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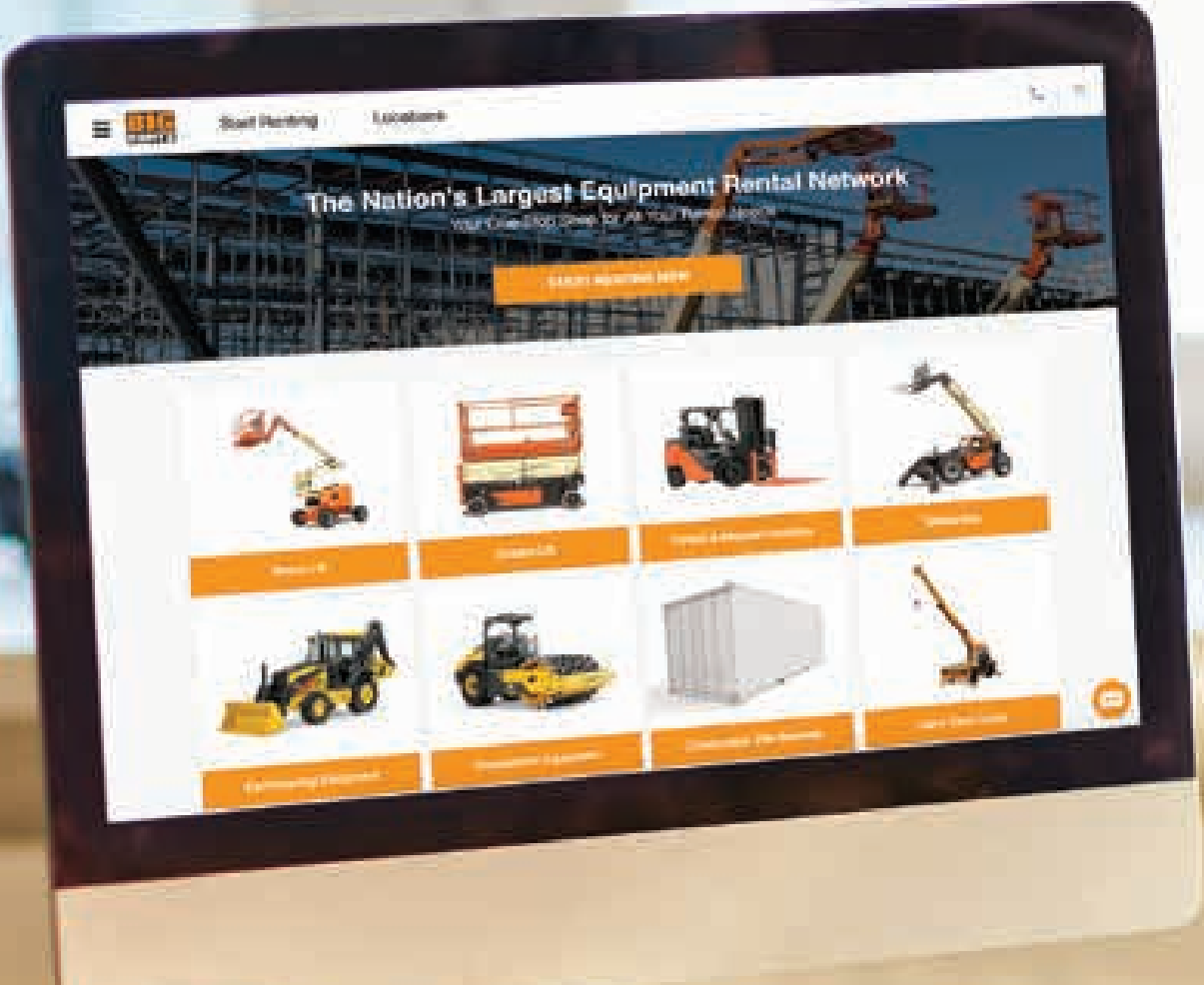


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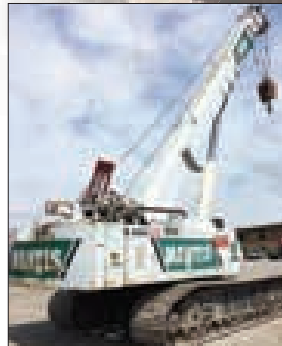
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Photo credit: SAVA.



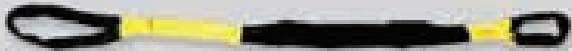
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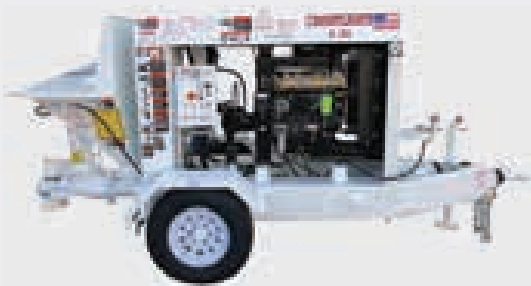
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A great fleet manager is a visionary. Consider the ramifications of a fleet leader without a vision — accidents, lawsuits, wasted investments, broken machinery, project delays — The margin for error is slim, but with modern technology, managers can execute their vision with data-driven assurance.

And last, but not least, consistency is key for any skilled fleet manager. There's no better way to improve or maintain fleet performance than to remain consistent with equipment repairs, regulating operators, and perfecting schedules.

Here is a quick list before you dig into this issue's cover story:

- Value safety
- Always seek knowledge
- Embrace technology
- Don't underestimate the effectiveness of metrics
- Fine-tune communication
- Build the muscle of multitasking
- Adapt to change
- Always stay organized
- Be humble and always willing to learn
- Be a team player
- Don't beat yourself up — we all make mistakes
- Try to have fun! ■



Alex Smoot, Publisher & Editor
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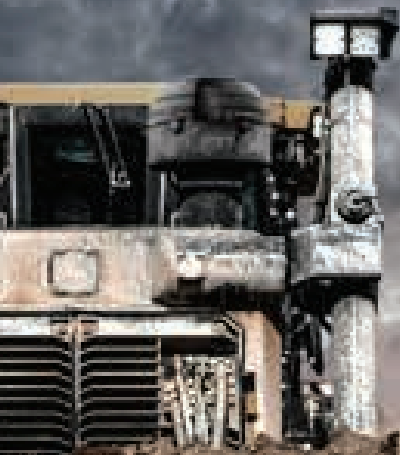


One of the world's largest bucket-wheel excavators digging lignite (brown-coal) in of the world's deepest open-pit mines in Hambach, Germany.

Courtesy of Corlaffra.

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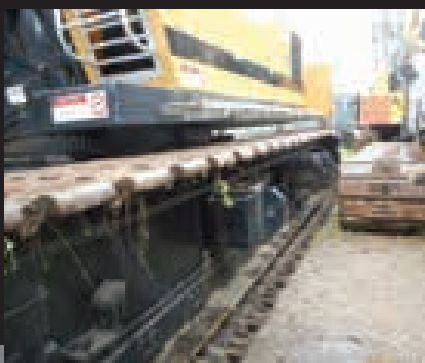
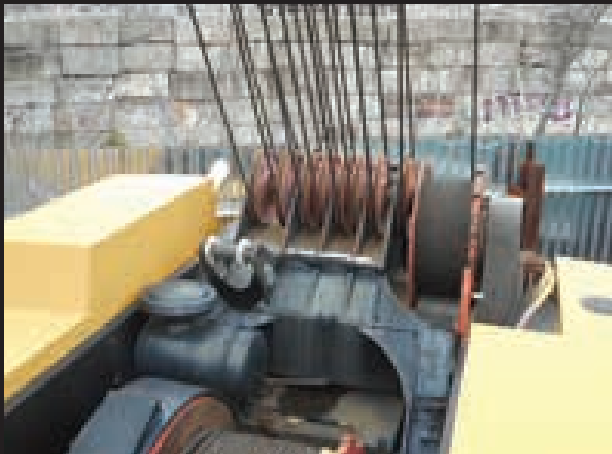
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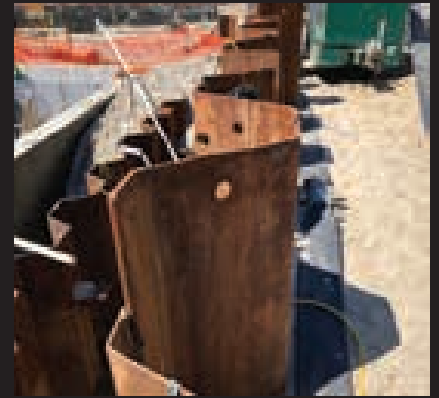
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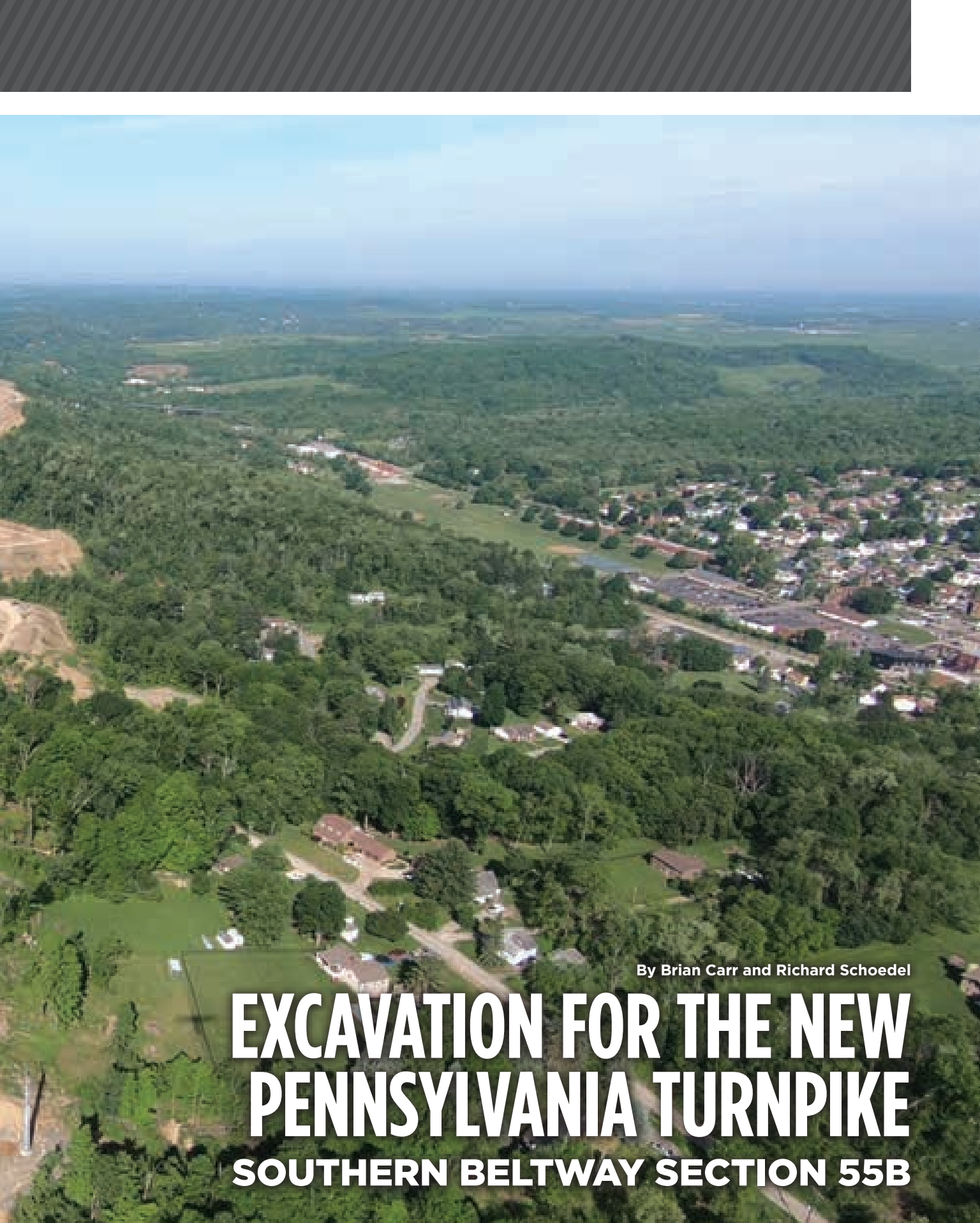
USED. CA. 12" x .219 Domestic ASTM A252 Gr. 2-3 20'-64' – Wt./Ft = 29.34. **\$640/ S.T.**



