improve their returns, and reduce costs. Our customer first approach is the real driver behind our development efforts, and we’re very excited about this opportunity we have to showcase our new solutions.”

“Not only are our products technologically superior, they also offer an unbelievable RoI to our customers. We have tied up with leading financial institutions to create some excellent finance plans which will pay back the entire cost of the equipment within the first few months of commissioning,” added Manish Madhogaria, CFO, CDE Asia.
Lubricants play a vital role in the reliability of any equipment. It is not only the oil quality but, most importantly, the oil storage and handling practices that enhance the reliability and life cycle cost of machines.

By Bhaskarudu Peddakotla

All fleet owners follow the equipment manufacturer guidelines in usage of appropriate grade of oils and when it comes to quality, some customers will go with the oil brand and some customers prefer proof of testing from oil labs. But few understand the importance of oil storage and handling.

Oil Storage and Handling

This job of ensuring proper storage and handling of lubricants is entirely in the hands of the fleet owner. Protecting lubricants is protecting the machine, but unfortunately, people at many sites do not pay serious attention to lubrication storage and handling practices as they are not aware of the repercussions and the problems that can arise with improper storage and handling. Lapses may be in providing improper covered storage facility, exposing barrels or containers to the open atmosphere; missing or loose fixing of caps; mixing of different oil grades; inadequate oil handling tools; using dirty cans to carry oils, etc. All these lapses expose the oils to dust (silica) or moisture (water).

Dust in lubricants

After oxygen, silicon is the most abundant element available on earth and more than 90% of earth’s crust is composed of silicate minerals; quite literally, there is no job site without silicon. Silicon when it joins with oxygen becomes silica - the most abrasive material; even more abrasive than any ferrous, copper or aluminium parts used in the power train components of a machine.

Construction or mining site operations are prone to fine dust (fine silica particles). Clearances between moving parts of the engine and other power train components are very thin in order to balance both sealing and lubrication film. These dust particles when mixed with the lubricant, pass between the piston, rings and cylinder and eventually become suspended particles and start “scratching” the surface. The next action will be induction of dust particles between two metallic surfaces, affecting uniform load distribution and leading to concentrated load on particles, with tremendous increase in pressure at the point of contact. All these lead to rapid wear and premature failure of engine and other power train components, and wherever the contaminated oil passes. Fine particles that are equal in size to the oil film are more harmful as they can easily pass along with the oil and act as a scratching medium.

Effect of dust in lubricants

Dust that enters the oil cannot be easily taken out and the lubrication activity turns into metal scratching, which leads to rapid wear of all parts where the oil passes through, such as the engine piston rings, liners, valve train, bearings, hydraulics pumps, motors, cylinder seals, barrels, transmission components, final drive parts, etc.

Most of the causes for premature failure of engine and other power components are attributed to dust entry. So, if one takes proper care in protecting the lubricants from dust, the reliability of the machines can be improved a lot and their life cycle cost can be minimized significantly.
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Water in lubricants

Water can exist in oil in three states: dissolved, emulsion, and free. The dissolved phase is the dispersed state of water molecules throughout the oil, but invisible. This can be found in fresh oil to the extent of 500 ppm (0.05%). When the water content exceeds beyond the dissolved state, it is considered as emulsion state, where microscopic water droplets are found in suspended form in the oil. This is like a foggy weather, wherein (in lubricants) fog is referred to as haze, which means a kind of cloudy appearance of oil. Further water contamination is the free state where water can be seen in a ‘separation’ form from the oil. As most of the lubricants’ specific gravity is less than 1.0, water formation can be seen below the oil.

Effect of water contamination

The most harmful water contamination stages are free and emulsion phases. For example, in crankshaft journal bearings, the incompressibility of water relative to oil can result in a loss of the hydrodynamic oil film, which, in turn, leads to excessive wear. It is so serious that one percent water in oil can reduce the life expectancy of a journal bearing by as much as 90 percent!

For roller bearings, the damage will be worse because the water not only destroys the oil film strength, but also causes instantaneous flash-vaporization under the extreme temperatures and pressures in the load zone of rollers, which leads to erosive wear.

Protecting lubricants from dust and water

- Depending upon the size of the fleet, proper oil storage room has to be maintained by providing the required facilities like pneumatic oil dispensing pumps with flow meters and adequate hose length, oil barrel covers, storage pallets, separate cans for each grade of oil etc.
- Moisture trapping filters to be provided in compressed air line and condensed water to be drained at regular intervals from air reservoir.
- Manual oil pumps are to be avoided however small the fleet size may be. Under unavoidable circumstances, for a single or two machines, small size oil cans to be procured.
- Oil top-up for tyre mounted machines has to be done directly through hose provided to oil pump.
- No drained or used oil to be stocked in the same room where fresh oil is stocked.

- Oils and grease have a shelf life and there is possibility of depletion of additives’ strength when oil is stored beyond its shelf life. So, oils are to be consumed on first come first serve basis. Whenever new stock arrives, it is to be stocked behind and the old stock kept in front.
- Clear signboards with ‘oil grades’ and ‘which compartment to be used’ are to be displayed in local language against each barrel.
- Lifting and carrying trollies are to be provided and fire extinguishers to be kept in storage room.
- Implement 5S workplace organization practices: Sort, Set in Order, Shine, Standardise and Sustain.
- Above all, educating the maintenance team on the importance of lubrication storage and handling is very important because unless the frontline technicians understand and feel ownership, execution will not be effective.

By maintaining good oil storage and handling practices, one can also reduce oil change intervals suitable to specific sites and thereby have additional savings. Cost incurred for maintaining contamination-free storage and handling facility is very little as compared to the benefits obtained through improved machine uptime and lifecycle cost of the machine.

Acceptable Oil storage facility

For further details, please contact:
Bhaskarudu Peddakotla, Email: bhaskarudup@gmail.com
An Optimistic Industry Banks on Technologically Advanced Machines for Faster Project Completion & Profitability

The Infrastructure sector is experiencing a lot of uncertainty due to Covid-19 as the pandemic has disrupted construction activities across the world. Industry experts are of view that the Construction Equipment and Infrastructure Sector will bounce back by Q1 of 2021 as by that time, the pandemic would have come down to its lowest level, plus the effect of the Government’s economic revival efforts, especially in infra projects, would become quite visible.

Against this backdrop NBM&CW speaks with major Equipment Manufacturers, Industry Associations, Contractors, Developers, and Technology companies on the current developments and growth prospects of the CE industry. A majority of the persons interviewed are confident that the government’s plans and initiatives will bring the Infra sector back on its earlier growth track. The stimulus package of ₹20 lakh crore announced will help the economy towards recovery and the infra industry will also rebound. Many hold the view that increasing mechanization with use of tech-enabled equipment will help in faster project completion, especially of stalled projects, and are keenly looking at the options available.
Challenges: As you are aware, the scale and spread of the pandemic has played havoc with lives as well as the economy. At this stage, governments across the world and the medical researchers are still grappling with the containment of the virus. Given the situation and the lack of a clear visibility on when exactly the pandemic will be contained, it is a challenge to make a clear and unambiguous projection.

The fact of the matter is that even before the large-scale outbreak of Covid-19, the CE market growth had slowed down considerably. In FY’20, the drop was to the extent of almost 20% by volume, with a sharp dip in March 2019 (in the early stages of the pandemic). The first quarter of FY’21 showed a precipitous drop of 50% owing to the lockdown and the resultant shutdown of almost all economic activities.

Q2-FY’21: We expect the second quarter to be only slightly better because of the additional impacts of the monsoon and the financing concerns for construction equipment. We are hopeful that the situation will somewhat stabilize by the last quarter of this fiscal. This, however, depends (as mentioned earlier) on the extent to which the disease can be contained and by when. It will be a while before the situation begins to have a semblance of normalcy.

“We are hopeful that the situation will somewhat stabilize by the last quarter of this fiscal”

Sandeep Singh, Managing Director, Tata Hitachi
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For a healthy growth of the road sector we need to get more long-term investments at low interest rates

Ramesh Palagiri, MD & CEO, Wirtgen India

**Investments:** Covid 19 has had a devastating effect on the infrastructure industry and on the financial performance of companies. There is a lot of uncertainty with regards to demand of machinery. As of now, we cannot be sure of the total impact and the timeline before things come back to normal. Our estimate is that it would take at least 6-12 months before the situation returns to normal. So, we are having a relook at our plans and making the necessary adjustments in our business.

For a healthy growth of the road sector we need to get more long-term investments at low interest rates. In fact, for infrastructure developments like roads etc, we definitely need more investment to come from outside, and for the government to fulfil its ambitions under the National Infrastructure Pipeline program.

**Awards under NIP:** The plan of the government to award enough jobs under the National Infrastructure Pipeline would definitely help the CE sector and the country’s economy. Rebooting activities in the Infra sector and more so in the road sector is critical for the economy as this industry can provide a lot of employment, especially in the road sector. We expect the road construction activity to pick up pace from September onwards, once the monsoon tapers off and the immigrant workers are back at the jobsites. There are enough projects which are already awarded and contracts available with the contractors. Only the work needs to get going on these projects, which will automatically revive the economy.
Recovery: Covid-19 pandemic and the uncertainty resulting for the same has disrupted the sector negatively. Last year, the industry was down 25% (YoY) and in Q-1, FY'21, the market has been majorly washed out. The general expectation (or speculations) doing the rounds in the industry is that the market will start to show some respectable (read profitable) demand from Oct’20 onwards.

