Moving into the Future with Comprehensive Solutions for Mining
L&T's corporate motto – “In Service Lies Success” – has been the foundation of our customer philosophy and core value systems for several decades now. Over the years, we have been living this credo in letter and spirit by working closely with customers, and offering them with the best of products, technologies, and, the best equipment solutions in mining space. When young engineers join our team, this value gets ingrained into their corporate ethos, and shows up as the “L&T way” of customer support. This value system alone makes our people stand out.

In our efforts to be the best in providing services to our customers, Komatsu and Scania have always supported us, with encouragement and understanding. While we provide them with information on customer needs and expectations, they take the initiatives to bring into India the latest technologies and products that would be of relevance to Indian market, thus helping us sustain our leadership position. We have faced, enjoyed and overcame many challenges in our mining business, which has been a great learning experience. As a result, over the years, we have successfully introduced and supported sophisticated mining equipment like the Komatsu 830E Electric Dump Truck, PC3000/PC2000 Hydraulic Excavators, D475 Crawler Dozer, WA900/WA800 Wheel Loaders, GD825 Motor Grader, WD600 Wheel Dozer, and the P410 Scania Tipper and earned customer goodwill and their satisfaction with committed and energetic support provided by our Service teams working at customer sites. We are proud of the achievements of our team in CMB.

At IMME 2016, L&T and Komatsu as always, are participating jointly, to showcase our strengths and capabilities. Coinciding with this, we are bringing out this special issue of L&T Earthmover News, with articles on some of our key customers, our success stories and new products. As we target to reach the status where our customers see us as their partners in progress, and not just as equipment suppliers, we at L&T reaffirm our commitment to our motto “in service lies success.”

I thank all our esteemed customers for their patronage and look forward to your continued support for Komatsu, Scania and L&T range of products.

Best regards

Arvind K. Garg
Executive Vice-President & Head
Construction & Mining Machinery Business
Larsen & Toubro Limited

Komatsu India Private Limited is proud to be associated with IMME 2016, the largest mining exposition in India. Along with our trusted partner, Larsen & Toubro, we are showcasing our strengths and capabilities to reach out to our customers engaged in mining operations. This participation shall help us to reinforce our presence in the Indian market and improve the relationship with customers.

I am happy to understand that L&T Earthmover News is bringing out a special issue coinciding with IMME 2016, which shall focus on customer-related reports and product offerings.

As a leading mining equipment manufacturer, Komatsu has been at the forefront of the industry offering a diverse range of products. We have been working closely with L&T to provide the best fleet solution and support services pan-India. Over the years, the relationship of Komatsu and L&T have strengthened in terms of capabilities and opportunities to expand the business in India and deploy machines to meet the toughest challenges at various job-sites.

At Komatsu, we build machines that are environment friendly and meet the strict standards of quality, safety and reliability. The products supplied in India are sourced from Komatsu plants worldwide including the sophisticated plant in Oragadam, near Chennai. Our excellent relationship with L&T enables us to plan and execute a variety of product support and service programs designed to enhance the equipment performance and maintain higher uptime.

We have crossed many milestones in introducing new technologies and new machines in the Indian market. We take this opportunity to appreciate the unrivaled support extended by L&T management and thank the customers for their overwhelming support which has enabled Komatsu to become a successful brand in India.

Warm regards

Kiyoshi Mizuhara
Managing Director
Komatsu India Pvt. Ltd.
L&T achieved a significant breakthrough last year with the supply of Komatsu WA800 Wheel Loader to Rajashee Cement, a unit of the highly-profitable Ultratech Cement Limited. The machine has since clocked over 6,200 Hours of successful operation in a span of 22 months. This is for the first time that 11 Cu.M. Wheel Loaders are deployed for production requirements in the limestone mines in India. Today at Rajashee Cement, WA800-3E0 Wheel Loader is the most preferred choice of production equipment and is being consistently used to produce more than half of limestone volume in the mines.

Rajashee Cement Works (RCW), located at Malkhed in Karnataka, was commissioned in 1984 and is one of the largest single-location plants in India. Its salient features are

- Installed annual cement production capacity of 9.0 MTPA with four individual lines
- Large-size Loading Shovel instead of two standard-size Loading Shovels. Looking into the excellent mining/blasting conditions at site and the operational abilities, L&T suggested RCW to opt for a 11 cu.m. Wheel Loader instead of Hydraulic Excavator.

"With no reference site available in the cement industry, it was a huge challenge for our team to convince the customer to sign up for the large-size Wheel Loader for its production requirements," says Mr. Anjan Datta, Zonal Manager-West, Mining Equipment Business-L&T. The onus was to prove the production ability and technical prowess of the machine to load the existing 100T Dump Trucks at site.

L&T team carried out a detailed study at RCW-Malkhed on the suitability of WA800-3E0 (with 11 cu.m. bucket) for the mining operations (bench height, blasting pattern, fragmentation) and the loading feasibility with regard to 100T Dump Trucks. This was followed by a visit of the L&T and RCW joint team to Hindustan Zinc Limited-Rampura-Agucha Mines, where WA800 was paired with 100T Dump Trucks. This gave an opportunity for L&T to demonstrate to RCW team its after-sales support, maintenance capabilities and remote management.