PROJECT SPOTLIGHT

Alignment of 1.5 miles of the new roadway alignment with the construction of our new dual span bridge structures.





By Brian Carr and Richard Schoedel

EXCAVATION FOR THE NEW PENNSYLVANIA TURNPIKE

SOUTHERN BELTWAY SECTION 55B



CAT 5130 with 777 (100 Ton) Truck

Fay, an i+iconUSA Company, is constructing the Section 55B portion of the new Pennsylvania Turnpike's Southern Beltway in western Pennsylvania. Upon completion in 2020, this section will be part of a larger new highway connecting the Pittsburgh International Airport to I-79, relieving traffic congestion on the other main arteries to the airport.

Mass excavation was needed prior to the construction of the 3.2 mile roadway which includes two adjacent 1,100' long dual lane bridges over State Route 980. In total, 5.8 million cy of excavation was required for cuts and fills to develop

balance in elevation for the new roadway alignment.

The excavated materials consisted of rock (including 206 rock), dirt, and coal refuse material. The 206 rock needed to be separated from the dirt to construct toe benches that support the fill areas prior to the mass cut materials being placed.

This was accomplished by excavating and placing the cuts and fills in layers. The 206 rock was placed for structural support for the fill locations as well as to help with the water drainage. The assortment of these different types of materials was a logistical challenge on this project.

Certain areas consisting of approximately 2.5–3 million cubic yards of material with rock, needed to be drilled and blasted. About 12,000 cubic yards could be blasted a day and 12,000–13,000 cubic yards of excavation could be moved per day. The blasting operation had to be synchronized with the

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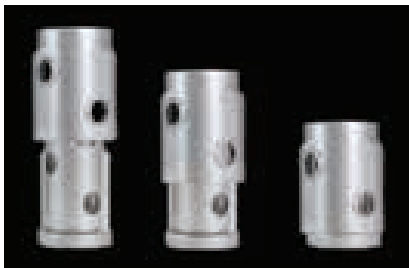


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excavation work and the timing was critical to keep the work flow moving and meet schedule.

The equipment used for this mass excavation included Hitachi 1900, and 5130 CAT excavators with a CAT 992 Loader. All units had a 14-cubic yard bucket volume capacity and were paired with D-9 Dozers, 825 Compactors and synchronized with as many as seven 777 CAT (100 Ton) trucks in route simultaneously to on-site fill areas when operations were in full progress. A CAT 385 excavator with D-8 dozers and sheep foot roller compactors were used for smaller areas and paired with as many as eight 740 CAT articulated trucks.

During the excavation operations, both 16G and 12G CAT graders were employed on the haul roads used by the truck fleets to keep the rocks off the road, avoiding tire damage to the large load capacity trucks.

Four D-8 and two D-6 bulldozers equipped with GPS were used to dress the slopes and cuts, putting the final shape on the landscape prior to grass seeding. The GPS technology assured accurate cut and fill depths and final slope configuration.

Double shifts were staffed throughout the entire project to accomplish the mass excavation work. The earthwork double shifting was performed for both utilization efficiency with the “big iron” and to work within the local noise ordinance restrictions of the project.

This project also had twelve sediment ponds that needed to be excavated. Cuts were made to create the ponds and in some cases, fills were used to

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CAT 385 Excavator with 40 Ton Articulated Trucks

The equipment used for this mass excavation included Hitachi 1900, and 5130 CAT excavators with a CAT 992 Loader. All units had a 14-cubic yard bucket volume capacity and were paired with D-9 Dozers, 825 Compactors and synchronized with as many as seven 777 CAT (100 Ton) trucks in route simultaneously to on-site fill areas when operations were in full progress. A CAT 385 excavator with D-8 dozers and sheep foot roller compactors were used for smaller areas and paired with as many as eight 740 CAT articulated trucks.

create embankments for the ponds. These ponds had to be constructed prior to and carefully synchronized with the mass excavation on the project to maintain and control water flow from the site throughout construction.

Three pipe crews were needed during one single shift to work multiple locations. They focused on installing

4,500 lf of mainline at grade storm water drainage pipes for the new roadway alignment and side roads. There were approximately three miles of pipes installed parallel and across the area for this new roadway. Komatsu 490, 360, and 200 backhoes were used to perform this work, along with a CAT IT 28 rubber tire loader.

After the roadway earthwork area was fine grade balanced, 144,310 sy of 6" subbase was placed to prepare the roadway area for concrete pours. For this operation, crews utilized a combination of tools including a CAT 140 grader with GPS controls, 84" drum vibrator roller, CAT D-6 dozer, spread box, road widener and

a CAT IT 28 loader. In unison with these operations, 58,413 lf of pavement base drain was installed at this time.

Excavation was also necessary to prepare the area for placement of the new dual span bridge footer structures. In this area of the project site, there were mine shafts that were located 2,000–3,000 feet underground.



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PROJECT SPOTLIGHT



BEFORE: Haul road logistics to construct the first section of roadway alignment. There was 1.35 M CY of excavation that was performed at this location.

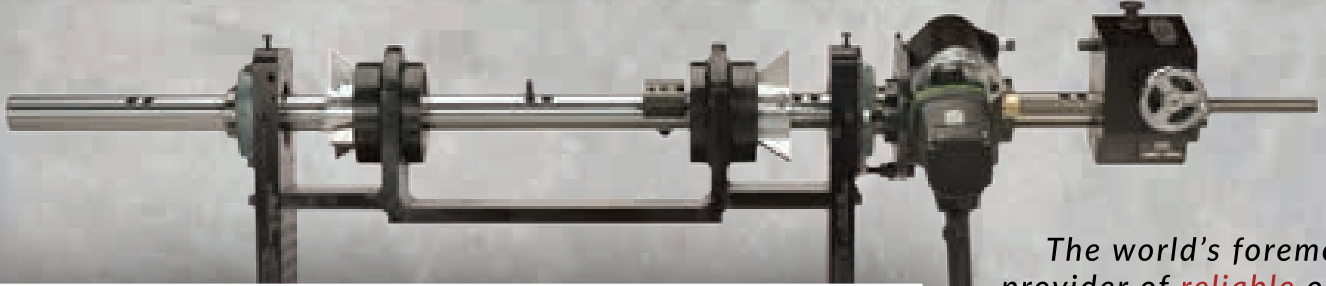


AFTER: Same area shot as above in final configuration with partially complete roadway.

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PROJECT SPOTLIGHT

Close up of mass excavation completion on the west side of the SR980 bridge structure. Shows the Hitachi 1900 Excavator with 777 Truck, D8 shaping slope configuration, and erection of the Dual Span Bridge structures utilizing two 2250 Manitowoc Cranes.



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This created the potential for a future settlement issue. To prevent the settlement, crews drilled into the mine shafts and injected grout into them to stabilize the voids, allowing the bridge to be built above. In addition to the mine grouting, forty-eight five foot diameter drilled shaft caissons were installed to support four of the main pier foundation structures.

For this project, additional technology beyond GPS units

was used. To overcome steep slope elevation issues (where slopes are greater than 3:1), drones were employed where conventional survey access was challenging. Additionally, Auto CAD 3D surface profiling was used for in-depth planning of earthwork and equipment needs. These surveys were taken prior to any construction, and in some cases before certain phases of work began for preplanning and scheduling of the work. ■

For this project, additional technology beyond GPS units was used. To overcome steep slope elevation issues (where slopes are greater than 3:1), drones were employed where conventional survey access was challenging.