Historically, the demand growth for CE has been correlated to government spend on infrastructural activities. In the current pandemic scenario, it’s vital that the government ramps up the infrastructure spending. With PM’s vision of US$ 5 trillion economy by 2025, it’s important to put on track the infrastructure development (the engine of growth) at the earliest. Liquidity is facing a strong headwind due to the economic slowdown and hence it’s imperative for the economy to attract FDIs in Infrastructure. A few aggressive initiatives and faster monetization of the completed projects could provide the much-needed investments and liquidity for the new projects.

Growth prospects: The Government has proactively removed some major obstacles in attracting investments viz. 90% acquisition of land before contract award, new alignments for land acquisition, cost optimization, simplified environment clearance, etc. The CE sector has a great future ahead and we expect 20-25% growth from next year onwards for the next 3-4 years. The anticipated recovery in the H-2, FY’21 is expected from the pent-up demand and increased mechanization of 5-10% resulting from reverse migration of labour.

“It is imperative for the economy to attract FDI in Infrastructure”

Ajay Mandahr, CEO, Escorts Construction Equipment
Growth drivers: India’s construction industry is an important growth driver of India’s economy with around 8% contribution to India’s GDP, making it one of the integral industries of India. The government’s construction projects are giving a huge thrust to the industry. The major construction activities accounting for the industry’s growth are power generation projects, highway construction, railway expansion, and export-import cargo.

Various factors such as the current infrastructure which is inadequate to sustain the urban population, the government’s new urban development mission and the partnership agreements between urban local bodies and foreign players are expected to further boost India’s construction industry. Also, 100% FDI in construction development projects (housing, townships, hospitals, hotels, education institutes, etc) and developing industrial parks are allowed through automatic route. Hence, even though COVID-19 has considerably slowed down the Indian building and contracting industry, there will no stopping the industry once things start becoming normal.

Embracing technology: There are discussions going on at various platforms that contractors and builders should adopt technologies that will help in better management of the 3Ms (man, material and machine) and complete projects on time. The Indian building and contracting industry has undergone revolutionizing changes in the last decade by embracing technological advancements. New-age construction methods have become highly necessary to ensure efficiency, faster delivery time, and cost effectiveness.

Covid-19 has caused a severe health and economic crisis that has changed the way we live, work, do business, etc. which is being touted as the ‘new normal’. In these challenging times, contractors and builders have to take note of emerging technologies, which have played a significant role in their diverse forms, and provided solutions for addressing and mitigating the current impact of the pandemic across the world.

“There will no stopping the industry once things start becoming normal”

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Reviving Infra: Most economists are advising increase of investment in Infrastructure to increase employment and boost the economy; hence, Infra development should be one of the prime beneficiaries of the revival plan of the GOI. The key to revival depends on the GOI, State Governments and other Government agencies spending on infrastructure development, and we find that the Centre and State Governments are doing their best to support the ecosystem by keeping the developmental plans intact.

It is also our belief that savings from the lower crude oil prices could be used for the road and urban infra development through the CRIF (Central Road and Infrastructure Fund). As an industry, we have a very positive outlook, as the government has been reacting quickly to the challenges and we are confident that the government will take all steps to revive Infra development to bring normalcy back by 2021.

Demand drivers: We are observing the restarting of many construction projects across the country and the re-activation of machines with better utilization levels. The revival in demand of the CE industry will depend upon many factors such as return of workers and operators post lockdown; financers being able to manage their portfolios in line with prudent norms to restart progressive financing options; construction activities gaining pace; payments from Government authorities; CAPEX plans of the private sector, to name a few.

We believe that the GOI is focussed on Infrastructure segment and have seen awards of large-size road contracts even during the lockdown. NHAI is considering awards for almost 4500 km of highway construction contracts in FY2020-21. Hence, we expect the demand to revive from the early part of H2 of the current FY.

Growth prospects: Construction Equipment (CE) demand grew by almost 25% y-o-y during 2015-19. The last fiscal was, however, a tough year with demand contracting during the first nine months but was seen as reviving in the last quarter. Covid-19 has been a ‘black swan’ event that has impacted the sales of CE since March 2020. The first quarter of the current financial year has seen a drop of about 50% in most product categories. However, we are seeing some signs of revival in Q2. July saw some green shoots with demand trend reviving for Backhoe Loaders and we expect demand for Excavators to follow suit.

Mining activities, covered under the Essential Services Maintenance Act, are also active and we see a growing demand for equipment in this sector. Since Q2 is usually a period of subdued demand due to the monsoons, we expect the actual revival to be in Q3 of FY 2021.
Construction demand: The business operations in the first two quarters of FY2020-21 have been adversely impacted by the pandemic. We are now in the exit-lockdown phase and are seeing improvements in the labour situation and the supply chain is also getting restored. Things should gradually improve during the remaining period of the year. Most companies have a good order backlog and the government’s investments in infrastructure projects will continue to drive construction demand. In the Real Estate sector, we expect more foreign capital inflows, which will lead to its recovery. In FY 2021-22, we expect the industry to return to the pre-Covid levels of activity and financial turnover.

Incentives: It is also pertinent to note that CAPEX investments will slow down due to the financial stress that most companies are experiencing. However, we expect the emergence of a new set of investors and vendors who will offer services and equipment on pay per use or rental model. In addition, we are exploring alternative financial models for CAPEX investments.

The construction industry has to necessarily embrace new technologies in order to stay relevant in the long run. The Government can facilitate by bringing in technology related incentives to encourage technology adoption.

“The construction industry has to embrace new technologies to stay relevant in the long run”

P.V. Prasanth, Director - Operations & Technology, Shapoorji Pallonji E&C
Investments: The Infrastructure sector, just like other sectors, has taken a beating because of the pandemic; the work progress and revenue generation has gone down significantly in the last quarter. Even in the current quarter, the work is progressing at a slow speed due to migrant labour issues and the monsoons. On a whole year basis, construction activity is expected to go down by at least 15%. The only way to rev up the infrastructure sector post the monsoons would be to ensure increased investments into the sector, which is also necessary to turn the wheels of the economy and ensure economic growth.

2022 outlook: The first 2 quarters of FY2021 will be the quarters for survival but we feel that the CE industry should get back on track after September and be somewhere near normalcy by end of FY2021. On account of low base of FY2021, the CE industry would witness growth in FY2022 - somewhat in similar numbers as compared to FY2020. The CE industry is dependent on infrastructure development and we are sure that the Government will find the ways and means to keep the ball rolling.

Demand in 2021: At this moment, there is a lot of uncertainty in the Infrastructure sector due to Covid-19, however, we are experiencing considerable growth in enquiries from customers. In my opinion, there will be reasonable movement in the market post the monsoon period. And 2021 will certainly be the year of revival; I envisage demand coming from ports, railways, and industrial development projects.

“The CE industry will see growth in FY2022 as the Government will find ways to keep the ball rolling”

Sorab Agarwal, Executive Director, ACE

“2021 will be the year of revival”

Premraj Kashyap, MD, KYB Conmat India
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10-11 September 2020

Inaugural Address by
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Hon’ble Minister of Road Transport & Highways & Micro, Small & Medium Enterprises
Government of India

Valedictory Address by
General (Dr) V K Singh (Retd)
Hon’ble Minister of State for Road Transport and Highways
Government of India

As India constructs efficient roads and highways to cater to the growing demand of developing sustainable infrastructure for the future, the market for bitumen, construction equipment and the road construction industry at large will be at its peak. Furthermore, the government is continuously focusing on the usage of innovative techniques and materials for faster and better-quality construction of roads and highways. BITU-CON 2020 aims to bring together the leading market participants from across the bitumen and road construction value chain to learn, explore, share experiences and build connections to find new and potential partners.

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**Demand factors:** There is no shortage of demand actually; rather, the demand factors have been strengthened further with the government taking various initiatives to promote infrastructure growth such as its ambitious road development program. However, the CE industry is facing a paucity of funds from the banks and non-banking finance companies, due to reasons quite obviously related to non-performing assets.

The present Covid-19 scenario has been another dampener. We have to wait and see how soon the situation normalizes and brings back the earlier level of business confidence in the prospective equipment owners. Since there is a lot of skepticism in the banks and NBFCs, we should take a more collaborative approach with the lenders so that they can repose more faith in the equipment purchaser.

**Customer engagement:** Demand of equipment can be propelled through proactive engagement with customers during the current challenging period, when customers are looking to lower their operating costs while enhancing productivity. Engaging with customers will enable the manufacturers to understand their requirements, which, in turn, will facilitate new product developments, innovative solutions for higher efficiencies in operation, productivity, and ease of maintenance.

**“We should take a more collaborative approach with the banks and NBFCs so that they can repose more faith in the equipment purchaser”**

Abhijeet Pai, President, Puzzolana

**“Government spending on Infrastructure will boost the private sector as well”**

Ashwin Reddy, MD, Aparna Enterprises

We are trying to automate processes where possible, and with minimum spending. Major changes require considerable financial resources which is a huge constraint in the present environment. It will take some time to give the desired results. The Government should take a lead and start the spending on Infrastructure which will give a boost to the private sector as well. Also, banks and financial institutions should be adequately capitalized to provide the required financial support to private players. This will give proper results.
Positive signs: With the onset of the ‘unlock’ process, we are seeing a revival of construction activities in the country. Infrastructure projects are restarting, leading to green shoots and positive signs for the Construction Equipment Industry. Revival is a combination of various factors, demand generation and opportunities in the sector being key. Both these factors are crucial in addressing the slowdown faced by the construction equipment industry. The growth of the Construction Equipment sector is directly dependent on infrastructure development in the country. All infrastructure projects had come to a standstill in April and May, due to which the industry was severely stressed. It went down by almost 40% in the first half of this calendar year, as compared to last year. As we get into a gradual and cautious unlocking of the economy, the re-booting of the supply chain is also of utmost importance, to ensure seamless operations of the supplier and dealer network. We are starting to see some positive movement in the sector, which is currently a combination of release of pent up demand and a slow and cautious revival of industry sentiment.