Against stiff competition from reputed global equipment manufacturers, L&T received the order for WA800-3E0 machine along with FMC for 10 years from Ultratech. Komatsu WA800-3E0 Wheel Loader was supplied within the stipulated delivery period and commissioned at Malkhed mines on 23rd October 2014.

Though the initial productivity was better than the existing similar capacity Hydraulic Excavator, L&T and RCW decided to launch measures to step up the productivity further. Simultaneously, L&T, Komatsu and RCW initiated various developments to enhance the productivity of the mine. L&T and Komatsu redefined the productivity of the mine by setting new standards with their advanced equipment and innovative strategies.

Komatsu WA800 -- Setting New Standards in Rajashee Cement

- A captive mechanized mine with a capacity of 13.4 MTPA of limestone production, is one of the largest single-pit limestone quarry in India

- Captive thermal plant of 108.2 MW & 5.7 MWDG.

- A wide range of branded products catering to multi-segment cement market e.g. Birla Super 53 grade (Multi-storied buildings, dams & bridges), Ultratech (Mass concrete laying and non-structural applications), Birla Coastal (Coastal areas) and IRST 40 (Railway Sleepers).

Previously, Rajashee Cement had an operational fleet of one 11 CuM and 3 nos 6.5 CuM Hydraulic Excavators (loading shovels) to handle blasted limestone and loading into 100T Dump Trucks. To optimize on operational costs, UTCL planned to acquire, one more
intervention programmes to familiarize the RCW operators to the unique features of WA800. The objective was to enhance productivity, safety and fuel economy.

The programme included hands-on training by a Master Operator from Komatsu-Japan; periodic assessment of operator skills and counseling on one-to-one basis by L&T’s application engineering team; and thorough training for RCW’s Shift Engineers and field operators to enable them understand the importance of the equipment features, maintenance aspects, tips on improving productivity and safe running of the equipment. With this focused and calibrated approach, it was possible to significantly improve the production (Tonnes/Hour) and productivity (Tonnes/litre).

This high-capacity equipment received excellent support from L&T’s team in PSD-South which ensured high equipment availability and to the complete satisfaction of the customer. L&T received an appreciation letter from Mr. Soumik Chakraborti, Sr Vice President (Mines), RCW as following:

- Very engaging pre-sales activity for removing the initial apprehension
- Extensive and periodic training, especially for operators, thereby improving their overall skills
- Our calibrated approach to improve the productivity (Tonnes/litre)
- Our after-sales service support and good maintenance practices at mines, thus exceeding the committed availability guarantee.

History: UltraTech Cement Limited (UTCL) is the largest manufacturer of grey cement in India, with manufacturing capacity of 69.3 MTPA (to become 90.50 MTPA on completion of the acquisition of 21.2 MTPA capacity cement plants of Jaiprakash Associates Ltd). UTCL has 12 integrated plants, 1 clinkerisation unit, 19 grinding units, 7 bulk terminals, 1 white cement plant, 2 putty plants and over 100 RMC plants – spanning India, UAE, Bahrain, Bangladesh and Sri Lanka. UTCL is also India’s largest exporter of cement and clinker, reaching out to meet the increasing demand in SAARC countries, Africa, Europe and the Middle East.

Over the years, L&T has built a superb reputation in UTCL with a high-performing Komatsu fleet of 91 machines including PC1250 and HD465 working at various UTCL’s plants and to the complete satisfaction of the customer.
As one of the deepest open cast mines and the largest zinc mines in the world, Hindustan Zinc Limited faces a formidable challenge each day to mine and haul huge volumes of overburden and ore at its Rampura-Agucha Site, located in Rajasthan. L&T has been closely involved with Komatsu in providing top-class fleet solution comprising Dump Trucks (830E, HD785), Hydraulic Excavators (PC20000, PC1250) as the main equipment and Crawler Dozers (D475S, D375S), Wheel Loader (WA900), Wheel Dozer (WD600) and Motor Grader (GD825) as support equipment.

L&T’s success story at HZL started way back in the financial year 2009-10 with L&T securing orders for supply of mammoth 240-ton Dump Trucks – Komatsu 830E model for the first time in the Indian mining operations. HZL mandate was to increase the mine capacity from 5 MT per annum to 6 MT per annum of ore and net excavation from 35 MT to 95 MT.

Prior to 2009, HZL was engaged in mining operations with 100 ton trucks and 15 Cum L&T’s order comprised 17 nos. Komatsu 830E-AC Electric Dump Trucks, which were incidentally the largest off-highway trucks in India. Komatsu 830E was an ultra-class dump truck used in open-cast mining, designed and built in Peoria, USA by Komatsu America Corporation. 830E-AC was powered with a massive 2500 HP engine to carry a load of 240 Ton. Besides the supply of off-highway trucks, L&T also signed up FMC for 5 years & 27,500 hrs with guaranteed availability of around 90%.

What followed was an enormous challenge for L&T as they had to work closely with Komatsu team to deliver such a mega project. Huge structures of equipment were shipped to the project from overseas plants and makeshift camps came up to erect the equipment at site. Massive cranes were deployed and expert teams in erection and welding were in full force to handle the project. L&T provided best-in-class support in terms of trained manpower, skilled specialists and local infrastructure to set new benchmarks in erection and commissioning.