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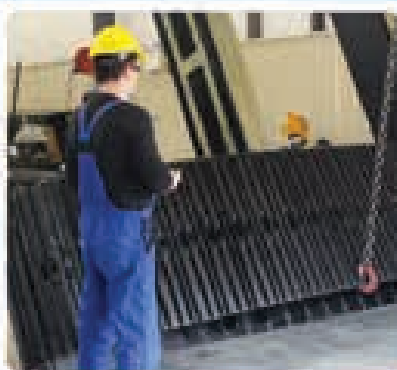
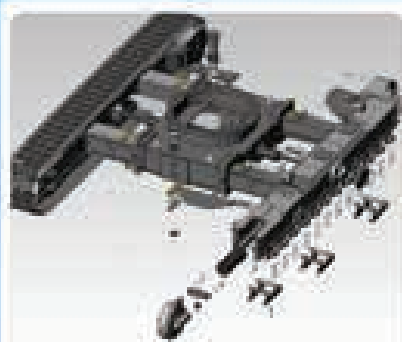
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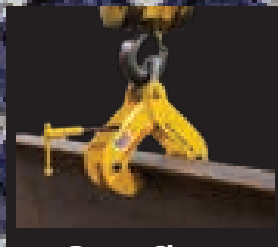


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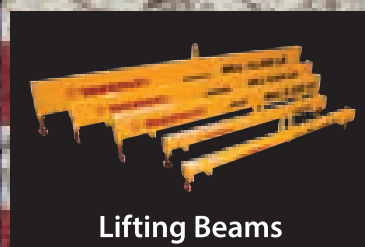
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Bucket wheel excavators work at Garzweiler Mine in Germany. Photo credit: Corlaffra.

By Zak Killermann

10 BIGGEST AND MOST HAZARDOUS MINES IN THE WORLD

One of the most common types of mining, open-pit mining, is also known as surface mining because rock or minerals are extracted from the earth from an open pit near the surface. This is a contrast to mining that requires tunneling into the earth. Miners first assess the content and size of a mine by drilling probe holes and plotting those holes on a map. Then, the mines are dug on benches, or horizontal layers, which vary depending on what material is being mined.

We present to you ten of the most gigantic man-made holes in the world.





Photo credit: Lee Prince.

**BINGHAM CANYON MINE
(Largest Man-Made Excavation)**

The Bingham Canyon Mine, which is located near Salt Lake City, Utah operates 24 hours a day, 365 days per year and provides nearly 25% of the total copper used in the United States. On top of the 275,000 tons of refined copper produced each year by the mine, 400,000 ounces of gold, 25 million pounds of molybdenum (used in steel

alloys), and 4 million ounces of silver are also extracted. The mine is massive, covering approximately 2,000 acres and growing, and reaches a depth of nearly 1,500 feet. In 2013, the mine suffered a landslide of nearly 176 million tons of material that reached speeds up to 100 miles an hour, setting the record for the largest man-made avalanche in history. No one was injured, but many machines were lost, and it took nearly a year to clean up and resume mining efforts.



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GARZWEILER MINE (Largest Surface Mine)

This German mine is primarily used to pull lignite deposits from the ground from three different seams, which are on average 120 feet thick and range between 120 and 700 feet in depth. Lignite, a soft, brownish coal, has been mined in the area for over 100 years and, by the time the source is tapped, an expected 1.3 billion tons of lignite

are expected to be extracted in total. Each year, in addition to lignite, approximately five billion cubic feet of overburden materials (gravel, sand, and loess) are extracted as well. The mine covers 18.5 square miles and has even interrupted nearby highways, forcing them to be rebuilt further from the mining area at the expense of the mining company.

Photo credit: Schrotschop.





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Photo credit: Sunsinger.

CHUQUICAMATA MINE (Largest Open Pit Copper Mine)

Considered to be the world's largest open-pit copper mine by extracted volume, the Chuquicamata copper mine is located in northern Chile and is believed to have been mined by the Incan Empire (1500 AD) and subsequent Spanish conquerors. The mine is

massive in size, measuring in at 2.7 miles long, 1.9 miles wide, and over 3,000 feet deep. The mine produces on average about 16,000 tons of molybdenum and 350,000 tons of copper every year (11% of total world production), but with the easily accessible veins drying up, plans for underground extraction have begun.



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KIRUNA MINE (Largest Underground Iron Ore Mine)

Located in Norrbotten County, Finland, the Kiruna Mine has been in operation since 1898, during which time it has produced more than one billion tons of iron ore. Obviously, the majority of this figure has been extracted in the last few decades as machinery and techniques have advanced to yield higher loads. On average, the mine produces

approximately 30 million tons of iron ore per year. The ore body is 2.5 miles long and up to 390 feet thick and reaches a total depth of 1.2 miles. It's estimated that it will probably sustain mining efforts until the year 2100. The mine has plans to expand over time, and because of this, the company has been slowly rebuilding the nearby town of Kiruna in a new location to ensure residents are safe.

Photo credit: Renata Kilinskaite.



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GRASBERG MINE (Largest Gold Mine)

The Grasberg Mine region is located in Papua, Indonesia and is not only the largest gold mine in the world but the second largest copper mine as well. Grasberg's elevation at 14,000 feet makes this one of the highest large-scale mines in the world. The mine operates in a few different zones, called "Block A" and "Block B", with

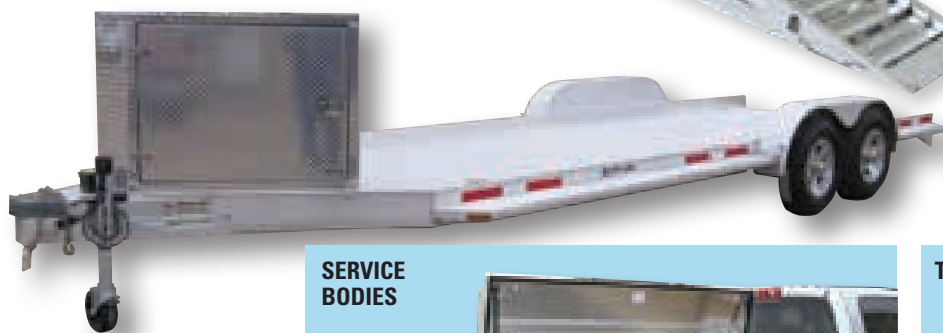
... respective sizes of 27,400 and 413,000 acres. Currently, all proven mineral reserves are in Block A, and they have an annual production of 500,000 tons of copper, one million ounces of gold, and nearly three million ounces of silver. This mine has suffered many attacks by armed terrorists and has had two mining accidents causing the death of 17 workers in total.

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MIRNY MINE (Largest Open Pit Diamond Mine)

Although the open-pit section of this mine is no longer in use, the Mirny Mine, located in Siberia, Russia, used to produce over ten million carats of diamonds annually when it was in full operation. The mine is nearly 1,800 feet deep and 4,000 feet wide, and it is so

massive that the airspace above it had to be restricted because the downward airflow was reported to suck helicopters into the pit. The mine operated for 44 years as a pit mine, and after closing in 2001, has moved mining operations to underground methods to continue extracting diamonds on a smaller scale.

Photo credit: Zebra0209.

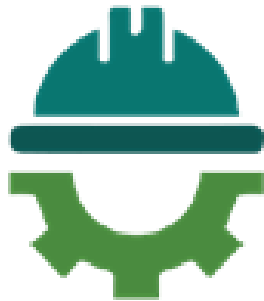


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EL TENIENTE (World's Largest Underground Copper Mine)

Near the town of Sewell, Chile, lies El Teniente mine, a massive network of over 1,900 miles of drifts (near-horizantal passageways). The mine entrance starts at approximately 7,500 feet above sea level in the Andes Mountains, and the mines eventually reach a depth of nearly 1,400 feet below where they begin. El Teniente has been in operation as a large scale mine since 1905 and has reached production levels of 500,000 tons of copper in a year. Expansion efforts are underway to access an additional 2.2 billion ton ore reserve, which should keep El Teniente in business for at least another 50 years.

OYU TOLGOI (Up and Coming Mine)

Originally discovered in 2001, the Oyu Tolgoi Mine isn't expected to reach full production until nearly 2021 if all goes as planned. The mine is located in the South Gobi Desert in Mongolia, a short drive from the border of the People's

Republic of China. Based on geological data estimates, the Oyu Tolgoi mine is expected to produce upward of 2.9 million tons of copper during its lifeline. Once fully running, mining experts expect the mine to have a yearly output of approximately 470,000 tons of copper, 425,000 ounces of gold, and "byproduct" silver and molybdenum yearly productions. The current site relies heavily on open-pit mining, but there are plans for underground mining at the site as well.

CARAJÁS MINE (Largest Open-Pit Iron Ore Mine)

Originally discovered by accident in the 1960s when a US steel helicopter was forced to land and refuel in the Brazilian Carajás Mountains, the Carajás Mine has since been proven to contain nearly eight billion tons of iron ore. There are a few things that make the Carajás special. First, it is home to some of the highest iron content ores on the planet at 66%. Second, the mine operates using

a truckless system, instead opting for electrical and automated systems that rely on conveyor belts. Lastly, the Carajás mining region contains a collection of other ores (gold, manganese, bauxite, copper, and nickel) in addition to iron, which help diversify its market value.