NBFCs & Banks: Another key measure for rapid recovery of the industry is last-mile lending from NBFCs since, for infrastructure projects to continue, liquidity is essential. The pandemic has made Banks and NBFCs even more risk-averse. Transmission of liquidity is critical for our industry – the RBI has done a lot in the past few months and the benefits need to be passed on to the end-users. The risk appetite must not become nil.

Technology adoption: With the Government’s ambition of making India ‘Atmanirbhar’ (self-reliant), it is critical to invest in building world-class infrastructure in the country with greater adoption of technologies like Telematics, IoT, Big data and Machine Learning. We need to continue to invest, innovate, create, scale-up, and export. This would support rapid recovery and sustained growth in the future.

Rural Development & Healthcare: Going forward, two key sectors are set to emerge and drive demand for construction equipment – first being the development of infrastructure in Rural India, and the other is the creation of a world-class Healthcare network across the country. With the gradual restart of infrastructure projects and support from the government, we are hopeful of a recovery in 2021. The Government has been giving support to our industry with their consistent focus on infrastructure development. It has already announced a slew of measures to stabilize the impact on the economy. The recent stimulus announced are all steps in the right direction, like focus on building infrastructure, reforms in coal and the mining sector, and support to MSMEs, etc. Additionally, the Government’s commitment of Rs. 111 lakh crore towards the National Infrastructure Pipeline is expected to provide the much-needed impetus to the sector. Railways, Irrigation, and large national-level projects like Sagarmala are expected to create significant demand for construction equipment and machinery with a multiplier effect.

We are hopeful that a strong focus coupled with a sustained investment in infrastructure development would result in multiple long-term benefits in the coming years.

“It is critical to invest in building world-class infrastructure using technologies like Telematics, IoT, Big data and Machine Learning”

Jasmeet Singh, AVP, Corporate Communications, JCB India
“Technological evolution, manpower management, right allocation of budget, and management of cash flow, can help the infra sector thrive in the present scenario”

Deepak Garg, Managing Director, SANY India & South Asia

Mechanized solutions: Given the present pandemic situation due to the novel Coronavirus, all the sectors of the economy, especially the infrastructure sector is witnessing a considerable negative impact in the short to medium term. The reasons for the same may vary from construction halt, labour crunch, and severe working capital pressure. In such a scenario, a few factors can play a big role in sustaining the growth prospects of the infrastructure sector.

Adaptation of mechanized solutions that increase efficiency and reduce dependency on manual labour can help in achieving a fast track recovery. Technology enablers like Internet of Things (IOT) which enhance equipment efficiency, and real time information transfer can be a saviour for the sector. Further, restarting halted government projects in a phased manner, can bring the industry back on track.

In addition, overall technological evolution at frequent intervals, proper manpower management, right allocation of budget, and efficiently managing the cash flow requirement for day-to-day operations leading to better financial management, can also help the infrastructure sector to thrive in a better way in the present scenario.

Mining industry: Undoubtedly, for every business sector, 2020 is the year of survival and the CE sector is no different. However, 2021 can prove to be the year of revival for the CE sector. The increase in government budgetary allocation to infrastructure sector will result in a lot of growth for the CE industry and also due to the booming mining industry in the country. This could be seen from the fact that the government has recently introduced commercial mining in the coal sector.

That said, the mineral rich soil of the country has always presented umpteen mining opportunities and in future, the demand for essential minerals is only expected to increase. So, having a direct correlation with the CE sector, mining industry would be one of the major demand drivers in the times to come.
"We expect to see a modest growth in demand in 2021 vs 2020 and then a much steeper growth 2022 onwards”

Jaideep Shekhar, MD (Asia & EMEAR)
TEREX Materials Processing India

We believe that the CE industry will start seeing some revival towards the end of 2020 itself. While there is no doubt that the last few months have been challenging, the long-term growth opportunities for the CE industry remains positive. We expect to see a modest growth in demand in 2021 vs 2020 and then a much steeper growth 2022 onwards. Most of the demand is expected to come from the Infra sector but we also believe that mining sector would contribute to the demand.

“For construction projects to sustain during a crisis all stakeholders need to be consulted and taken care of”

Anuj Dayal, Executive Director, Corporate Communication, DMRC

Labour dependence: The lockdown did have an impact on the construction activities of DMRC. However, during this period, DMRC has been in touch with the contractors and ensured timely payments to them. The labourers who stayed back during the lockdown were also taken care of. Once the government granted permission for construction activities, the work resumed at all our sites. Despite the heavy shortage of labourers, we managed to achieve important milestones in Phase – IV project, such as casting the first pier on one of the three approved corridors and starting the construction of an underground section.

Despite use of cutting-edge technologies in construction, mammoth projects are still dependent on labour involvement and their shortage does have an impact on the pace of work. For the construction projects to sustain during a crisis like the current pandemic, all stakeholders need to be consulted and taken care of.

Technologies: DMRC has always used cutting-edge technologies in construction. Before starting work on every phase of DMRC’s projects, and while preparing contract conditions as well as safety and health manuals, it is ensured that the latest technologies are incorporated into the contract conditions. The same has been done for the ongoing Phase–IV project of Delhi Metro. Even during the current situation, we are in touch with our contractors and are looking at new, innovative ways which can help expedite the progress of work.

Growth opportunities: The Infrastructure sector is one of the largest employers of skilled and non-skilled manpower. In order to kickstart the economy, the government needs to have continued focus on infrastructure projects in order to generate large scale employment opportunities. I believe this sector will continue to grow and will, in fact, become a more important sector as the government tries to give a push to economy. In the long run, the investment in Infra sector would get the GDP growth and spur the economy.
Opportunities: Construction activity is expected to decline for the first time due to the spread of the pandemic and bring down investments in the Infra sector in fiscal 2021. Even with the permission to commence construction activity since April 2020, shortage of labour and unavailability of supply chain logistics are the major roadblocks for developers to resume work fully.

Given the challenges, investments in the Infra sector are expected to contract 7-9% in fiscal 2021 in the base case, after witnessing healthy growth of around 17% in fiscal 2020. National highways and state roads make up more than 90% of these investments. Funding constraints amid the economic slowdown caused by the pandemic delay awarding new projects.

The NIP: The government is continuing its thrust to boost infrastructure development. It has launched the National Infrastructure Pipeline of ₹103 lakh crore projects, besides providing about ₹1.70 lakh crores to NHAI for transport infrastructure and for accelerating highway construction. It comprises over 6,500 projects across sectors and are classified as per the size and stage of development. NHAI has started the much-awaited Bharatmala Highway bidding process. The ₹20 lakh crore relief package under Atmanirbhar Bharat also brings opportunities to the infra sector.

High-tech equipment: At KNR, our philosophy is speed in construction to cut down costs of projects and improve profitability. The company has invested ₹1200 crores in sophisticated high-tech equipment for earthmoving, hauling, hoisting, conveying, for aggregate and concrete production, pile driving, tunneling, rock drilling, pumping and de-watering, besides tower cranes and laser screeding paving machines.

We are also focusing on computer-aided design (CAD) which is becoming essential in the design and construction processes. CAD is also a positive adjunct in fast-tracking construction (an approach in which engineering and construction proceed concurrently), besides laser-based survey equipment, laser-guided excavation equipment, and new tunneling equipment. Off-site fabrication and assembly for large volume and bulky modules, particularly for flyovers and bridges in cities, are trends that are picking up.

Artificial intelligence (AI), robots and machine learning systems can improve worker productivity in construction sites for jobs like welding, bar bending, retrieving tools, materials, and equipment and for overall better performance.

Worker safety: Due to Covid-19, employees are expected to be kept safe from health hazards by following sanitation rules in the workplace. We have initiated mobility policies to encourage remote working, when necessary and wherever possible. Staggering of shift timings, distance between workers, banning visitors to construction sites, and avoiding non-essential travel are some of the steps that are being followed at our project sites. As regards supply of materials, the current disruption in supply chains could mean identifying alternative suppliers.

“CAD, laser-based survey and excavation equipment, new tunneling equipment, off-site fabrication and assembly techniques are becoming popular”

K. Jalandhar Reddy, Executive Director, KNR Construction
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Government initiatives: The government is trying its best to tackle the current slowdown in construction activities and the recent announcements made by Nitin Gadkari, Union Minister of Transport and Highways, have ensured that the sector will reinvigorate soon. MoRTH has also set a target to build 12,000 km highways for the current financial year and has ensured that it will reduce the build-up of arbitration cases. The Government has also partially released bank guarantees, which will help in releasing some liquidity for the contractors. Recently, NHAI announced the removal of land acquisition hurdles which will speed up the project completion rate. We are hopeful that these initiatives will have a positive impact on the infrastructure sector and subsequently on the economy as well.

Measures announced: The government has announced a number of new projects and several policy decisions have been taken to ensure smooth project clearances and operations. The Ministry has permitted building 34,800 km of national highways in 5 years with an expected cost of Rs 5.35 lakh crore in Phase-I of Bharatmala Pariyojana and NHAI has been mandated to build 27,500 km. In order to ensure liquidity for ongoing projects, the government has announced quick disbursal of pending payment to the vendors. The Ministry is also working to reduce arbitration cases and has eased land acquisition process. It has also set mechanisms for fast clearances of projects and has started evaluating bids for highway projects of more than 1,300 km and another 1,500 km are ready for bidding. We are confident that these measures will help bring back the construction sector on track and subsequently generate adequate equipment demand.
Industry Perspective

Government plans: The uncertainty caused due to Covid-19 and the subsequent lockdown imposed by the Government brought the entire country to a standstill for a couple of months in H1 of 2020. However, June onwards unlocking activities began, and industries resumed their business cycle - operating as per Government specified norms on social distancing.