This project was a huge success with India performance of the Large size trucks, the testimony of which was a repeat order of 4 more trucks from HZL in 2011. The average performance of the trucks exceeded the commitment made by L&T and was over 90%.

HZL, which was a public sector undertaking under Government of India, was acquired by Vedanta Group and several initiatives were launched to modernise and optimize its operations. The result – HZL became a performance oriented organization with high standards in production, safety and maintenance. The close association and execution of this project at Rampura-Agucha Mines was a new learning for L&T team.

Says Mr. Manish Jhamb, Zonal Manager-North, Mining Equipment Business-L&T, “The entire activity of coordinating with HZL project team on the delivery and commissioning of 830E trucks was fraught with palpable tension and excitement. Looking back, I feel amply satisfied that I got an opportunity to closely associate with this project which is perhaps the largest of its kind in open cast mining in recent times.”

Komatsu 830E Dump Trucks – Standing Tall in HZL - Rampura Agucha Mines
Larsen & Toubro’s enduring and productive journey with the coal major—Singareni Collieries Co. Ltd. started in the year 1980 with the supply of the first L&T 300CK Hydraulic Excavator (Sl. No. E004). This machine’s reliable and impressive performance led to repeat orders from SCCL for 14 more units spread over the next two decades. Thus reinforcing SCCL’s confidence in L&T’s product quality and service capabilities as well. In the process of supporting SCCL’s equipment, L&T had developed a highly motivated and skilled team of service engineers as well as support infrastructure in the mining projects such as office space, storage facility, parts depot and vehicles to provide effective service 24 x 7 to SCCL. All these proactive efforts resulted in over 90% fleet availability and with 80% utilization of L&T equipment rendering highest level of satisfaction to SCCL.

The turn of the millennium saw L&T introduce Komatsu’s cutting-edge technology in SCCL projects. This augured well, with SCCL stepping up modernization drive of its mines and processes, and to effectively handle the difficult geological parameters in the state of Telangana. Over the years, L&T and SCCL have shared a mutually beneficial relationship and growth. Today, SCCL has an active fleet of 175 Komatsu machines of various models viz., 153 nos. Dump Trucks and 12 nos. Hydraulic Excavators operating successfully, and with 10 nos. Crawler Dozers under supply.

The SCCL contract for supply of Komatsu Dozers was a major breakthrough for L&T, considering that the company had been predominantly using Dozers of another manufacturer. With stipulation of 85% minimum availability and superior technical specifications, L&T emerged as a frontrunner with Komatsu D155A-6 and D275-5R Dozers. Incidentally, Komatsu D155 and D275 Dozers are the most popular models marketed in India. These machines come equipped with engines fitted with Electronically controlled high pressure common rail fuel injection system to meet the stringent emission norms, Automatic powershift transmission, Palm Command Controlled Joystick for Travel and Steering, Load sensing hydraulics, advanced monitor with self-diagnostic function and a host of other smart features which provide the dozer its excellent productivity and reliability.

L&T team has endeavoured to work closely with SCCL management to improve on the equipment performance and after-sales deliverables. A case in point is the introduction of large-size Hydraulic Excavators as a replacement to Rope Shovels. Seizing this opportunity, L&T was quick to introduce Komatsu’s high-performance excavators i.e. PC1250 and PC2000. Komatsu’s state-of-the-art technology and L&T’s best site support paved the way for a win-win situation at SCCL.

The next challenge was to maintain these high-value machines with utmost care and under expert supervision. With SCCL entrusting this responsibility, L&T began its massive operation at the sites for continuous monitoring and parts planning. With critical care becoming the
responsibility of the manufacturer, this initiative enabled SCCL in reducing its operational costs and parts inventory. The manufacturer, by virtue of his experience and expertise, could recommend and execute the parts replacement as per the best practices in the mining industry and take up preventive maintenance to avoid breakdowns and consequent revenue losses.

In a path-breaking initiative, L&T bid and bagged the first Parts Cost Cap tender from SCCL for a total fleet of 59 Nos. Komatsu Dump Trucks. In the process of implementing the Parts Cost Cap operations, L&T team faced quite a few stumbling blocks. But given the effective support of SCCL, L&T could soon overcome the shortcomings and develop a robust system which has given the desired results and to the full satisfaction of SCCL management. The testimony to this is, that today SCCL is adopting the Parts Cost Cap system for tenders of all its productive equipment.

Says Mr.D Ramaraju, Zonal Manager-South, Mining Equipment Business-L&T, “We are proud that in SCCL’s modernization drive to improve productivity, availability and cost reduction, L&T and Komatsu got an opportunity to make valuable contribution.” As always, L&T works closely with SCCL to help produce coal at the lowest cost possible and to pave the way for increasing its profits.

History: Singareni Collieries Co. Ltd. is jointly owned by Govt. of Telangana (51%) and Govt. Of India (49%) and engaged in production of coal from opencast and underground mines by deploying latest technology. SCCL’s major opencast projects are located in the districts of Adilabad, Khammam, Karimnagar and Warangal.