GOLDSTRIKE MINE (Largest Goldmine in North America)

The Goldstrike Mine is located in Nevada, US and has been mined by various companies since 1962. Currently, it is both owned and operated by the largest gold mining company in the world, Barrick Gold, which has produced roughly 42 million ounces of gold from the site so far. The mine complex is comprised of three distinct mines. One is an open-pit while the other two are underground mines, and combined, they produced over one million ounces of gold and silver in 2015. The Goldstrike Mine is the third largest global gold mine and accounts for nearly 24% of all gold that is produced in Nevada. ■

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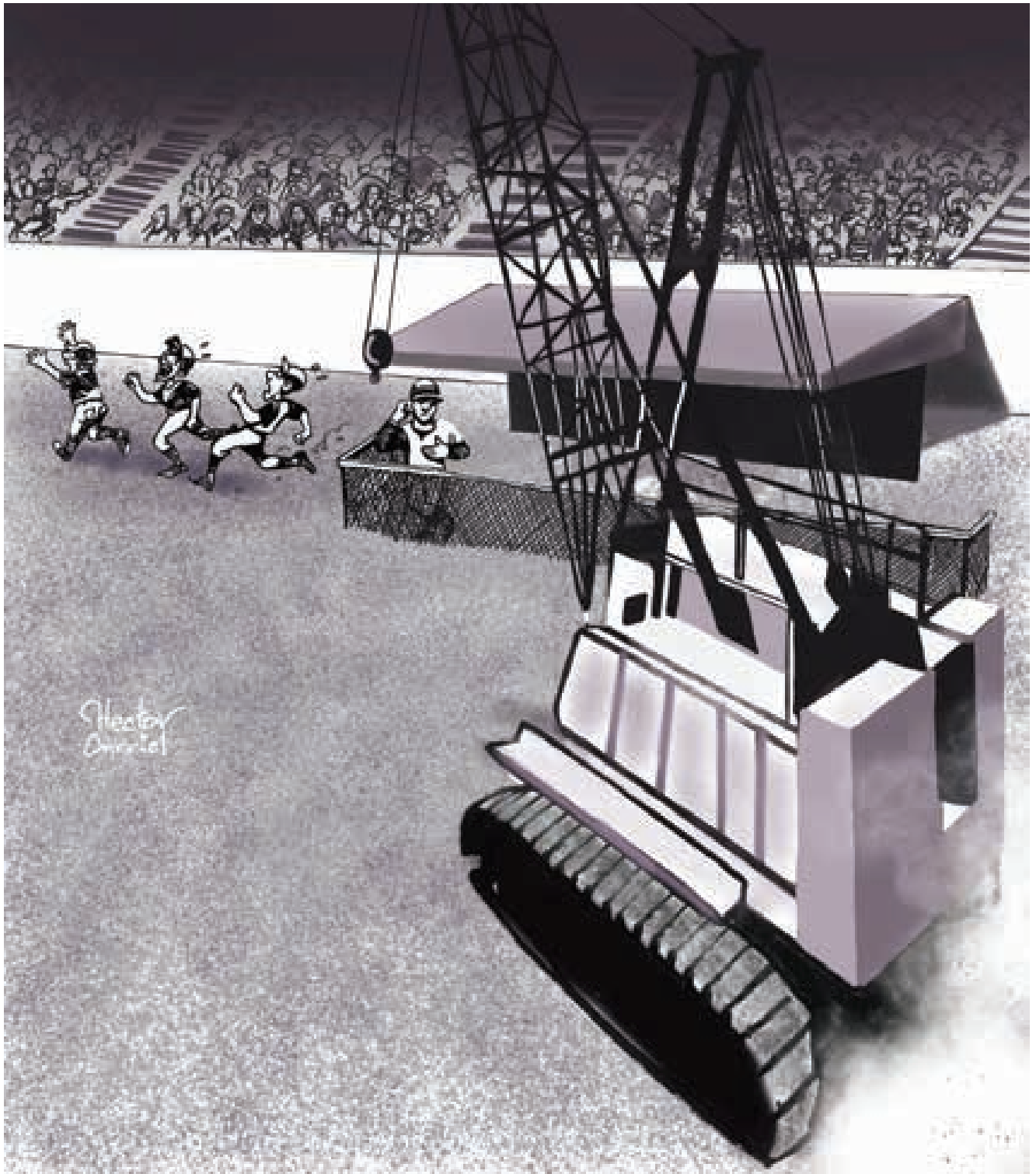
By Erik Pisor

OPERATOR AND CREW MEMBER SAFETY FOR HOISTING AND RIGGING

ORDINARY LIFTS,
CRITICAL LIFTS,
MOVING THE LOAD,
AND HAND SIGNALS



Photo credit: Microgen.



When conducting hoisting and rigging, an operator and signal person must be familiar with all crane or hoist operating characteristics and related safety rules. While general practices vary based on the circumstances of each lift, some standards always hold true. >>



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Regardless of lift type, the most important step in any rigging operation is determining the weight of the load to be hoisted. If this information can't be obtained from shipping papers, design plans, or another dependable source, the operator may have to calculate the weight.

Determining load angle factors is also important, as this will dictate how the load is carried by slings.

To obtain a load angle factor and the proper sling tension, an operator must first define the load's designated pick point. Measurement of the sling's length and the vertical height from the horizontal plane of the load to the point where the sling attaches to the suspended hook should follow.

Dividing the slings length by the vertical height will result in the load angle factor, which is then to be multiplied by the portion of the weight placed to the pick point. The result is the total stress that can be applied to the sling.

ORDINARY LIFTS

Hoisting and rigging operations for ordinary lifts require that a designated leader be present at a site during an entire lifting operation. If a lift is being made by only one individual, that person assumes all responsibilities.

Once the load weight is determined, the leader will select the proper equipment and accessories, ensuring the rated capacity is not exceeded. Before starting operations, this individual will survey the lift site for unsafe or hazardous conditions, and ensure that all equipment is properly set up, positioned, and inspected.

Confirming that all personnel involved understand how a specific lift is to be made represents another crucial requirement of the leader.

Once lifting commences, the leader should direct all operations, stopping a job if an accident, injury, or unsafe conditions occur.

CRITICAL LIFTS

A lift should be deemed critical if a collision or load drop would

significantly delay a project, jeopardize future operations, release radioactive chemicals, or put personnel at unacceptable risk of injury.

Before conducting critical lifts, a pre-lift meeting involving all participants must be held. During this conference, the entire lift plan must be reviewed and all questions resolved. Included in the plan should be an identification of all items to be moved, including their weights, dimensions, and centers of gravity. The presence of any hazardous or toxic materials must also be acknowledged in the plan, along with an identification of all operating equipment and its rated capacities.

Workers should also review a detailed rigging sketch that properly recognizes all its components, along with their rated capacities. These components include slings, lifting bars, accessories below the hook, load indicating devices, load vectors, lifting points, sling angles, boom and swing angles, attachments, and crane orientations.

MOVING THE LOAD

Prior to the lifting of any weight, many tasks are required of the operator and designated signal person; however, both should confirm that no crane, hoist, or rigging hardware is loaded beyond the rated capacity.

The operator must ensure the hoist rope or chain is free of kinks, and that multiple-part lines are void of twists

around each other if the load line is slack. This person must also confirm that the line sits on the sheaves as slack is removed and that the load line is plumb to prevent side pull.

Two degrees of plumb line is considered excessive, as it introduces stresses in the crane that were not necessarily accounted for during its design. These additional stresses may result in the bridge or trolley brakes holding the load, which can damage the rope as it runs up the side of a sheave or drum.

The signal person must verify a load is well secured and balanced in the sling or other device, while also confirming that the load path is clear of any obstructions. When utilizing a mobile crane, accessible areas within the swing radius must be barricaded off in order to prevent an individual from being struck or crushed.

When working around any powerline, a signal person must identify a location where he can safely stand and warn the operator when any part is approaching the minimum safe distance of 10 to 50 feet, depending on the line voltage. Of note, the most repeated killer of riggers is electrocution caused by the contact of the boom, load line, or load of a crane with electrical power lines.

Following an in-depth inspection of the equipment and lift site, operations can commence.

During initial load application, the operator must first lift the load only a few inches. At this time, brake function, load balance, and sling/rigging hardware

Before conducting critical lifts, a pre-lift meeting involving all participants must be held. During this conference, the entire lift plan must be reviewed and all questions resolved. Included in the plan should be an identification of all items to be moved, including their weights, dimensions, and centers of gravity. The presence of any hazardous or toxic materials must also be acknowledged in the plan, along with an identification of all operating equipment and its rated capacities.



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integrity can be checked. During this stop, there must be no downward drift of the load. Additionally, never raise the load higher than several inches at this stage.

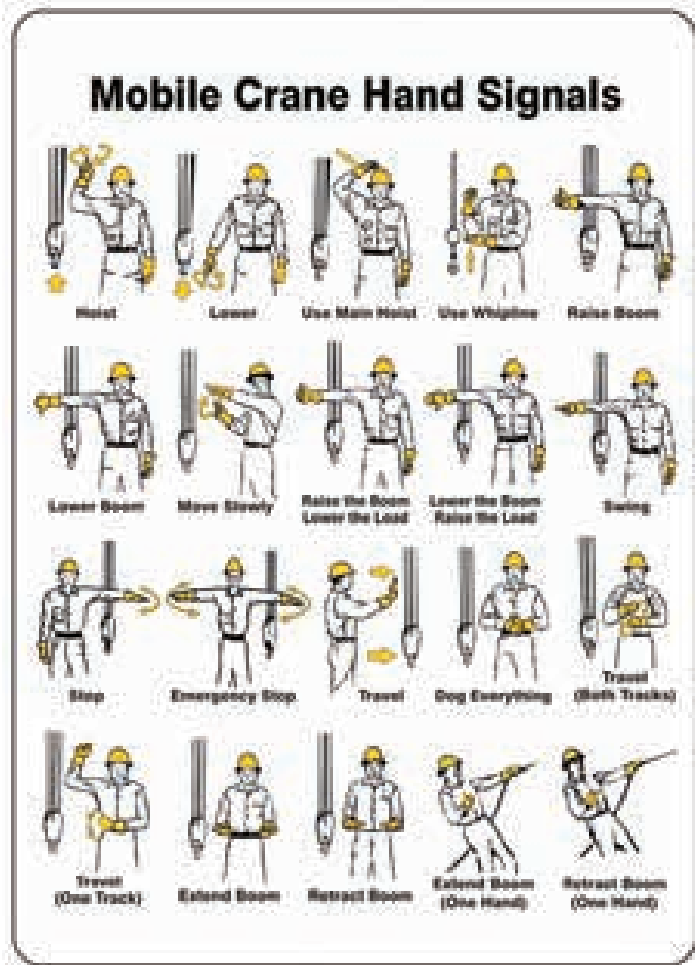
When conducting outdoor operations, wind speed must be considered, as the load or hook is not permitted to swing during crane travel or hoisting. If wind speeds of more than 25 mph are encountered, operations should be halted. The conditions must be evaluated by a qualified person to determine if the size, shape, and weight of the load can be safely lifted moving forward.