While it is too early to say whether the crisis and the economic downturn will make a U-turn, or change the value-creation profile of corporate India (or by how much), Indian corporates and executives will definitely continue to face the challenge of reallocating capital away from businesses and sectors that create less value, and toward those that create more. The government has announced ambitious plans to spend $1.4 trillion on infrastructure over the next five years, which looks promising.

Liquidity: I feel that to sustain the Infrastructure growth, the cardinal focus should be to bring positivity in the mindset of the business community, through time bound actions on important focus areas. As we know, most of the projects are severely affected by time and cost over runs due to multiple reasons/constraints caused due to the pandemic. Supporting the time and cost overrun of the majority of Infra contractors will greatly boost the morale of the Industry players in contributing to Infra growth, through their aggressive participation with skills, equipment, technology, and financial resources.

FDI & VC funds: There is an urgent need to build infrastructure in areas such as water, power transport, communication, logistics, supply chain systems, freight corridors, expressways etc, which will lead to rapidly setting up of industries with abundance of cost-effective resource availability, at world-class quality and the shortest lead times. These will attract direct foreign investments, create employment opportunities, allow factories to run at full capacities, and ultimately boost country’s GDP growth in the times to come. Strategic VC funds must be made available as SPV from within or outside the country to support the major Infra projects across the country; this is critical for the overall revival and sentiments in the industry.

The six-month moratorium announced by the Government to support the industry was an excellent move. At the end of August 2020 when the moratorium period ends, finance partners will focus on overdue collection, bringing additional liquidity in the market, in all probability. The financers’ outlook for Q4 will also depend on the quality of assets recognized post the moratorium period and will be a wait and watch situation for the credit lending in Q4 of 2020 and next year.

Specialized machines: The year 2021 is expected to be the Year of Revival, with demand coming up for specialized machines like Digitally Smart Excavators, Mini Excavators, BHLs, Skid Steer Loaders, Material Handling Equipment, and a variety of equipment for smart cities, wherein the time bound work with mechanization and remote management will be the key focus. Digital platforms, and marketing of products and services will promise an opportunity for growth. Opportunities in used equipment and rental business coupled with innovative financing solutions by OEMs will be key drivers of growth in equipment sales and rentals. A word of caution here: there could be cautious lending by some of the financial institutions, NBFCs and banks.

Atmanirbhar Bharat: Going forward, the Government’s emphasis on Atmanirbhar Bharat for Make in India in the manufacturing sector has set clear directives for a long-term commitment to all investors. This is a promising note with the economy in 2021 appearing to rebound and normalcy expected to be restored. Certain landmark decisions by the Government in the real estate sector like RERA, Insolvency and Bankruptcy Code, Transparency in projects allocation, advance Land/Forest clearances for Infra Projects, bring transparency in businesses and for the economy as well.

“The year 2021 will see demand coming up for specialized and digitally smart machines”

Rajiv Chaturvedi, Vice President- Sales & Marketing, After Service & Parts, Hyundai
Government initiatives: The infrastructure and real estate sectors have been experiencing tough times and the scenario is likely to remain grim till the overall health scenario improves. However, the long-term story of the sector remains intact as the Government is committed to building a world-class infrastructure in the country. This is evident from its initiative of setting up NIP - the national infrastructure pipeline of projects - involving investments of Rs. 111 trillion over five years up to 2025. The green shoots of recovery can already be seen in various equipment classes such as the backhoe loader that has grown by 32% y-o-y in Jul’20 and by 10% over the previous month.

Key opportunities: CE industry forms ~20% of a project cost, and in times like these, every contractor is looking to reduce its project cost. Hence, we are observing a shift in consumer behavior - from owning equipment to renting equipment - to save capital. The rental and leasing market will therefore be a key opportunity for the industry. The leasing penetration of India is expected to improve from 3% to 10%. The rental business releases plenty of capital in the system, and going forward, the industry needs to capitalize on rental opportunities. Another important focus point for this year would be on used equipment because there are a lot of resources which are under-utilized and lying in different pockets. So, people would like to own that equipment as it will reduce their cost of acquiring new equipment.

Financial institutions on the other hand are de-risking their balance sheets through co-lending partnerships with banks. The co-lending model attempts to leverage the reach and distribution capabilities of NBFCs and low-cost funds of the banking industry in order to service the priority sector.

Holistic approach: The Covid-19 situation has demonstrated strong possibilities in a very difficult scenario that has challenged us to think and work differently. As health, hygiene and privacy takes prominence amongst consumers, we have also ensured that all our properties become self-sustainable. It is important now to customize relevant technologies that incorporate modern habitat design with traditional practices as the new situation expects us to take a holistic approach. We also believe that once the crisis is under control, the government will have to dole out various economic measures to bail out severely hit sectors. Going forward, we hope that the government takes more developer and investor-friendly initiatives for the betterment of the real estate market.

“The rental and leasing market offers a key opportunity; leasing penetration is expected to improve from 3% to 10%”

Devendra Kumar Vyas, MD - Srei Equipment Finance Limited

“The pandemic has encouraged the entire business fraternity to optimize use of digital, technology and innovation in their day to day business”

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“Digital transformation in infrastructure sector is overdue and will now be expedited”

Subhash Sethi, Chairman, SPML Infra

Digitisation: The digital transformation in infrastructure sector is overdue which is aggravated by the pandemic disruptions. The adoption of new technology will be expedited, and we expect good integration of digital technologies including Internet of Things (IoT), Cloud Computing, BIM, Machine Learning, 3D Printing and Robotics in infrastructure development projects. SPML Infra is executing a number of infrastructure development projects in water, wastewater and power transmission & distribution segments, and we started technology integration in our projects much earlier, which has helped us in seamless project execution with ease of operations and maintenance during the current tough situation.

Government Initiatives: The spread and severity of coronavirus is a matter of great concern. The Infrastructure sector is already feeling the effects in terms of liquidity constraints, supply chains disruptions, shortage of labour, cost overruns and many other issues that will affect project execution and timelines. During these testing times, the government has taken a number of initiatives towards continuance of infrastructure development in order to maintain the momentum of the economy. It announced a ₹1.7 lakh crore relief package in March, followed by RBI’s facilitating increased lending by the financial institutions. The stimulus package of ₹20 lakh crore will help the economy towards the recovery path and the infrastructure industry to rebound. Other initiatives by the government like extension of toll collection period in contracts to compensate the operators, moratorium for loan payments, reducing late payment surcharge for discoms, ₹150 billion package to enhance the healthcare infrastructure, extension of the existing foreign trade policy (2015-20) till March 31, 2021, and extending the timeline for compliance to companies will help in easing the situation.

“The rental market is expected to be quite bullish in FY2021”

Satin Sachdeva, Founder & Secretary General, CERA

Performance: Recent push from government on Infrastructure growth just after agriculture and pharma sector, can be a big turnaround for this sector. We are heading towards decent growth in the infrastructure sector, that is, in roads, metro rails, railways, bridges etc. After the rains, many big projects will take off, resulting in huge employment and further fuelling other commodities and related sectors. Airport infrastructure development will also play a big role. Though the Equipment Rental market has faced many challenges due to a slowdown in the last one year, and due to the Covid-19 pandemic, which worsened the situation, the silver lining for us is the rental industry’s performance, which has been better in the last one-year as compared to other sectors. Also, as rental companies operate in bigger spaces, it has been easier for them to follow social distancing norms and take the health precautions prescribed by the government, thus enabling rental companies and infra companies to abide with the Covid distancing norms.

Growth prospect: Generally, the monsoons are quite challenging for the rental industry but this year we are foreseeing good demand in the market, given the increased focus of the government on infra development. In fact, we are expecting good growth of the rental industry in the coming years. The rental market is expected to be quite bullish in FY2021 due to the uncertainty in the market and to avoid high capital spending, contractors and infrastructure companies will opt more for the rental and leasing model.
Government initiatives: The government has assured huge investment in infrastructure projects and we are hopeful that these projects will be awarded quickly, which will create demand for construction equipment. Along with this NBFCs should start releasing funds for equipment purchase which currently is not to the level as expected, as they are closely reviewing the credit worthiness of contractors, especially of those who have availed the facility of moratorium. Having said that, we hope that these are a temporary phenomenon which will be settled soon as we are quite confident on the initiatives and investments proposed by the government on infrastructure projects.

Road packages: The government has already started finalizing contracts for many projects. The recent award of contract for many road packages by MoRTH is a major step towards kick starting the economy. We expect to be awarded many contracts in the road sector in the near future. Our association – ICEMA - is also having regular interactions with many state governments and these discussions have been very positive. So, going forward, from the beginning of FY 2021, we can expect many contracts being finalized by the Central and some State governments, which will benefit the construction equipment industry.

“Going forward, from FY 2021 beginning, we can expect many contracts being finalized by the Central and State governments”

Anand Sundaresan, Managing Director, Ammann India

Finance: The government’s National Infrastructure Plan provides a clear road map with sector wise objectives for Infrastructure in every aspect for India. Currently, the biggest challenge for the revival of the sector is availability of financing for this sector and for associated industries like Construction Equipment.