SCCL has been the source of coal for NTPC, SAIL, APGENCO and various cement plants located in the states of Telangana and Andhra Pradesh. SCCL’s annual production of coal was 60 MT in FY 2015-16, which has seen a production increase of around 15% on yoy basis. The acute demand for coal in Telangana, to mitigate the power crises in the state, has encouraged SCCL to add a large fleet of equipment over the last two years to boost coal production. SCCL has added a power generation capacity this year to the tune of 1200 MW by installing a pit head power plant at Ramagundam.

### Scania Holds an Edge in Bihar Construction

Scania Tipper Trucks provide a cost-effective solution in mining transportation. Given its rugged features and easy manoeuvrability, a number of customers are increasingly opting for Scania brand of Tipper Trucks for overburden removal.

Bihar Construction Company (BCC), based in Korb–Chhattisgarh, has over four decades of experience in handling construction works, mainly ash pond management at NTPC in Korb. BCC bagged the overburden removal contract recently and has become one of the leading contractors in South Eastern Coalfields Limited, contributing significantly. Today, its daily production targets across different mines is appx. 60,000 CuM per day.

In Chattisgarh state, BCC started its initial OBR project at Jampali with Tipplers of other make. As Mr. Hrishikesh Rajhans, Zonal Manager, L&T-West & Central, puts it, “It was a big challenge for us to penetrate in the region which was abuzz with competitor models and secure BCC’s confidence for Scania Tipplers. We started pursuing in the last quarter of 2015 with extensive trials at SECL-Jampali site and could successfully demonstrate Scania’s fuel efficiency benefit and lesser hauling cost per CuM compared to same-class models in the market”. This is the first order secured by L&T involving Scania Tipplers from contractors in Central India.

By the end of 2015, BCC was convinced of the product superiority and value but the next challenge was to win their confidence in L&T and Scania’s ability to provide service and parts support at site. Mr. Surindar Pal Singh (alias Bony Khalsa), MD, BCC, recalls, “My father, Mr. Mahindar Pal Singh was comfortable with the existing models of Tipper Trucks and we found it rather tough to change his mindset. So I urged L&T team to take up this challenging task to convince my father on this. I felt happy when he finally gave in after a few round of meetings, and agreed for placing order on Scania Tipplers.”

Today, BCC owns an operational fleet of 40 nos. Scania Tipppers procured in less than 10 months of its association with L&T and Scania. BCC has gone in for additional 30 units looking into the long-term and growing requirements of coal companies. Mr. Bony Khalsa continues, “Our relationship is growing from strength to strength and we are working closely with L&T, Scania and Volkswagen Finance Services on developing a joint strategy to acquire new contracts/projects. It’s truly a partnership approach and has made a real difference from being merely equipment supplier to becoming a service provider!”

The customer believes in benefits that Scania offers over competition which include rugged vehicle, reliable suspension, uptime guarantee, spare parts availability, and a proactive approach of L&T and Scania service team. Soon, BCC will turn into a model customer for Scania Tipplers and is supporting L&T as well as Scania to increase the footprint in the region.
Mr. V. Prabhakar Reddy, an astute businessman with an impeccable foresight, started his business operations with a small contracting firm executing earthwork projects in the 1990s. He saw an opportunity in the mining sector and forayed into it with the execution of OB removal contracts. In a short time, he successfully led his firm VPR Mining Infrastructure Pvt. Ltd. (VPRMIPL) to become one of India’s leading Mining and OB removal companies and expanding footprint globally. From 1990s to 2000, VPRMIPL executed large projects in OB excavation and irrigation canals. In post 2000, Mr. Prabhakar Reddy has focused his attention and resources to become the most efficient OB removal contractor and thereby executed several projects in the coal sector.

Today, he is the single largest private contractor in India executing large-size projects and deploying large-size equipment. In the process, VPR has established benchmarks in terms of teambuilding, optimizing resources and timely execution of projects. True to its philosophy, the company has forayed into newer horizons, where very few contractors had dared to venture. In 2010, VPRMIPL was the earliest to break new ground on foreign soil by signing up mining projects in Western Africa (Senegal) and South East Asia (Indonesia).

Besides, there are a lot of firsts that the company has done even before others could think of them:

- First contractor to deploy 8 x 4 Tipper Trucks with 60 ton excavators (L&T 300CK) for Overburden Removal in coal projects

VPRMIPL’s core area of expertise is in the field of mining excavation. The company has been consistently executing projects in Singareni Collieries Co. Ltd. and Coal India Limited’s subsidiaries for over 15 years now. VPR has completed 15 major OB removal projects and is now executing 10 more large projects across India, besides the global projects in Indonesia and Senegal. Currently, VPR has a 500-strong fleet of large and small equipment and commands a production capacity of over 50 Million BCM per annum.

To understand the challenges that VPRMIPL has taken in the last few years emphasizing his conviction in the mining sector, L&T highlights a few milestones in the VPR’s journey to reach the pinnacle of OB contracting work.

Year 2008: Mr. V Prabhakar Reddy was awarded an ambitious overburden removal project floated by SCCL at Srirampur with a volume of 79 Million BCM of OB to be
removed in just 56 months. This is when VPRM IPL introduced Komatsu PC2000 and HD785 for the first time in a OB removal project, a pioneering move, as it became the first contractor in India to deploy a combination of 14 cum HEX with 100 ton DT for OB removal work. The deployment of Komatsu’s large size and high quality equipment paid rich dividends and VPRM IPL was able to successfully execute the project within the stipulated time.