During power hoisting, engage the load in a controlled, deliberate manner, ensuring that there is no sudden acceleration or deceleration of the load. Quick reversals, along with sudden acceleration or deceleration, creates a shock loading situation, which can easily cause the load tension on the crane, hoist, and rigging equipment to double.

When lifting weight, the safest method for a rigger to control a load suspended from a hook is via a tagline or restraining device, as these will give the rigger the distance needed should the load shift or move unexpectedly.

Taglines should be placed at points on the load during lift-off, traveling, and placement, with the person responsible for placement never looping the line around his/her arm or body. This person should have a clear view of the travel path and the signaler so that the load's movement can be better anticipated. Additionally, the tagline person should trail the load while traveling with it to ensure optimum control.

An operator must never carry loads over people or perform work on a suspended load. All personnel, including the rigger, must remain clear of the load until it naturally settles. Once the load is within its final placement, it may be adjusted by hand.



Credit: OSHA.gov

HAND SIGNALS

Standard overhead crane and hoist hand signals adopted by ANSI standards are always to be followed, with no movements made unless all signals are clearly understood by both the operator and the signal person. The operator should generally respond to signals only from the designated person, but a stop signal should be obeyed regardless of who gives it.

All persons acting as signalers during operations should be clearly identified to the crane operator via an orange hardhat, orange globes, or an orange vest. In situations where the crane operator can't see the signaler, a relay signaler shall be stationed in view of both the signaler and the crane operator.

If the operator can't see the signaler when operating in the blind, then radio communication should be implemented. Voice communication should only

All persons acting as signalers during operations should be clearly identified to the crane operator via an orange hardhat, orange globes, or an orange vest. In situations where the crane operator can't see the signaler, a relay signaler shall be stationed in view of both the signaler and the crane operator.



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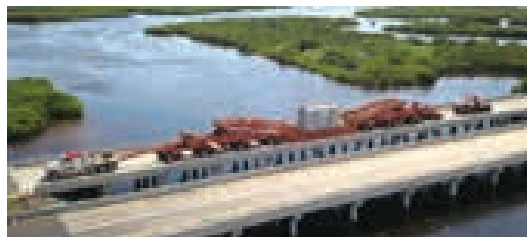
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occur between the two individuals, not through a third person.

When communicating with an operator, a signaler must exaggerate all signals, making distinctive moves when choosing to stop one command and go to another action. The signaler must also train himself or herself to perform these signals in an exact, repeatable fashion, which will reduce or eliminate confusion between the two parties.

Included below is a list of standard hand signals and how to properly make them. For the most updated signals, it is advised that workers review American National Standards Institute manuals based on the specific type of crane or hoist being utilized for their lift.

Hoist: Extend one forearm vertically and point the forefinger upwards. Move the hand in a small horizontal circle.

Lower: Extend one arm downward with the forefinger pointing down. Move the hand in small horizontal circles.

Bridge Travel: Extend one arm

forward with the hand open and slightly raised. Make a pushing motion in the direction of travel.

Trolley Travel: With the palm up, fingers closed, and thumb pointing in the direction of motion, jerk one hand horizontally.

Stop: Extend one arm palm down. Move the arm back and forth. When signaling for the operator to travel on an overhead crane, anticipate and give this signal in advance so the load doesn't pass beyond its landing spot. Again, the stop signal must be recognized and followed by the operator regardless of who gives it.

Emergency Stop: Extend both arms with palms down. Move arms back and forth.

Multiple Trolleys: Hold up one finger for block marked 1 and two fingers for block marked 2. Apply regular signals.

Move Slowly: Use one hand to give any motion signal, with the other hand motionless in front of it.

Proper coordination between

operator and signal person will always be a fundamental component of any lift. Both parties must maintain a clear understanding of what is required of them prior to, during, and after a critical or ordinary lift if a job is to be conducted in a safe and efficient manner. ■

Sources:

NAVFAC P-307, Management of Weight Handling Equipment.

OSHA Department of Labor, 29 CFR.

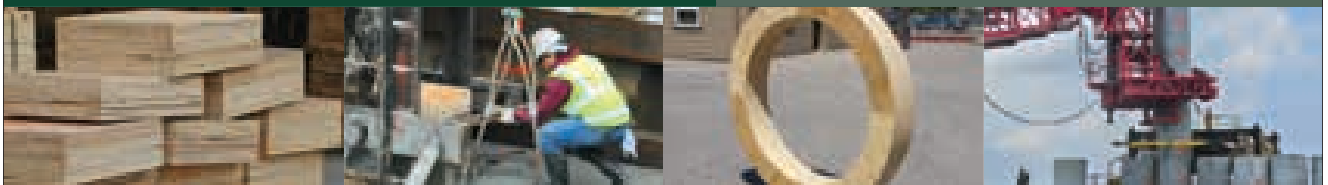
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Wire Rope Users Manual, Wire Rope Technical Board, Stevensville, MD.

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Excavators are a crucial piece of heavy equipment usually found on huge construction or industrial sites. With an enclosed cab situated on top of a wheeled or tracked undercarriage, the most prominent feature of an excavator is the long, crooked arm protruding from the cab with a bucket on the end.



Excavators are brought in for big, messy jobs like demolition or dredging a river. They also are relied on for excavating foundations, holes and trenches. The excavator is a vital piece of equipment in the mining and metals industry. Plus, it is used across industries for tasks such as installing pipes and moving heavy materials.

..... The sheer variety of excavators could make your head spin. Hitachi has compact excavators, utility excavators, construction excavators, reduced-tail-swing excavators, mining excavators, and even wheeled excavators. They offer sizes ranging from a “mini” that is more appropriate for use in urban areas, to large, hydraulic models with gigantic buckets for use on big work sites.

BACKHOE LOADER

This mighty digger looks like a tractor with a loader (imagine a dustpan the size of a trough) in front, and a backhoe (an arm with a claw-like bucket on the end) on the back. Given their broad range of uses, backhoes are commonly found on both agricultural sites and construction sites. They can dig pits, break up asphalt, move trees,

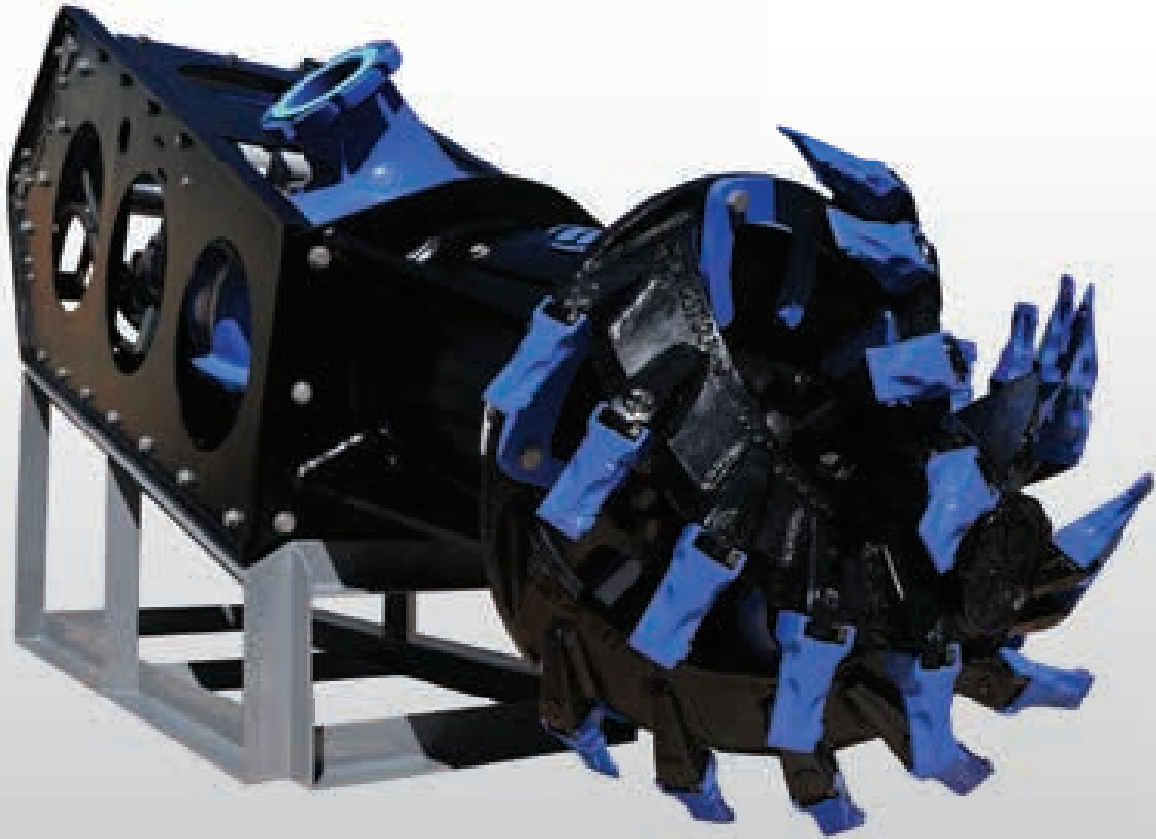
plow everything from dirt to snow, and more.

JCB, a pioneer of the backhoe loader, has everything from a “compact” backhoe loader with a gross engine power of 74-horsepower to a “super” model sporting 109-horsepower. Though most are made to suit the needs of any industry, one exception is the JCB 5CX Waste-master model designed specifically for the waste and recycling sector.

John Deere 710L Backhoe

- Net Peak Power: 110 kW (148 hp) at 2,240 rpm
- Max Standard Dipperstick Digging Depth: 5.25 m (17 ft 3 in)
- Operating Weight: 11,607 kg (25,588 lb)





Excavator Becomes Super Dredger



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BULLDOZER

Bulldozers, sometimes called dozers, are high-powered, diesel tractors with a continuous track (much like a tank) and equipped with a large, curved, hydraulic blade in front. The track makes it easier for the machine to move across rough and muddy terrain, the usual domain of earthmoving equipment.

The bulldozer has one major function: to use its sheer brute strength to push mountains of dirt around. It performs this task exceptionally well.