In addition, to bring activity levels back to some normalcy, Government needs to ensure pending bills of contractors are paid quickly. The cash flow situation in power sector also needs to be solved urgently as state government finances are not in good shape. The central government should take the lead and form a time bound task force of ministers that can review progress reports and identify specific issues to be resolved. After all, the Infra sector is key to the economic revival of the Indian economy.

Customer support: 2020 is a year of surviving in a tough Covid-impacted market. Focus on cost management and at the same time managing inflationary pressure on the input side, are key. Factory absorption will be challenged, putting pressure on OEM financials. OEMs and dealers need to work together, communicate closely, and ensure that customers who are operating continue to get the support they deserve. Year 2021 could see a demand revival as the impact of the pandemic wanes. However, it is still an uncertain situation and planning ahead will remain a challenge for 2021.

“To kickstart the Infra sector, the government should form a task force to review progress reports and identify issues”

Dimitrov Krishnan, MD, Volvo CE India

NBM&CW SEPTEMBER 2020
Subhash Sethi, Chairman, SPML Infra: bauma CONEXPO INDIA is certainly a big platform for the construction industry and since the pandemic situation is still quite grim across the country, it was a wise decision to reschedule it to the next year. I think technology exhibitors will be the most sought after for their solutions for the CE industry.

Sorab Agarwal, Executive Director, ACE: February 2021 seems to be an opportune time to hold bauma CONEXPO INDIA as the CE industry as well as the Infrastructure sector would be back on track. We feel that it was a wise decision to postpone the event. Due to the Covid fear, participation from the CE Industry and the visitorship would have been limited.

Mu. Moahan, President, BAI: There is no doubt that bauma CONEXPO INDIA is a very important event for Indian builders and contractors. Participants are expected to display their latest machinery, methodologies, services, etc, for the players in the building and contracting industry. They will be able to know about new technologies and adopt them for better management of the 3Ms (man, material and machine), and complete their projects on time. The postponement is even more welcome as the BAI National Members Meet can be planned alongside, with maximum pan India participation.

P.V. Prasanth, Director - Operations & Technology, Shapoorji Pallonji E&C: The organisers have taken the right decision by rescheduling the bauma CONEXPO INDIA event to Feb 2021 as it was unavoidable due to the pandemic. Hopefully, the situation would improve by then and the industry leaders and delegates would feel safe enough to attend the event. Another option that could be explored is to conduct a virtual expo now to showcase the new products and offerings – when we need them most; plus the target audience and decision makers are relatively free now to witness such an event.

Ajay Mandahr, CEO, Escorts Construction Equipment: Rescheduling of bauma CONEXPO INDIA to Feb 2021 was inevitable given the current uncertainty and demand contraction, and in view of the health and safety related challenges. Most of the companies would like to preserve cash, so in their list of priorities, exhibition participation would be stacked lower than employee safety and welfare, digital investments, and product developments, etc.
Anand Sundaresan, Managing Director, Ammann India: It is undoubtedly a wise decision to reschedule the expo to Feb 2021. The year 2020-2021 has been very challenging for everyone; travel restrictions and fear of the virus are still there as no one wants to take a chance. So, I would say that, firstly, more contracts should flow in from the government, and, secondly, we should see the pandemic coming under control. My take on bauma CONEXPO INDIA is that the participation will be lukewarm.

Puneet Vidyarthi, Brand Leader, CASE INDIA: We understand that in the current situation, safety of all exhibitors and visitors is of paramount importance. Considering the magnitude of the event, it is necessary that adequate time and resources be available to all stakeholders to ensure proper planning. We’re hopeful that the situation will be conducive by February 2021 and are eagerly waiting to be a part of the event.

Jaideep Shekhar, MD (Asia & EMEAR), TEREX Materials Processing India: I believe that this is the right decision taken by the organisers. With the current health crisis, it would have been very difficult for companies to participate and even for the visitors, if the bauma CONEXPO INDIA would have gone ahead with the original dates. However, we need to be cautiously optimistic since the event is just six months away and the health crisis does not seem to go away anytime soon.

K. Jalandhar Reddy, Executive Director, KNR Construction: The onslaught on the CE and Infra sectors due to the Covid-19 pandemic is expected to continue till a vaccine is produced and supplied to all; but the uncertainty is likely to persist till March 2021. In the meanwhile, the organisers of bauma CONEXPO INDIA could circulate newsletters, CDs, brochures, or e-mails, on the new technologies and equipment, or provide information by way of demos in webinars.

Abhijeet Pai, President, Puzzolana: Rescheduling bauma CONEXPO INDIA dates to February 2021 is the right decision in view of the aftermath of Covid-19. The CONEXPO USA was a lackluster event due to very low participation by the OEMs and the visitors. bauma CONEXPO INDIA has been an important platform to showcase our products and drive business, however, it will be vital for the organizers to package the future event in a manner that will help us draw business after the lull.

Devendra Kumar Vyas, MD, Srei Equipment Finance Limited: Postponing bauma CONEXPO INDIA to 2021 is in the best interests of the exhibitors and visitors. It will give exhibitors more time and resources to participate and visitors from across the country can go the trade fair without fear of any complications.

Lincoln Bennet Rodrigues, Founder & Chairman, Bennet & Bernard Group: The decision to reschedule bauma CONEXPO INDIA to Feb 2021 is very good, considering the Covid-19 pandemic. We believe that there will be more focus now by the organizers on maintaining social distancing, health, and hygiene, so there should be a good turnout at the event.

Premraj Kashyap, MD, KYB Conmat India: It is a good decision to reschedule bauma CONEXPO INDIA to Feb 21, as it will provide the participants an opportunity to review their decision to participate or not, as by that time the Covid situation will be somewhat clearer.

Ashwin Reddy, MD, Aparna Enterprises: The decision of rescheduling bauma CONEXPO INDIA to Feb 2021 will certainly have an impact on the timelines by which the newer technologies can be implemented. Though online demos have become the norm, there are still certain things that require major decisions, which will be delayed due to the postponement of the trade event.

Jasmeet Singh, AVP, Corporate Communications, JCB India: The world has been hit by a global pandemic which has adversely impacted economies and businesses across sectors. While there are different solutions and recovery measures for each industry, sectoral exhibitions are a few of the most impactful, immediate, and universal solutions to give organizations and their products wide visibility, and drive market demand. bauma CONEXPO INDIA has always been a platform of repute, and we feel that it will be instrumental in bringing the entire industry together and work concertedly to scale up and sustain the market. Given the ongoing pandemic, the highest priority for each one of us right now is to ensure the health and safety of all our stakeholders. We believe that it is a prudent decision of shifting the expo to February 2021.

Deepak Garg, Managing Director, SANY India & SOUTH ASIA: The rescheduling of bauma CONEXPO INDIA from November 3-6, 2020 to February 23-26, 2021 in Gurugram/New Delhi due to the ongoing pandemic situation, is a very strategic move on the part of the organizers and a boon for the participants as well. Since it is one of the best platforms to showcase machines and interact with the customers, it would be very vital for the CE segment and its players to participate in the trade fair after the current slowdown, as it may give a considerable boost to their business.

Rajiv Chaturvedi, VP- Sales & Marketing, After Service & Parts, Hyundai: The decision to reschedule bauma CONEXPO INDIA is a welcome move. The current social distancing norms that are in force will possibly continue for a longer duration and conducting a mega exhibition like bauma CONEXPO INDIA with a mass gathering would put all exhibitors as well as visitors at high risk. The decision to postpone the exhibition will help interstate vehicle and people movement to be further relaxed. Mobility of goods and display materials will be eased, and also the norms relaxed for customs clearance at ports. Participation by exhibitors and visitors will be encouraging, as the fear of pandemic would have eased to some extent and normalcy would have been restored.

Dimitrov Krishnan, MD, Volvo CE India: I believe that the decision of rescheduling bauma CONEXPO INDIA to Feb 2021 is the right move at this juncture. With the current tight business situation, manufacturers’ ability to maintain discretionary spending is low and I would say that exhibitors in general need to have a flexible approach. Online expos need to be looked at and focus must be on enhancing the expo experience. I would not comment on the Feb 2021 timing yet, as it is tough to plan for shows without seeing a clear revival of demand.

Satin Sachdeva, Founder & Secretary General, CERA: It’s a wise decision to reschedule bauma CONEXPO INDIA to Feb 2021 as it’s still difficult to predict the Covid situation in the near future. Looking at the increasing number of cases in our country and across the world, we cannot expect people to go to large social gatherings and exhibitions. The Government has also called for strict social distancing norms. Hopefully, by February 2021, the situation would have improved, and we will see business gatherings once again. Delhi’s climate too will be appropriate in February.
Bauma CONEXPO INDIA 2020 is now scheduled to be held during Feb 23-26, 2021. What were the deliberations behind the change in date?

As a trade fair organizer, our prime concern is the health and safety of everyone involved in our trade shows and at times of economic difficulties such as these, we wish to stay aligned with what the industry needs. If the CE industry needs a trade fair, we will do our best to provide an even better ROI to the participants. But if our exhibitors, stakeholders, and partners do not share the enthusiasm, or are not in the right mindset to accept a trade fair, I think we need to respect that.

Keeping this in mind, we had multiple discussions internally with our international teams and with our advisory board members, partner associations like iCEMA, BAI etc, exhibitors, and also with our buyer and visitor community. The new dates are an outcome of these discussions with the stakeholders.

Having said that, we are working with several partners to ensure and design trade fairs that enable a safe exhibiting experience for everyone at the fairground.

Bauma CONEXPO INDIA will strictly follow government directives and take additional safety measures as well to facilitate a safe and lucrative environment to conduct business in.