Year 2011: VPRM IPL started on its largest OB removal contract overseas in Indonesia, involving a massive 190 Million BCM of OB to be extracted in 5 years’ time. This time, VPR introduced Komatsu PC1250 (6.7 cum) Hydraulic Excavator in the Indonesian project and the machines proved a great success with the desired productivity and a distinct advantage in fuel consumption over equivalent machines. Komatsu PC1250 became a hero in VPR’s operations abroad.

Year 2014: VPRM IPL has secured another large OB contract in Medapalli involving an OB removal of 98 Million BCM within a duration of 68 months. VPRM IPL had initially started operations in the project with 6 units of other excavators and Komatsu HD785 Dump Trucks. Subsequently, L&T supplied 2 units of Komatsu PC1250 to VPR in September 2015. The distinct superiority in production capability and better fuel economy of Komatsu PC1250 was appreciated by VPRM IPL and it paved the way for supply of another 2 units of PC1250 in July 2016 as replacement for the existing fleet. The testimony to the superiority of PC1250 in terms of productivity and better fuel economy, is that VPR has placed another order for 2 nos. of PC1250 in the month of Sept 2016. in all, this project has 6 nos. of PC1250 forming the backbone of the project. The first lot of PC1250s has already clocked more than 7500 hours in just a year which in itself is a testimony to the equipment’s success at site. The customer is also extremely delighted with Komatsu PC1250’s performance as it has ensured that VPRM IPL stays ahead of its daily production targets for the project.

It has been VPRM IPL’s endeavour to equip their team with the latest equipment and it is this ideology that has made VPR a patronized customer of Komatsu and L&T for over a decade. Komatsu’s superior technology equipment along with L&T’s expert advice and reliable support have always found favour with VPRM IPL. This is demonstrated by the fact that a significant share of VPR’s 500 plus equipment is of Komatsu brand.

VPR’s equipment repository includes a large fleet of Komatsu equipment comprising 100 ton Dumpers HD785, Excavators ranging from 14 cum (PC2000), 5 CuM (PC1250) & 2 CuM (PC450) and 320 HP Dozers (D155). VPRM IPL has been a strong advocate of Komatsu technology and had confidence in the superiority of PC1250 machines over equivalent models. L&T is proud that Komatsu’s reliable machines and the best trained manpower of VPRM IPL have collectively achieved their target and have raised the performance bar higher.
With around 400 nos. operating in various mining projects, Komatsu HD465-7EO (60T Dump Truck) is probably one of the most enduring success stories in the Indian mining industry. This work-horse hitherto has been the mainstay in the limestone mining applications. However, this trend underwent a change by end 2014, with L&T and Komatsu bagging a major order from Central Coalfields Limited (CCL) for supply of 59 nos. Dump trucks with 3 years Guaranteed Parts Consumption contract.

With this order, CCL has become one of the largest fleet owners of Komatsu HD465-7EO in India. Incidentally, this order was path-breaking as it was not only the first time a Komatsu 60T Dump Truck (HD465-7EO) was being supplied to Coal India subsidiary, but because of the physical deployment of these machines spread over 8 areas and 24 projects of CCL.

L&T’s Product Support team put its best foot forward, as always, to meet the stringent conditions of the contract for supporting these Dump Trucks to maintain qualitatively to get the best output. L&T and Komatsu have been able to conduct skill building activities with the whole-hearted support of CCL for their operation and maintenance staff, which has helped in safe and productive usage of these dump trucks with minimum accidents and ensuring higher uptime. In fact, these trucks remain the 1st choice of operators due to its ease of operation and best-in-class comfort. Says Mr. J.K.Pal, Zonal Manager-East, Mining Equipment Business, L&T, “It is very satisfying to learn that the HD465 trucks have achieved high availability at CCL projects inspite of geographical spread of machines”.

All this was achieved due to the excellent quality of machines, manufactured by Komatsu, which are built under its design philosophy of ECO-T3, encompassing Ecology and Economy features using state of the art Engine, Hydraulics and Electronic Control technology. This ensures best reliability, productivity and fuel economy an availability of over 90% in the last 22 months. This is a testimony of not only the superior reliability of the machines but the untiring efforts put in by L&T’s after sales support team at the sites.

These trucks have clocked an average close to 6000 hours of operation maintaining an availability of ~94%, which is the best in its class. Even since the first deliveries were executed, CCL has engaged with L&T in providing essential support to L&T staff so that the machines are deployed with maximum concern for environment.