It can also be used to move rocks, brush, waste, or whatever else needs moving. When not pushing, the dozer strength can be used to pull items like trailers, tools, or large and heavy pieces of equipment.



John Deere 1050K Crawler Dozer

- Net Power: 261 kW (350 hp) at 1,800 rpm
- Operating Weight: 42,800–43,100 kg (94,300–95,000 lb)
- Track on Ground: 3,419 mm (134.6 in)



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WHEEL TRACTOR-SCRAPERS

Not the most elegant in appearance, the wheel tractor-scraper is an efficient earthmover with a sharp front edge for cutting and a rear hopper ('the bowl') to store materials. Elevating scrapers, towed scrapers, and open bowl scrapers are among the different types available.

Each type can have single and tandem engines.

With applications in construction, mining, agriculture, and other industries, wheel tractor-scrappers are used for hauling materials such as dirt and coal across short distances.

John Deere 2112DC Carry-All Scraper

- Struck capacity: 10.7 m³ (14 cu yd)
- Heaped capacity: 16.4 m³ (21.5 cu yd)



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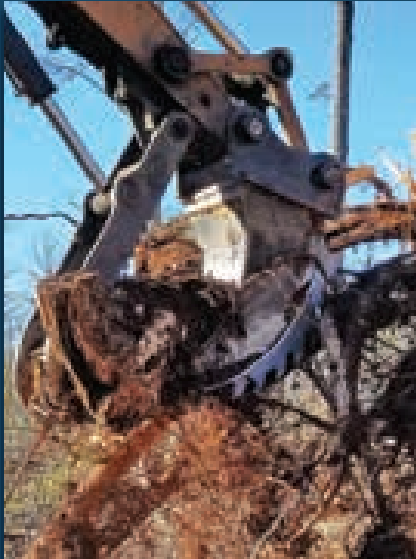
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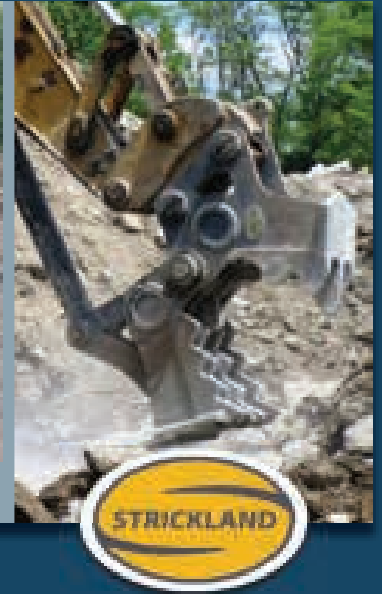
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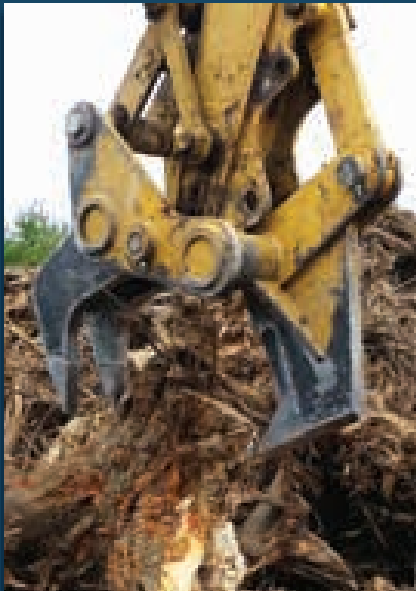
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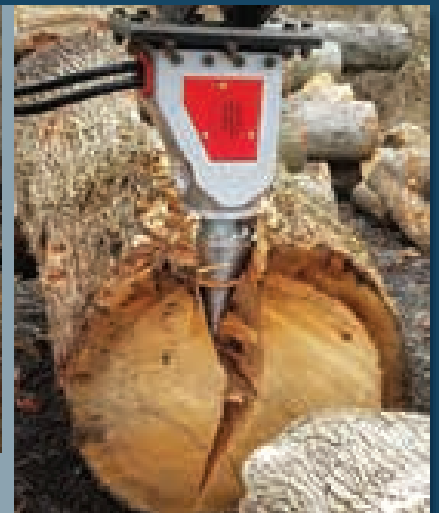
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John Deere 316GR Skid Steer

- Rated Operating Capacity: 795 kg (1,750 lb)
- Gross Horsepower: 48.5kW (65 hp)
- Net Horsepower: 45.6 kW (61 hp)
- Operating Weight: 2,894 kg (6,375 lb)

SKID-STEER LOADERS

This piece of equipment is compact, powerful, and easy-to-maneuver earthmover with a cab supported by four wheels and a lift arm that can be used to move different kinds of loads. There is also a multi-terrain type of loader that has tracks instead of wheels.

Skid-steer loaders are extremely flexible by nature, designed to

take on a vast array of tough jobs. Bobcat, which invented the first skid-steer loader several decades ago, proudly offers many models, along with dozens of attachments like bale forks, dozer blades, tillers, and utility forks.

The kind of attachment fitted to the a skid-steer loader determines the task performed such as scoop up and haul dirt, carry pallets, plow snow, or assist in landscaping duties.

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TRENCHERS

Just as the name describes, this earthmover is designed to create trenches. Trenchers tear deep into the ground and clear out soil, roots, rocks, and anything else that's getting in the way.

Trenchers might be utilized by anyone from an individual homeowner trying to create a trench for drainage, to a utility company needing to lay wires or pipes under the ground.

High-performance, ride-on trenchers are popular, but there are also walk-behind models to maneuver within narrower spaces.

Other choices include chain trenchers and wheel trenchers. Chain trenchers have a chainsaw design and offer maximum control. Wheel trenchers have a toothy metal wheel and are ideal for cutting through rock.

John Deere 326D Skid Steer with trencher attachment



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DUMP TRUCKS

The earthmover most frequently seen by urbanites is the dump truck, which is known universally for performing the service of collecting trash from residences and businesses. The large bed of the truck can then tilt to dump the cargo at a waste management facility or landfill.

..... The very largest dump trucks do move earth, not just waste, in places like open-pit mines or on industrial sites.

..... Hitachi makes three models of rigid dump trucks that are designed to excel off-road and meet the specific needs of both the mining and construction industries.

John Deere 460E Articulated Dump Truck

- Engine Power: 359 kW (481 hp) @ 1,900 rpm
- Rated Payload: 41,819 kg (92,195 lb)
- Heaped Capacity: 25.5 m³ (33.4 cu yd)



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- Net Power: 205 kW (275 hp)
- Operating Weight: 20,217 kg (44,570 lb)
- Blade Pull: 22,453 kg (49,500 lb)
- Net Torque Rise: 55%

MOTOR GRADERS

Motor graders, also known as road graders, have a long blade in between the cab and front tires used to smooth out surfaces.

Graders are utilized for the creation and maintenance of roads, but can also be used to help establish a foundation for buildings

and other structures. Prior to paving a plot or a road, graders help level out the ground.

The two main types of motor graders are the rigid frame, which has one axle, and the articulated frame, which has two axles with a hinge in between, making it adept at turning in smaller spaces.



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- » Retaining Walls
- » Small Water Piles

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WHEEL LOADERS

The wheel loader is one of the most iconic pieces of heavy construction equipment. The main purpose of the wheel loader is to scoop materials up in its large bucket and transfer them to wherever they need to go. Wheel loaders are staples in mining, waste management, forestry, farming, landscaping, and on building sites.

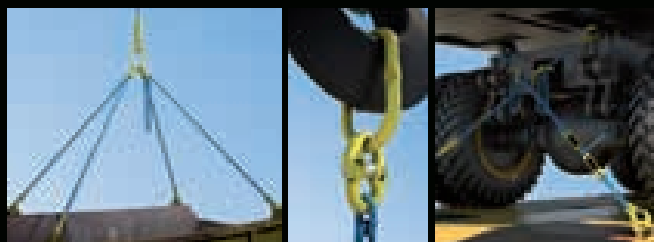
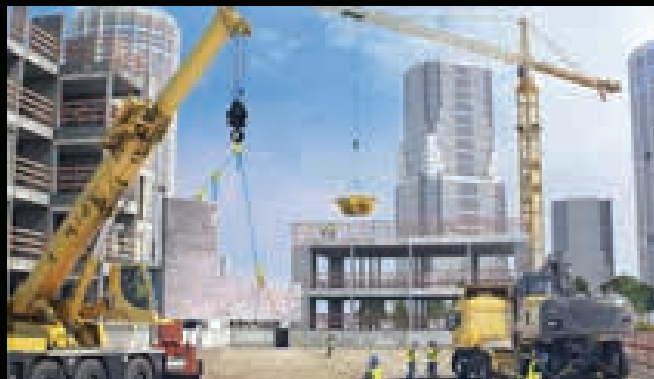
Because the wheel loader is utilized in multiple industries for an endless variety of tasks, wheel loaders can be found in all sizes. For example, Hitachi has 14 different models, in sizes ranging from two tons to a massive 47 tons. ■



John Deere 944K Hybrid Wheel Loader
 • Net Power: 400 kW (536 hp) at 1,600 rpm
 • Bucket Capacity: 7.65 m³ (10 cu yd)
 • Operating Weight: 54,253 kg (119,607 lb)