In view of the current situation, what do you think of making bauma CONEXPO INDIA a hybrid event, that is, both a physical and a digital event?

There is immense uncertainty over the commencement of the trade fair industry as well as the expected negative economic impact on onsite exhibitions. In the last two quarters, the Indian market has seen various plug-and-play solution providers for virtual
expos, and many organizers have opted for these solutions for various reasons - to generate some additional revenue, to stay connected with the business community, to keep their staff occupied, and so on.

While there is nothing wrong with the above approach; what must be kept in mind is the exhibitor fatigue caused due to substandard experience on many of these virtual exhibition platforms, and, more importantly, the lack of value creation for the participants. If these platforms only create a scenario where the organizer “takes it all” and leaves exhibitors and visitors dissatisfied; the outcome can hurt the brand equity of such exhibitions; and, more importantly, the lack of value creation for the participants. If these platforms only create a scenario where the organizer “takes it all” and leaves exhibitors and visitors dissatisfied; the outcome can hurt the brand equity of such exhibitions; and, despite the short-term gain, may dampen their long-term relationship with their customers.

bauma CONEXPO INDIA is open to tread unexplored territories to enhance the exhibiting experience for our stakeholders, exhibitors, and visitors. We are exploring various new avenues that are safe and beneficial for all the parties involved.

How is bauma CONEXPO INDIA organiser engaging with the audiences during these times?

I have no doubt in my mind that the need of the hour demands companies to be even more considerate to their customer’s demand and needs; I believe the ones who will think about their customers will survive and thrive. Companies who only think about themselves with a myopic view will struggle in the long run!

First, the safety of everyone is paramount. We can only make positive contributions to the business if we stay healthy and avoid spreading the virus. Business continuity is key. We focus our efforts on staying in touch with our customers every step of the way. Our telecon pipelines are full and we are constantly in touch with our exhibitors and other partners to understand their business challenges and their plan of action hereon.

Through our webinar series we have connected with over 20,000 industry colleagues, which is special in many ways. We also had the pleasure to host several central ministers at our webinars. The webinars also provided an excellent platform to engage the audience, connect the stakeholders and bring forth competencies from across sectors.

How do you see the overall scenario of the exhibition industry in 2020 which has been washed out by Covid-19?

With multiple events being either postponed or cancelled, the impact of Covid-19 on the trade fair industry has been tremendous. As exhibition organizers, we like to plan things way in advance, and hence it is not just uncertainty that is impacting us but also our response to the uncertainty.

My learning is that we are clearly living in a VUCA (volatile, uncertain, complex, and ambiguous) world. Most businesses know how to handle the normal, but it’s times like this that make assumptions of the business clear to you, some of our business assumptions are getting challenged now!
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With India planning to reach the US$5 Trillion economy in next 5 years, Infrastructure sector which attracted about 40% of total PE/VC investment in 2019 is expected to play a major role. The Government intends to spend about US$1.4 Trillion in next few years on infrastructure with clear focus on time bound creation of assets of world class standards. With India expected to be the 3rd largest Construction market globally by 2022, there exists a tremendous need & opportunity for trained personnel, mechanisation, technology / knowledge transfer and strengthening of existing supply chains in the tunnelling & underground infrastructure space which is a key component of the infrastructure industry. This conference aims to meet these key objectives by providing a platform for best in the industry to come together to explore knowledge sharing & business networking opportunities. Experts from the industry sub-segments will be sharing their thoughts on the subject. Companies & Industry Professionals are invited to participate in this mega event of the decade. A great opportunity for academicians, practitioners, decision makers, businesses & other stakeholders involved in the Infrastructure sector to meet, connect, interact & showcase their products / services besides providing a rare collaboration & networking platform for everyone.

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During the last two decades, significant progress was made in sprayed concrete technology, with advanced admixtures, as well as in the application of sprayed concrete, with sophisticated spraying robots and in waterproofing, with spray applied membranes. Also numerical design techniques have improved. All these factors have enabled designers to use sprayed concrete linings increasingly for long-term service life. In many cases, the traditional double-shell lining system was replaced by the composite shell lining system, which consists of two concrete linings with a sprayed waterproofing membrane between linings.

Typical tunnel lining configurations are the double-shell lining (DSL), the single shell lining (SSL) and the composite shell lining (CSL), as schematically shown in Figure 1. Usually, the lining of tunnels excavated by conventional methods has been designed and built based on the double-shell lining (DSL) approach. Initially a temporary sprayed concrete lining (primary lining) is built to stabilize the opening after excavation and to contain only short to medium-term loads. Later on a permanent cast in situ concrete lining (secondary lining) is installed to contain long-term loads, and attend the requirements of serviceability and durability. Before the secondary lining is installed, a pre-fabricated waterproof sheet membrane is installed against the primary lining, separating the primary lining from the secondary lining. This approach does not consider any structural contribution of the primary lining, although loads are carried by the primary lining for a long time after construction. However, under some project conditions,
e.g. deep tunnels with anticipated high water pressure and required fully drained conditions, this design approach is the only possible approach to build underground structures.

Single shell linings (SSL) have been built for decades as permanent concrete linings, mainly in impermeable ground or ground with minor water inflow, to construct different underground structures. They may consist of a single layer or several layers of concrete placed at different times, without a waterproofing membrane. The key design issues are related to the structural interaction between primary (outer) lining and secondary (inner) lining, since they are usually built at different times and thus submitted to different stresses and strains, as well as to water tightness of the lining.

During the last two decades, significant progress was made in concrete technology (mix-design), with advanced admixtures (e.g. water reduction, alkali-free accelerators), as well as in the application of sprayed concrete, with sophisticated spraying robots, and in waterproofing of tunnel linings with spray applied membranes. All these factors have enabled designers to use sprayed concrete increasingly for long term service life.

Using a spray applied waterproofing membrane with high bonding strength to both primary and secondary linings, the integration of the primary lining in the final tunnel lining has become viable under groundwater conditions that previously did not allow the use of single shell lining. The composite shell lining system was born. Design engineers have now more options for the lining design and can optimize it according to the specific project conditions.

The Composite Shell Lining Approach

The composite shell lining system is a further development of the single shell lining system (see Figure 3). It consists of two concrete linings with a double-bonded spray applied waterproofing membrane embedded between them. It is suitable for tunnels in permeable ground with limited, manageable water ingress or treated by means of pre-grouting or groundwater lowering, since these conditions allow the use of spray applied waterproofing membranes. While the primary lining consists of sprayed concrete, the secondary lining may consist of sprayed concrete or cast in-situ concrete. Both concrete and waterproofing membrane are relevant functional parts of the composite shell lining system.

Design options and related benefits

The following options are available for the design of composite shell linings (see Figure 4):

- Option 1: Temporary primary lining / Cast in-situ permanent concrete secondary lining
- Option 2: Temporary primary lining / Permanent sprayed concrete secondary lining
- Option 3: Primary and secondary linings made of permanent sprayed concrete

The benefits resulting from option 1 are mainly related to the bonding properties of the waterproofing membrane and its fast application (shorter construction program). Additional benefits resulting from option 2 are faster construction of the sprayed concrete secondary lining, with no need for formworks.

In the case, the structural contribution of the permanent primary lining can be ensured, option 3 enables additional savings through substantial reduction of the lining.
thickness of the secondary lining, leading consequently to a reduced tunnel cross section, which requires less excavation and reduced volumes of construction materials.

Besides of the above mentioned advantages, the use of a spray applied waterproofing membrane also leads to higher flexibility of work programming and sequencing. Also long-term maintenance costs can be reduced, because with the use of a double-bonded waterproofing membrane any leak through the tunnel lining can be easily located and treated locally with a small volume of injection materials.

**Project reference: Tunnel de Viret, Metro Lausanne, Switzerland**

The final concrete lining of the tunnel de Viret, part of the metro line M2 in Lausanne, Switzerland, was designed based on the composite shell lining approach, with permanent fiber reinforced sprayed concrete and the spray applied waterproofing membrane MasterSeal 345 installed between primary and secondary linings. The tunnel is about 275 meters long and passes under the Cathedral of Lausanne.

The tunnel is entirely located in weak molasse rock, partially with very low rock overburden. The overlying soil consists of water saturated strata of sand, gravel and moraine. Because the cathedral of Lausanne is founded on these sensitive soils, one of the critical issues for the design and construction of this tunnel was to maintain the groundwater level, avoiding any drainage of groundwater during tunnel excavation or operation, in order to reduce risks of settlements of the cathedral. The following Figure 6 shows the critical vertical section where the tunnel passes close to the cathedral. This situation required a proper technical solution to maintain the groundwater level during construction. For that purpose, pre-injection of the ground, surrounding the tunnel was done in combination with groundwater infiltration through wells. In order to avoid any drainage of groundwater during tunnel operation, the tunnel lining was planned with a fully-tanked (submarine) waterproofing system.

As shown in Figure 7, the original tendered design called for a double shell lining system, with a cast-in-place secondary lining with a thickness of 30 cm, and traditional waterproofing with a prefabricated polyethylene waterproofing sheet membrane over the entire tunnel perimeter. This design was reviewed during construction, and an alternative technical solution based on the use of permanent fiber reinforced sprayed concrete and the spray applied waterproofing membrane MasterSeal 345 was adopted, creating a composite shell lining system.