Komatsu HD465-7EO comes with standard features
- Komatsu SAA6D170E-5 Electronically controlled with High Pressure common rail fuel system and heavy-duty cooled EGR which enables engine to meet the stringent EPA Tier 3 norms
- The Dump Truck can be operated in 2 modes, viz., Economy and Power to suit the changing operating environment, to ensure fuel economy and productivity
- 7 speed fully automatic Komatsu K-atomic with skip shift
- Hydraulically-controlled wet multiple disc brakes with Automatic Retard Speed Control (ARSC) as standard
- Advance monitoring system with Payload meter

This reiterates that key to the success of any mining project is in deploying machines that define safety, quality, reliability and productivity.
Cost Per Ton™ is an oft-used term in mining parlance today, which becomes the single most important factor in the selection of machines and processes. Companies involved in mining and the OEMs are in a continuous race to find and adopt simple and innovative methods to reduce Cost Per Ton for producing the engineering-related issues for a given machine / fleet. Let us take the case of a Dump Truck where, as per the fundamental knowledge, it is a given, that Power required to move the vehicle equals Rolling resistance plus Grade resistance. Since the largest segment of a round trip time of Dump Truck comprises of its hauling and return time, any increase in rolling resistance and/or grade resistance will not only have an effect on the power required but drastically increase the round trip time (cycle time). While the increase in power required will reflect in higher fuel consumption and prolonged use on similar terrain may also have its effect on the durability of powertrain unit.

Application Engineering – Optimizing Operational Fleet & Productivity in the Mines

desired output. Technological evolution of Mining machines over the last decade or so has resulted in machines being more productive, reliable, cost-effective, and adaptable to various operating conditions. However, these machines have to ultimately work at sites, with each site being unique. This uniqueness, be it the strata, the density, the mine plan which has its bearing on bench heights and haul road design, the operating and maintenance regimen, etc, bring variability which can affect the output of the machines.

One needs a keen eye to decipher the unfavourable conditions from favourable ones, generate and analyse data to bring out planned recommendations, to reduce the effect on machine performance due to these variables. This is where the Application Engineering aspect of Mining machinery team comes to the fore.

Understanding of factors that inhibit productivity and reliability of machines is the key to resolving most of the application
higher cycle time will lead to loss of production or mismatch of the fleet deployed. Cost Per Ton becomes the casualty here.

Continuing from this example, it is emphatic to say that haul roads are the lifeline of surface mines and are as important an element as an excavator or dump truck in achieving the desired production. We, at Komatsu and L&T, continuously engage with our customers to offer services to help identify areas that can inhibit productivity and economical aspect of machines and as well provide recommendation for improvements.

Deploying a standard spec machine in a unique operating environment could be detrimental to the health of the machine. Hence it becomes important for the correct selection of specs, such as boom & arm length, bucket capacity, counter weights, GET selection, etc. Application engineering team recommends the correct machine to be deployed in the mines vis-à-vis material to be excavated keeping in view the productivity and longevity of the machine.

**Customised software**

Technological evolution has touched the application engineering aspect too, with hi-tech tools and customised softwares being used to map the operating conditions and to understand better the difficult areas. Haul road mapping is done using MapSource and GPS tool and then this data is fed in a customised software to break-up the haul road segments and identify areas of improvement. The same data is also fed in Komatsu’s OFR software to perform sensitivity analysis of Load Vs Total Resistance Vs Speed Vs Fuel consumption. This analysis helps in not only optimising the haul road but in optimising the fleet as well.

One less truck to get a similar production after the alteration of haul course gives a better return on cost per ton.

Today, all Komatsu mining machines come with the benefit of Komtrax Plus. There are sensors mounted on all the most important areas to not only map pressures, spikes, temperature, etc. of various systems on the machine but also measure payload on dump trucks. This data when downloaded is used effectively by the maintenance team and also by the end user so that the productivity and fuel consumption could be mapped well. Komatsu is now using this data live with video-streaming while the machine is in operation using REALISP. This is an effective tool which can help in identifying areas of improvement in live environment.

Machine operator is the most important link in the entire chain who is solely responsible for obtaining the desired output. He also plays an effective role in improving the machine life by avoiding operations that could be harmful for machines’ systems and structures. It is in this context that one needs to have an expert intervention with the operating staff, so that correct operation techniques, effective use of energy saving practices, pre-empting unsafe acts, etc. are inculcated.

Be it a greenfield or a brownfield project, having an optimum fleet is the ultimate desire of any end user; Komatsu and L&T have been involved closely with many mining companies in offering optimum fleet for the desired output. While the technology plays its part in providing fleet calculations, the importance and the efficacy of the application engineer involved can never be over emphasised. He is the person who has to possess the requisite skills to understand the ground reality, continuously seek inputs, analyse loads of data and then work using his entire experience to come up with solution that finds acceptance among a larger group.
Globally, the challenge in mining operations is to produce high volumes at optimum costs. As equipment age over time, production efficiency as well as reliability could decline. With increased customer demands and to endure in tougher terrain, dusty environment, higher payloads, faster turnaround time, L&T Product Support focuses on restoring high uptime at lower costs.

To understand the harnessing of right resources, doing away with unwanted costs and integrating processes efficiently to increase the user profitability is imperative. "L&T is committed to lowering total cost of ownership as well as operating costs so that the customer gets greater return on his investment on a fleet of large and diverse machines," says Mr. Arun Pai, General Manager-Product Support, L&T. L&T PSD provides comprehensive services that can repair and refurbish a wide range of aged equipment providing increased lifespan and operational value.

Refurbishment and Rebuilds can often be complex and time-consuming projects, where even an unforeseen error could lead to significant delays in bringing a machine back to full production. L&T makes life simpler for its customers by reducing probable risks to the minimum. Longer equipment life, good performance and safe operation depend on an extensive understanding of equipment and maintenance procedures.