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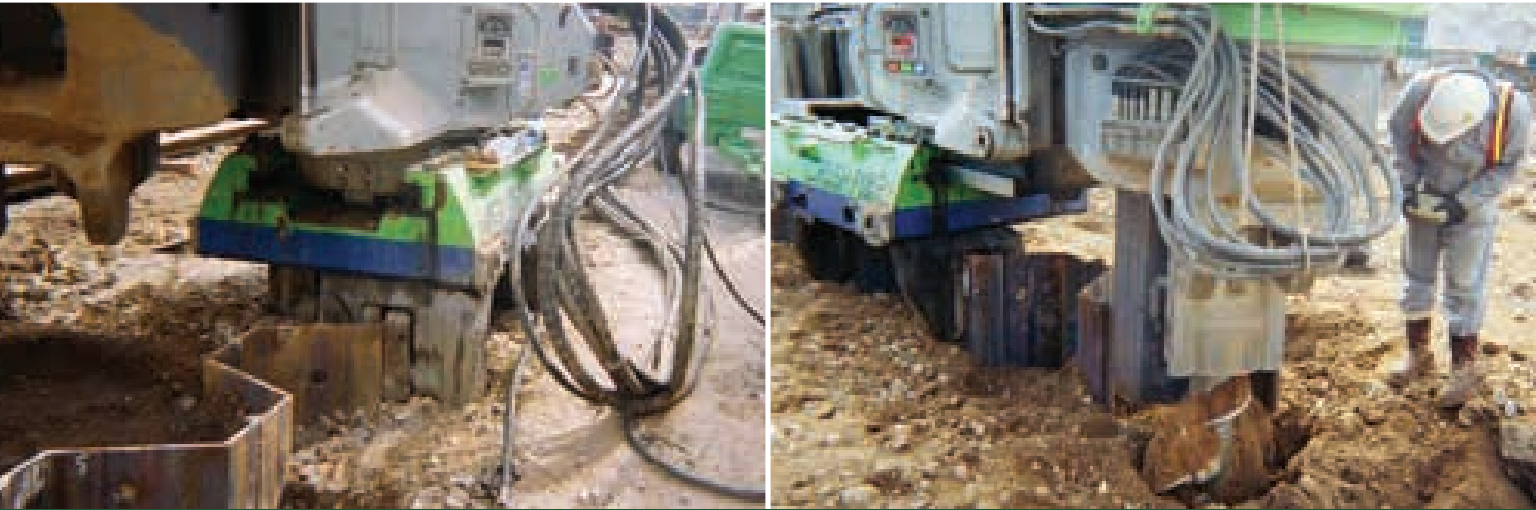
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PROBLEM

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- Below-grade construction would prove costly when using conventional methods
- Overall expenses, including time and material, were turning out to be much higher than budgeted
- Driving steel sheet pile, traditionally done in sections with vibratory or impact hammers, can be a noisy process that often disrupts surrounding communities
- Negative implications of loud hammering or vibration on neighboring buildings in the urban environment
- Presence of very dense (50 blows/3") sands and gravels

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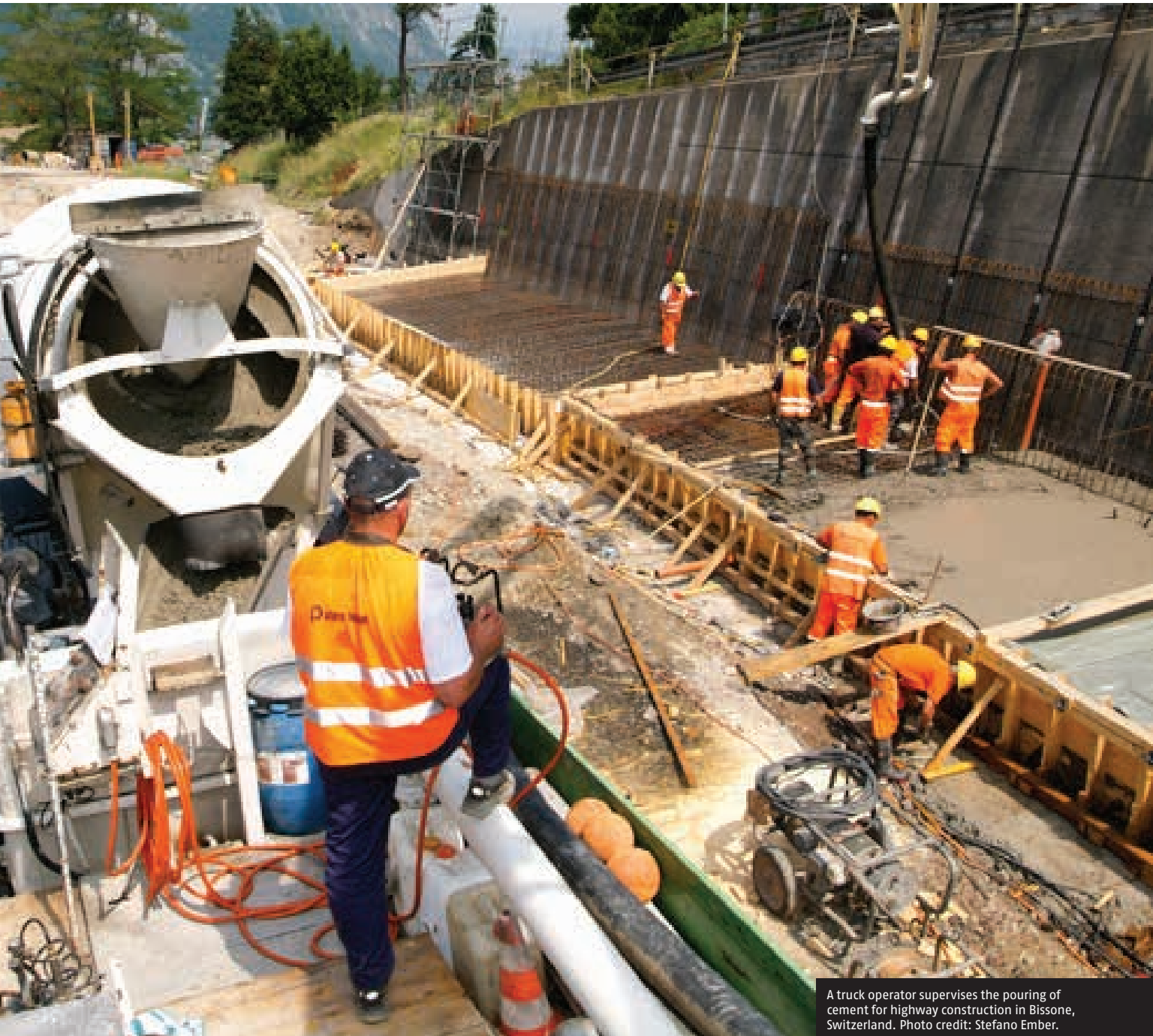


Photo credit: Bannafarsai.

An aerial photograph showing a large-scale construction project. A massive circular concrete structure is under construction, with a dense grid of rebar visible. A blue conveyor system, likely for shotcrete or guniting, extends from the center of the structure towards the right. Several workers in orange safety gear are visible around the perimeter of the structure. The surrounding ground is rocky and uneven.

By Erin Pohland

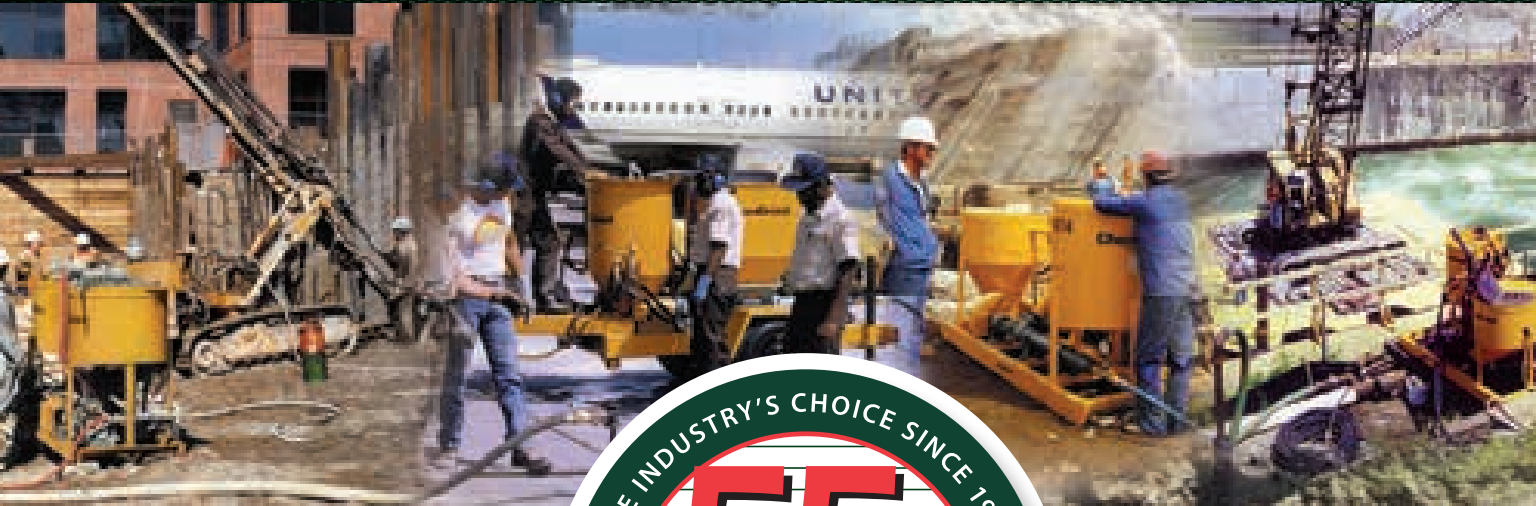
CONCRETE VS. SHOTCRETE VS. GUNITITE



A truck operator supervises the pouring of cement for highway construction in Bissone, Switzerland. Photo credit: Stefano Ember.

For those embarking on a construction project involving the use of concrete, there may be some question about the best method of application. There are three primary methods that can be utilized, each with its own advantages and disadvantages: traditional poured concrete, shotcrete, and gunite. The best choice for the job will depend on a number of factors, including budget, where the concrete will be applied, and the skill of the workers applying the concrete. >>

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Concrete is the most commonly used man-made material on earth. It is a composite material, made of three elements: Portland cement, water, and aggregates. Portland cement acts as a binding agent when mixed with water and aggregates. Water chemically reacts with the cement and makes the concrete workable. Aggregates in a concrete mixture may be fine (sand) or coarse (rock or gravel). When mixed, these three components can be applied and will then harden into a durable material.

Traditionally, concrete has been poured from a ready-mix truck onto a project site. It is either placed on the ground or into forms and then vibrated to flush out air and make sure that it is

compact. Because it typically requires the use of forms and vibration for the concrete to be compacted, it is often more expensive and time-consuming than other forms of concrete application. However, there are significant advantages of poured concrete, such as its ability to be used in larger areas, like in a building foundation.