A risk analysis was carried out in order to verify long-term durability issues, as well as possible repair and maintenance of the tunnel lining. This analysis concluded that the adopted technical solution met the requirements for long-term durability. Different technical and financial aspects were analyzed and considered favorable for this alternative technical solution, including:

- Reduced total lining thickness, from 56 cm to 43 cm (about 23% reduction)
- Shorter construction time
- Reduced total construction cost (no formworks, faster construction)
- A more reliable technical solution due to the properties of the waterproofing membrane (no migration of water, easy repair of eventual leaks)
The construction of the tunnel lining was done in the following sequence (see Figure 7 and Figure 8):
1) Installation of temporary excavation support
2) Construction of the permanent fiber reinforced sprayed concrete primary lining
3) Smoothening of irregular areas on the primary sprayed concrete lining
4) Manual spray-application of the waterproofing membrane against the primary lining (on the crown, bench and invert)
5) Treatment of localized seepage points (temporary drainage, injection)
6) Construction of the cast-in situ concrete invert
7) Construction of the permanent fiber reinforced sprayed concrete secondary lining in the bench and crown of the tunnel
8) Construction of an unreinforced sprayed concrete finishing layer (4 cm thick) in the bench and crown.

The tunnel de Viret is in operation since 2008 (see Figure 9). In addition to the successful design change with this innovative technical solution, significant construction cost and time savings were achieved, including

- Reduction of the excavated section due to the reduction of the lining thickness
- Significantly reduced amounts of construction and excavation materials
- Elimination of cost of formworks through the use of permanent sprayed concrete for the secondary lining
- Reduction of the original construction program by two months
- Total cost savings of approximately CHF 700,000 for the whole tunnel (about CHF 2,500 per tunnel meter)

Since taking into operation in 2008, the tunnel lining has shown neither defects nor leaks.

Waterproofing Membrane for Composite Shell Lining

MasterSeal 345 is a cementitious polymer-based spray applied waterproofing membrane for underground structures with a successful track record since 2005. The membrane is produced by means of a non-reactive system. It is applied against
the primary sprayed concrete lining (substrate), typically with a thickness of 3 mm, in only one stage, and covered later on by a secondary concrete lining or a protective non-structural concrete layer, building a composite shell lining.

The outstanding feature of this membrane is its bond strength. The membrane adheres equally to primary and secondary concrete linings (double-bonded) with significant bond strength, giving the tunnel lining system unique mechanical properties and waterproofing features. The bond is unaltered by the concrete placement technique, be it sprayed or cast in place, or by the presence of fibers.

In a composite shell lining with this double-bonded waterproofing membrane an eventual groundwater inflow through the primary lining stops as it reaches the membrane and it cannot migrate along the membrane-concrete interface. Thus, potential groundwater paths can be eliminated, mitigating considerably the risk of water ingress into the tunnel, as shown in Figure 11. Additionally, the strong bond between the membrane and the secondary lining provides a further barrier against water ingress into the tunnel.

The use of MasterSeal 345 is particularly advantageous in geometrically complex areas such as in lay-by niches, cross passages, turn-outs and crossover caverns, where installation of conventional waterproofing membranes is inherently difficult and locating of possible leaks is challenging. Additional advantages result from the sprayed nature of the membrane and its bonding properties.

Application of this waterproofing membrane is fast. It is done by means of a dry-mix process (dry powder and water). Typically 50 to 100 m² per hour can be manually applied by 3 operatives, while mechanized/robotic spraying can reach up to 180 m² per hour. These rates are far higher than typical installation rates of sheet membranes (approx. 25 m² per hour). Resulting time and cost savings for both owners and contractors have contributed to spread out this waterproofing concept worldwide.

It is suitable with all types of inner lining including steel fiber reinforced sprayed concrete and cast in-situ concrete. It is appropriate for application on all types of concrete substrates which provide proper bonding and allow building of a continuous membrane. It does not require surface evenness. However, the smoothness (maximal aggregate size of the concrete substrate) and quality of the substrate influence the substrate preparation works and the consumption of material.

This waterproofing membrane is compatible with conventional waterproofing systems, i.e. sheet membranes. It can be sprayed onto properly installed and cleaned sheet membranes. It is also compatible with all types of reinforcement, including steel fibers, i.e. the membrane can be applied over reinforcement, steel insertions and bolt plates. Steel fiber reinforced sprayed concrete can be applied onto the membrane.

Different underground structures, e.g. tunnels, cross-passages, metro stations, shafts and caverns have been successfully completed using MasterSeal 345, under quite different conditions and design requirements. It has offered a viable, cost-effective solution for regularly found ground and hydrological tunneling conditions. It strongly contributes to the functionality of the tunnel lining, and enhances the durability and serviceability of the tunnel lining system.

**Bibliography**


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Precast Segmental Lining for Underground Tunnels

R. Praneshwari, Director – Projects, INMA

India, which has been lagging behind other countries in metro rail development with the country’s first Metro commissioned in Kolkata in 1984 followed by New Delhi only during 2002, is now catching up with over 585km of operational lines and 622km of under-construction Metro/MRTS lines in Tier-I and Tier-II cities, February 2019. Going forward, Metro is seen as the most safe, sustainable and eco-friendly solution for mass rapid transit system. It is one of the most efficient modes of mass commute with a 8-coach metro train having a carrying capacity of 2500 passengers, equivalent to that of 1000 cars or 50 buses. In additions to reducing travel time, it also generates substantial direct and indirect job opportunities and boosts local businesses. Underground Metros are often seen as the best solution in the more congested and space-restricted areas, without disturbing the above-ground infrastructure and aesthetics. Tunnel lining systems prior to the 1940s were characterized by bolting steel plates through flanges, but it was in the late 1900s that the technology of precast concrete tunnel lining segments emerged.

Segmental Tunneling System

The segmental tunneling system which is used in various industries such as Railways, Subways, Highways, Water Supply, Sewerage, Oil and Gas has gained popularity over the years due to the higher levels of quality control possible, higher production rates that can be achieved, and the relative ease of installation.

A Tunnel Boring machine is used for boring beneath the ground sequentially, while simultaneously installing the precast segments and forming a permanent lining of the tunnel. In addition to finishing the internal wall of the tunnel, the precast segments also serve the following primary purposes:
• Ensuring that the tunnel will be resilient enough when faced with internal/external pressure
• Allowing the TBM to move forward as the machine leans upon the last ring it installed to progress inside the tunnel

The underground tunnel liners, given a design life of usually 120 years, are expected to demonstrate the following:

• Internal pressure
• TBM thrust from rams
• Temporary Load – form removal / stripping, stacking, transportation, assembly, grouting
• Seismic conditions

Each tunnel ring is completed by joining together a number of the precast segments (varies from 4 to 10, depending on the tunnel geometry and other factors) and locking the arrangement in position using a trapezoidal key segment. The picture below depicts the plan of a precast ring with 5+1 configuration (Pic 1).

When installed in the tunnel, the set of segments fit together naturally due to their shape and moulding pattern and are joined together using specialized connecting devices at the circumferential and radial joints, as per the design provided. These devices not only fix the segmental arrangement but also play a key role in the seismic performance of the tunnel (Pic 2).

Manufacture of Precast RCC Tunnel Lining Segments

To achieve the production rate and quality control that makes the segmental tunnel lining method an efficient and preferable option, the process of manufacturing the segments plays a key role. The manufacturing process further weighs heavily due to the following reasons:

• TBM & associated capital and labour costs mandate that the segment manufacturing should NOT control the mining cycle
• When managed well, it can lead to significant savings in project cost and lifecycle cost.

Some Tunnel Segment Nomenclature

• Cage – Fabricated Reinforcement of the segment
• Extrados - Outer side of the segment
• Intrados – Inner side of the segment
• Inserts – Sleeves provided in segments for fixing the connecting devices
• Grout / Lifting socket – Sleeve provided at the center of each segment for lifting the segment for and grouting for stabilization of soil around the tunnel where necessary.
• Circumferential joint – Joints between adjacent rings forming the length of the tunnel
• Radial joint – Joints between the segments of a ring, forming the complete ring
• EPDM Gasket – An extruded ethylene-propylene diene monomer liner fixed in the grooves around the circumference of the segments to seal the joints in the tunnel to prevent the ingress of water.

Hydrophillic strip which is nowadays extruded homogenously with the EPDM gasket, swells automatically with water contact. By swelling, the pressure between the tunnel segments increases, making the tunnel watertight. The strip swelling is reversible. When not in contact with water, it dries out and regains its original shape.
Manufacturing Process
Based on the requirement of each project, the selection of the right production techniques, equipment, methodologies and processes for manufacturing plays a key role in optimizing the process and achieving the target. With the technological advancements today, the manufacturing operations can be carried out either manually (Static System - where the moulds are fixed and people & machinery are moving; or by Automated Carousal system where the moulds are moving and the people and machinery remain stationary in fixed workstations where all production activities are carried out simulatenously.) The levels of automation range from basic to highly advanced. In the Chennai and Mumbai Metro Rail projects, we have employed both these systems. Chennai Metro Rail is the first agency to have implemented this advanced system in a Metro Rail Project in India.

Moulds
The precast segments are produced in high precision laser-cut moulds that are designed and customized based on the segment dimensions, Rebar design, concrete mix design, vibration pattern required, permissible tolerances the joining arrangements and manufacturing process. These moulds are accurate and calibrated in microns, with a tolerance of +/- 0.2 mm. The moulds are fitted with built-in pneumatic vibrators for the compaction process.

Dimples at specified intervals are provided in the moulds which indicate the location in the Tunnel Segments where additional grouting can be easily carried out, if needed.

Cage Fabrication
The steel reinforcement cages are fabricated in customized templates called Jigs that are accurately designed and calibrated as per the reinforcement design drawing. The Fabrication process involves precision welding in designated spots and a specialized binding method. Given the dimensional tolerance of the final precast segments, the dimensional accuracy followed for the steel cages is +/- 1.5 mm.