Says Mr. Vivek Hajela, Head-Service Centres, L&T, “Our on-site engineers share expertise, follow the manufacturers' defined maintenance and repair procedures, and have access to equipment specialists pan-India. The users can rest assured that diagnostics, mechanical repairs and component refits are done correctly and equipment age data, transforms it into clear and effective goals, and schedules the activities”, he adds.

L&T’s specialized Rebuild & Refurbishment Services are designed to help the customers to return their ageing machine for a new lease of life. With L&T repaired or refurbished machines, production efficiency is increased, machine reliability is improved and the life of the equipment extended keeping the cost low compared to buying a new machine. The program draws upon the knowledge and experience only found with an OEM, L&T:

- Ensures that the mandatory production-enhancing technology upgrades are precisely installed and rigorously tested
- Integrate a full range of technical expertise and support services
- Provide accurate assessments of machine health by drawing on a database of pan-India practical experience
- Handle the entire rebuild process, including auditing, diagnostics, cost estimating, parts procurement, planning, disassembly, repair and replacement, testing, training, commissioning, and start up

Mining equipment are extremely large, a lot of raw materials are consumed when new engines and transmissions are...
manufactured. Therefore, it is wasteful to replace old components with new ones, when only some parts of the old components are worn out. It calls for reuse of old components after restoring them: all worn-out parts are replaced with either new or reconditioned parts; post the repairs, the restored component is referred as Rebuild component. As Rebuild components require a higher level of precision and quality, L&T ensures engaging latest technologies backed by skillful workmanship.

A machine’s productive lifecycle is determined by the life of its major components. The end and beginning of each new cycle are marked by the well-planned Preventive overhaul (OV), with Rebuilt exchange offered by L&T PSD. Advance estimation of critical repairs of the old component is shared with the customer, and is agreed as a prefixed cost of the Rebuilt component (in ready stock with L&T) that is given in exchange. This helps the customers save on repair lead time and consequent loss of production.

Between the cycles, the equipment requires distinctive maintenance that are either predictive, preventive or corrective. Each one of these maintenance activities are to be managed and executed efficiently, complying with all the mandatory processes. The goal is to repair before failure, so as to maximize availability at the lowest cost.

L&T Pre-Fixed Price Servicing is available for most Komatsu models of mining machines in India and includes additional services as part of the pre-fixed overhaul, including the ‘Komatsu Oil Wear Analysis’ (KOWA) of oils, machine health condition; Preventive Maintenance or ‘PM-Clinic’ report. L&T’s commitment is to deliver exceptional service and to ensure that the assets are in optimal working condition.

Komatsu Mining Machines use KOMTRAX Plus which provides information on vehicle health and monitoring system through various sensors installed in the equipment. By using KOMTRAX Plus data effectively, maintenance and overhauls are done by L&T team to enable the customers get the best output from the machines. Additionally, L&T and Komatsu work closer with customers to enable them improve on fuel consumption.

The high-performance of Komatsu machines can be ensured only when Genuine Parts are fitted on to the high-value machines. Absence of updated information on exact serviceable parts could delay in commissioning of the repairable machine. To eliminate these hurdles and make the routine maintenance and repairs simpler and faster, L&T has developed Service Kits / Repair Kits which are unique to each Komatsu model / its components, to facilitate high equipment up-time.

All repair activities are effectively handled by L&T’s trained crew at its state-of-the-art Service Centres located strategically across India – Bahadurgarh (North), Durgapur (East), Pune (West), Nagpur (Central) and Kanchipuram (South).

While engine rebuild activities are handled in-house in the workshop, there are others relating to huge structures and equipment repairs that are attended to at site by L&T expert crew. Says Mr. Arun Pai, “We firmly believe in forging strong relationships with our customers with a spirit of partnership in the joint upkeep of their equipment, through our various maintenance programmes and repair solutions, so that our customers can maximize their equipment productivity.”

Customer voice: Mr. Bipin Rawal, Project Head-Agucha, Dhansar Engineering & Co. says, “We are delighted with the excellent services provided by L&T Product Support in overhauling the engines of our entire fleet of 17 nos. Dump Trucks operating in Rampura-Agucha Mines. All this was accomplished in 6 months’ time, thanks to L&T Rebuild Engine Solution on pre-fixed cost basis. Normally, an engine overhaul takes 3 to 4 weeks but with L&T Rebuild Kit the OV job was done in 2 weeks. The Trucks were back in action soon after and that’s a huge difference! With prefixed price, we were within our OV Budget and there was no scope for after-shock. In fact, planned repair has helped us to achieve optimum fleet productivity of Komatsu HD785 trucks in the mines. I am happy to recommend this value-added services of L&T to others as well.”
Speed, versatility, reliability, performance and lowest cost per ton, etc. are the buzzwords today to define what characteristics a machine should possess in tough mining applications. It is not only the machine that has been changing its character to meet the ever changing demands of its end users, but the mining processes too have metamorphosed over a period of time, bringing innovation not only in the mining process but in the ultimate selection and use of machinery, putting high onus on speed and versatility.

Wheel Dozer is one such machine which fits the bill, it displays the mobility and features of a Wheel Loader while packing a punch of a Crawler Dozer to perform dozing while exhibiting high mobility in light duty applications.