The conversion of steel to the required shapes and sizes as per the reinforcement design drawing, tagging and segregated stacking play a key role in ensuring the
required quality, accuracy and efficiency by minimizing rework and wastage.

Proper handling of the cages (each weighing 50 to 150 Kg) is important as the arrangement should not be disturbed in the process.

**Segment Casting includes the following Operations:**

**Mould preparation:** This includes cleaning of steel mould using specialized tools, application of suitable mould release agent for smooth surface finish, placement of cages in the moulds, and fixing of cast-in inserts. Concrete spacer blocks are attached to the steel cage at designated locations to precisely control the cover on all 6 sides of the segments. The moulds are sufficiently tightened to prevent loss of grout or mortar from the concrete while placing & compaction. The assembled moulds are then inspected for accuracy of placement prior to concreting.

**Concreting**

Only tested material from approved sources are used for production of concrete.

Fine aggregate and coarse aggregate are stored in separate stockpiles after inspection and testing and kept cool using a sprinkler system.

During Batching, the weighed constituent materials, water and admixture are mixed in the mixer for approximately 30-90 seconds. The batching of concrete is fully computerized and automatically carried out. Given the service life and cost involved, triple blend (with Flyash, GGBS, Silica fume) concrete is used nowadays to ensure high performance, sustainability and to achieve an economical mix. Prior to placement of concrete, workability of the mix is checked by slump-cone test, in addition to visual test for consistency and homogeneity. To keep the concrete temperature under control (maximum permissible temperature being 32 degree C), chiller systems are provided in the batching plant to cool the water before dispatching into the mixer.

Sample for compressive strength tests and durability test such as Rapid Chloride Penetration Test and Water Permeability Test are collected and the concrete is transported from the batching plant to the concrete station through the flying bucket fixed with vibrator for free flow of concrete; alternatively in a stationary setup through transit mixers, for pouring through concrete bucket to ensure homogenous casting.

Vibration is done using the built-in pneumatic vibrators for compaction of concrete in a 3-stage sequence. The above process takes place for approximately 4-7 minutes, depending on the concrete mix design, at a pressure of 7 bar. The vibration is alternated between low-frequency high-amplitude and high-frequency low-amplitude to ensure thorough compaction.

**Finishing**

Surface Finishing is achieved by working the top surface of the segment with steel square pipe to get the accurate thickness of segment. Early trowelling is done to achieve reasonably smooth level. The segments are then covered with polythene sheet to prevent drying out.
Steam Curing: This is applied after the initial setting of the concrete is achieved, for obtaining early demoulding strength. Total time for steam curing is usually 4 – 6 hours. Application of steam is not done directly on the concrete and requires 100% relative humidity to prevent loss of moisture and for proper hydration of the cement. A manual steam curing system consists of steam inlets from the main steam line of boiler along the floor below the enclosing segments. Thermal sheets are used to keep the moulds covered during the curing process.

In the automated system, a curing chamber is incorporated, the steam is passed into the chamber through pressure-controlled valves. The temperature and humidity are controlled and monitored using sensors. The rate of increasing and decreasing the temperature for steam curing should not be more than 22°C per hour to ensure the segment is not subjected to thermal shock. The maximum temperature adopted was 65°C.

Demoulding, micro finish / inspection and Segment marking: When the concrete attains the required minimum compressive strength of 12 N/mm² as per the design requirement, the naturally cooled segments are demoulded with specialized lifting devices (Vacuum Lifter) and stacked in the inspection area where they are checked for post-concrete dimensions and surface finish. Any repairs such as pin hole and edge damages are rectified and finished using high strength repair and bonding agents.

The devices used for segment handling (lifting, tilting, turning and stocking) are designed with full safety, i.e., incase of a power failure or otherwise, these machines can hold the segments for 30 minutes. Demoulding of the segments from the original mould is a critical activity since after curing the segments inside are quite hot and sensitive. Any damage to segment while handling leaves a permanent damage to it.

A coating of curing compound was applied on the surface of segment immediately after demoulding as an alternate arrangement for water curing. The segment surface temperature during application of curing compound should not be more than atmospheric temperature + 20°C.

The final finished segments are then marked with a unique identification number and shifted to the storage area where they are stacked vertically using timber spacers of specified length and cross sections in the intrados, and arranged in prescribed alignment for uniform loading of self-weight during storage.

The stacking design and methodology depend on the self-weight of the individual segments, Uniformly Distributed load from the self-weight of the segments, length of segments, no.of segments to be stacked and Bending moments generated at the centre and at the supports. Hence stacking the segments as per the approved design and methodology is crucial to maintain the segment integrity.

Quality Control: In order to ensure the stringent quality and durability requirements,
addition to the regular Quality control tests on raw materials, cement, steel and concrete, a range of elaborate and specialized tests are performed prior to, during and post the manufacturing process such as the Alkali Silica reactivity test on aggregates; reflective index, absorption and test for film thickness of curing compound; and field pull-out test for grout socket.

The RCPT and WPT were conducted at 28 days, with a permissible value of 1000 Coulomb and 10 mm respectively.

Since the segments are expected to fit perfectly in the tunnel, it is important to ensure the dimension of segments manufactured in the casting yard are within strict tolerance limits of +/- 2 mm. To achieve this, the moulds are inspected and calibrated at least once a month.

Further, for every few 100 rings manufactured, a trial ring was assembled in the casting yard to practically check the dimensional accuracy of segments produced.

**Safety and Occupational Health:** Such kinds of high precision and continuous jobs require the Engineers, Technicians and workers to remain focused during the working hours – continuous, high attention work pattern leads to monotony causing depression, which in turn affects the safety, quality and productivity. Hence, strict safety policy and PPE practices are followed in and around the work premises.

To address these concerns in our Projects, in addition to the mandatory Tool Box Talks and Safety Induction, frequent safety, skill training, upgradation programs, PT Sessions, Yoga, motivational programs, counselling and job rotation were adopted. Eye check-ups and medical camps were conducted regularly.

**About INMA**

INMA is a multi-service contracting company with experience in a range of specialized and niche fields in India and overseas. It has executed several prestigious and strategic projects such as the Maldives Airport Building, Maafushi Jail house Complex in Maldives, FIFA Football Stadium in Port Blair, Entrepreneurial Technical Development Centre in Senegal and Manufacture of Underground Precast Segmental Lining for Metro Projects in India.
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True to its commitment to innovate while embracing the "new norm", the World Tunnel Congress 2020 will now be a fully digital event, paving the way for tunnelling academicians and industry players to be a part of the world’s greatest meeting of tunnellers, regardless of where they are based.

Short for ITA-AITES World Tunnel Congress 2020, WTC2020 was initially due to be held in September at the Kuala Lumpur Convention Centre (KLCC). Recent circumstances set off by the COVID-19 pandemic has led to many cancellations of major events around the world. The WTC2020 decided to move to a digital platform due to the global border control, restrictions on mass gathering, and the requirement for physical distancing.

After much deliberation with the official organizer — The Institution of Engineers Malaysia (IEM) and the International Tunnelling and Underground Space Association (ITA-AITES) — it was decided to make the Congress a virtual event by streaming the programs from 11th to 17th September 2020 via a secured digital platform.

WTC2020 will kick start with opening speeches on 14 September 2020 by industry giants such as long-time IEM backers, WTC2020 Organising Chairman, Ir. Dr Teik Aun Ooi, IEM President Ir. Ong Ching Loon plus ITA President, Prof. Jenny Yan. Themed “Innovation and Sustainable Underground Serving Global Connectivity”, the Congress will feature up to 300 technical presentations and talks focusing on these areas.

The main highlight will be a cross-discipline initiative at WTC, a Landmark Lecture given by Professor Charles W. W. Ng, Chair Professor of Hong Kong University of Science and Technology and President of the International Society for Soil Mechanics and Geotechnical Engineering. An illustrious speaker, he has given keynote speeches worldwide; his talk on tunnel to tunnel and tunnel to pile foundation interactions is bound to liven the Congress.

There will be interactive sessions throughout as participants will get to pose their questions and engage with speakers and presenters. In fact, although now fully digital, WTC2020 makes no compromise in what it offers, as up to 80 exhibitors will showcase the latest in tunnelling trends via a digital gallery, complete with attendants ready to answer visitors queries via chatrooms.

The WTC2020 will also feature two general assemblies at the end of the Congress, namely the ITA young members (ITAym) General Assembly and the 46th ITA General Assembly.

WTC2020 is a golden opportunity for the engineering fraternity in Malaysia as it brings our ingenuity, expertise, and capacity in tunnelling to a global stage. Malaysia’s tunnelling icons include the 9.7 km, two-storey SMART Tunnel - the longest dual function highway, the storm water drainage tunnel in South East Asia, and the impressive Mass Rapid Transit lines – the Kajang and Putrajaya line, respectively. These projects have given birth to many tunnelling innovations such as the Variable Density Tunnel Boring Machine (TBM) and the autonomous TBM.

Although the format of the Congress is now virtual, conference objectives will still be met, if not exceeded, as technology removes the geographical and physical limitations of knowledge transactions. While it is disheartening that the Congress could not be held physically in the beautiful city of Kuala Lumpur, Malaysia continues to wait for delegates everywhere, as we battle the Covid-19 pandemic in unison.

WTC2020 Digital is open for registration but filling up fast.

For more details/updates on upcoming programs, check official homepage www.wtc2020.my.

For Congress details please connect with Dr Ooi Teik Aun at drtaooi@gmail.com.

For Media clarification please connect with Dr Bhavani Krishna Iyer at 0193128303.
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