Indian mine owners engaged in various applications have favourably evaluated Komatsu WD600-3 Wheel Dozer over the last few years. Be it iron ore mines or coal mines, be it loading face maintenance, or wheel loader feeding or the dump yard / haul road maintenance, this machine has proved its mettle in every sphere of its operation.

Powered by a Komatsu SAA6D170E-3 engine delivering 485 HP, while meeting the stringent emission norms, this 43 Ton machine with a dozer blade (Straight Blade) of 8 - 10.6 CuM capacity develops brute power to deliver the best in class productivity and fuel economy.

Komatsu WD600-3 employs the most reliable Komatsu Full Powershift Planetary gear transmission which is automatically controlled. The torque converter employs a lock-up feature to improve productivity and fuel economy in low load operation. Automatic kickdown function pre-selects the optimum gear as desired when changing directions, thus reducing cycle time and improving fuel economy.

No spin differential with full hydraulically actuated multiple disc brakes provides unhindered traction, reliability and safety and with two independent fully hydraulic brake circuits, the system becomes fail safe.

The operator’s cab sets the Komatsu Wheel Dozer apart from the others. That’s a placed steering wheel (joystick steering option), the advanced monitors and operating joysticks and controls for productivity feature one can’t ignore, no matter how good the machine specs are or how much is promised for productivity, unless the operator can work a full shift without becoming fatigued, one will never get the full measure of promised productivity.

Komatsu WD600-3 comes fitted with an air suspension, high back, 6-way adjustable bucket seat. Add to this the ergonomically-implement and transmission controls, this machine can never fail the person who operates it.

With all the major maintenance and daily check items placed at ground level, Komatsu WD600-3 stands true to its promise of not only being operator but service friendly too.
Motor Graders are probably one of the most familiar and intriguing of the earthmoving machines, due to its versatility in design and application. Design features that are common to Motor Graders across the manufacturers include:

- Powertrain without torque converter or provision of a lock-up if torque converter is provided
- Blade mounted in centre with 3600 rotation capability
- Tandem drive for rear wheels
- Front axle oscillation with leaning mechanism
- Frame articulation, etc.

Most of these intrinsic features are provided on Motor Graders to ensure:
- Straight travel capabilities
- Consistency of speed, unhindered by load
- Minimum blade deviation to ensure excellent grading

and these are inherent to improve the basic capabilities of a Motor Grader. With these features, the Motor Graders were construed as machines applicable predominantly for road-making with an array of features to improve productivity, ease of operation, and energy-saving features to improve fuel economy.

High pressure common rail fuel system complimented by air to-air aftercooler and high efficiency turbocharger allows the advanced Komatsu engine to meet the stringent emission norms. This ecology feature is further accentuated by use of hydraulic driven cooling fan to reduce parasitic load and the unique 4 stage variable horsepower control. These combine to provide fuel economy par excellence.

The powertrain employs Torque converter with lock-up coupled to Komatsu countershaft full powershift transmission (8 speed forward and 8 speed reverse) which is auto controlled to manage consistent drive while pushing heavy load or while finish grading. This machine also provides a feature called “CREEP MODE”, which, when actuated all the machine to creep at a constant speed of ~1 kmph in F1 at low idle, this would be very useful in mining application to maintain consistency of surface grading in rough areas. Apart from Komatsu closed centre load sensing hydraulics system, using variable displacement pump and closed centre control valves with pressure compensation valves, provide precise flow on demand control and simultaneous operation of implements unhindered by load, this provides excellent operator control and fuel economy.

Komatsu GD755A-5R comes with an advanced multi-monitor with full EMMS (Equipment Management Monitoring System) which provides all the data that operator and the maintenance team wants for safe and productive use of the machine. This system can be integrated with KOMTRAX (optional) to provide the best ICT intervention that an-end user aspires for.

Excellent visibility which is an important prerequisite for a superior understanding of the quality of job being performed is inherent in the design of Komatsu GD755A-5R. Add to this the ergonomically laid-out control levers for operation of implements and transmission, a differential

Komatsu GD755A-5R --- A Winner All the Way

applications. However, in mining applications, with focus on enhancing productivity, dump truck through-put time, safety, etc., Motor Graders have now become indispensable for haul road maintenance today.

Komatsu has been at the forefront in providing the best available machines for all the major requirements of mining customers. Komatsu Motor Grader GD755A-5R is one of the newest offerings which is designed to enhance the operating efficiency of the mines.

Developed with concern for ecology and economy as its design mantra, the machine boasts of features that help in reducing load on mother nature, while putting more onus on productivity and reduction in cost of operation.

This 21.6T Motor Grader with a 14 feet blade is powered by a technologically-advanced Komatsu SAA6D125E-5 engine. It is designed to deliver 290 HP and is apt for the rugged operations that one encounters in the mines space. It comes fitted with differential lock to ensure consistent traction in all terrain, with all maintenance items accessible at ground level making it easier for the service personnel, etc., this machine has all the ingredients to be a winner all the way.

This an RPM SET mode is provided which provides the operator the facility to set the engine rpm while in operation with the press of a button, to maintain consistent speed, which is akin to the cruise control used on advance automobiles.