With shotcrete, the concrete is projected at high velocity, typically onto a vertical or overhead surface. The force of this application method consolidates the concrete, resulting in an outstanding bond with most substrates. It is often more cost-efficient than traditional concrete placement methods, as it requires less formwork. Shotcrete involves applying the concrete after it is already mixed.

With shotcrete, the concrete is projected at high velocity, typically onto a vertical or overhead surface. The force of this application method consolidates the concrete, resulting in an outstanding bond with most substrates. It is often more cost-efficient than traditional concrete placement methods, as it requires less formwork. Shotcrete involves applying the concrete after it is already mixed.

Guniting is similar to shotcrete in that it is a method of applying concrete involving a high-pressure hose. However, with guniting, the concrete is loaded dry and mixed with water at the nozzle when it is sprayed. It is generally less expensive than shotcrete and allows builders more work time to complete a concrete project. However, it is only cost-effective on projects where the application is small, such as in repair work for spalling. Pre-blended bagged spec mix can be loaded by hand. Alternatively, super sacks can be hoisted with the material fed into a rotary gun to reduce waste other than unavoidable rebound at the nozzle.

All three methods result in a water-resistant surface that is less susceptible to deterioration over time than other building materials, such as steel or wood. In addition, because concrete can last in higher temperatures without compromising its structure, any of these methods can be used to fireproof steel. The

finished products also share the other positive attributes of concrete, including strength, low maintenance, and relative cost-effectiveness compared to materials. Before concrete hardens, it is also very pliable and can be easily shaped.

The traditional poured concrete method has several advantages. First, it is incredibly versatile; contractors can use this method for a variety of projects by building precise, customizable forms. Second, poured concrete results in a strong, smooth surface. Third, the application of concrete in this method is common so it doesn't require the specialized skills of shotcrete and guniting. Fourth, it is generally the most appropriate method for large-scale building projects, as it is more time and cost-effective than the other processes.

However, poured concrete is the most expensive of the three methods. It has a much higher labor cost because it requires forms to be built



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To prevent a collapse, a worker sprays shotcrete on a highway slope. Photo credit: Gena Melendrez.

and then removed once the concrete has hardened. In addition, the concrete must be vibrated to flush out air and to compact the material. It is also challenging to form shapes with poured concrete or to make joints.

As a concrete application process, shotcrete has several benefits. Operators who apply concrete using the shotcrete method must be skilled but need not be experts in mixing concrete because it is

premixed and loaded into the hopper. Shotcrete takes less time than pouring concrete and it forms a strong and consistent coating. Because concrete must be of a certain quality in order to “hang” on the surface it is being applied to and to pump, cement applied in this fashion is typically strong. It also is an inexpensive way to apply concrete in curves and irregular shapes, which are often difficult to impossible

to achieve with conventional concrete methods. Shotcrete also does not need a complex system of forms, as with poured concrete, and generally needs only a one-sided form or no forms if the soil is compacted. Finally, it does not require vibration or compaction after placement.

Yet, there are drawbacks to using the shotcrete process. Because it is premixed, once the process is started, the concrete must be applied

quickly, without any stops. If too much water is added to the mix to keep it from hardening, cracks may form in the concrete. In addition, shotcrete — while less expensive than poured concrete — is more expensive than gunite. Finally, shotcrete takes a significant amount of time as compared to poured concrete, making it a less than ideal choice for large foundations, structural piers, or other large projects.



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There are many advantages to choosing guniting as an application method, particularly if you are working with skilled operators who can expertly mix the concrete. The guniting method allows operators to stop and start projects without creating what is known as “cold joints,” which are areas that form from two separate pours when operators attempt to blend a new pour into an old pour. This cold joint will not only look different; it will also be susceptible to cracking. With guniting, an operator can stop and start the process without creating a cold joint, because the velocity of the application allows the materials to bond together. You will also have more time to work with the concrete

Ultimately, the concrete application method that works best will depend on the specific needs of the project. Understanding the benefits and drawbacks of each process can help you make an informed choice as you move forward with your concrete construction project.

because the concrete will be mixed on site and the process can be stopped and started as needed. Guniting is generally a less expensive process than shotcrete and concrete pouring with most of the same advantages as shotcrete. Unlike pumping wet shotcrete, line blockages rarely occur with guniting as the dry material is carried in a stream of high-velocity air.

The guniting process is not without disadvantages. It requires a skilled operator who understands how to achieve the proper ratios when mixing concrete so the quality of the concrete is not compromised. Guniting also has a tendency to produce over-spray (rebound), which is both messy and wasteful. Production rates for guniting are limited, and maintenance costs on guniting machines can

be high. A large, expensive compressor is typically required for applying guniting. Ultimately, the concrete application method that works best will depend on the specific needs of the project. Understanding the benefits and drawbacks of each process can help you make an informed choice as you move forward with your concrete construction project. ■



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Excavator Becomes Super Dredger

Hello Readers,

After 30 years in dredging and reading Pile Buck, EDDY Pump is happy to be in the new Equipment and Contracting magazine. We look forward to educating you about how our dredges will boost your revenue. The trend in marine and heavy construction shows contractors looking to do more with their current work tools.

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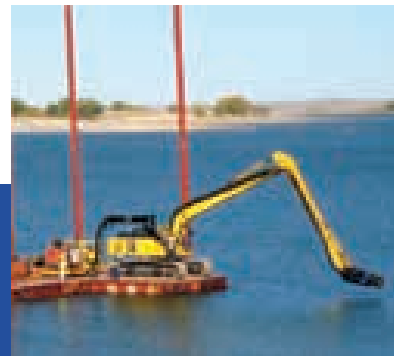
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By Erin Pohland

THE BASICS OF CONCRETE PAVEMENT DESIGN

CHOOSING MATERIALS AND MIXES







A basic concrete mix always includes common materials: an aggregate filler, mixed with water, air, and cement to bind the mixture. Even though it is a simple combination, there are times when additional chemicals or materials are used to improve the performance of the pavement. The chemical combination of the mixed products has an impact on the lifespan and behavior of the paved surface.

These extra materials might include a support system and reinforcements, such as tiebars, dowel bars, and more. Additionally, it can be helpful at times to use curing compounds on the surface of the cement. In this article, we are going to look at a range of supplementary cementitious materials (SCMs) and factors that need to be considered to achieve the right mix for each project.

OVERVIEW OF HYDRAULIC CEMENT

When a mixture is designed to be a hydraulic cement, then it means that the materials harden and set after coming in contact with water. These materials are often used when concrete needs to be placed under water.

Two common types of hydraulic cement might be used:

- Portland Cement
- Blended Cement

Availability of concrete mixes might depend on the area where the cement is sourced. If a specific type is needed but it isn't available, then it is common to combine another cement type with specific SCMs. The goal is to meet the anticipated

requirements for the environmental factors, such as a lower heat of hydration or high early strength.

AN OVERVIEW OF SUPPLEMENTARY CEMENTITIOUS MATERIALS

Over 60% of the cement mixes in the US supplement Portland cement with SCMs. This practice is growing in popularity for several reasons. SCMs are usually cost-effective since they are often by-products of other industrial processes. Additionally, the chemical components are similar to the makeup of Portland cement. Not only can SCMs be used for the technical benefits, but they are also beneficial for energy and environmental conservation.



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For many years, SCMs were used individually in concrete mixtures. Now, a combination of SCMs can be used to optimize the properties of the pavement. Common SCMs might include:

- **Fly Ash:** The most widely used SCM, added to about half of the ready-mix concrete products in the country. This material usually decreases the amount of water that is needed for workability. Expect a longer setting time with reduced early strengths. But, the later strengths are increased, and permeability is reduced. The classification of the fly ash will affect the mass amount used in the cementitious materials.
- **Ground, Granulated Blast-Furnace Slag (GGBF):** Also known as slag cement, this SCM allows the cement to hydrate without the need for extra calcium. Slightly less water is needed. One of the main benefits is the significant improvement to chloride penetration. GGBF slag often accounts for as much as 35% of the material used for paving mixes.
- **Natural Pozzolans:** These SCMs are helpful for the process of converting calcium hydroxide to calcium silicate hydrate. The materials are heat-treated before being ground to a powder for the cement mixture. They can comprise between 15% and 35% of a concrete mixture, helping to improve the resistance to sulfate attacks, reduce permeability, and improve strength development.
- **Other Pozzolans:** Sometimes other byproducts are used, such as rice husk ash. These materials typically don't fall under the categories that are used for other materials.

- **Silica Fume:** This material isn't often used because it is expensive and can have a negative impact on the workability of the concrete. It is usually reserved for special applications, such as gutters, curbs, or roads that will be impacted by studded tires.

HOW SUPPLEMENTARY CEMENTITIOUS MATERIALS AFFECT CONCRETE PERFORMANCE

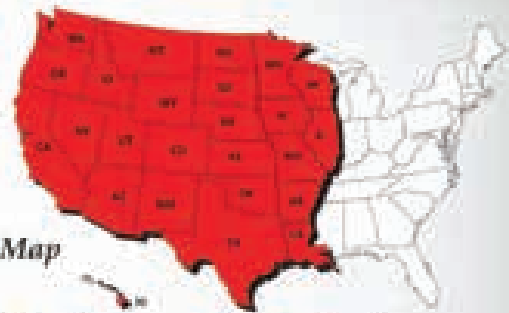
The properties of the concrete can be greatly affected by the SCMs that are used in the mix. Some of these desirable effects are the reasons why contractors choose to add SCMs. Although, there are accommodations that need to be made for the side effects that are less than desirable. It is important that trial batching is completed if you are using unfamiliar combinations or materials.

Here are some of the possible performance factors that might be experienced with the use of SCMs:

- **Fresh Cement:** The workability of the fresh cement is always affected by SCMs, either increasing or decreasing workability based on the ratio of the mixture. Also, the rate of stiffening could be increased when chemical incompatibilities are present.
- **Permeability and Durability:** Reducing permeability is a desired trait to improve the long-term durability of the pavement. Most durability concerns are related to the

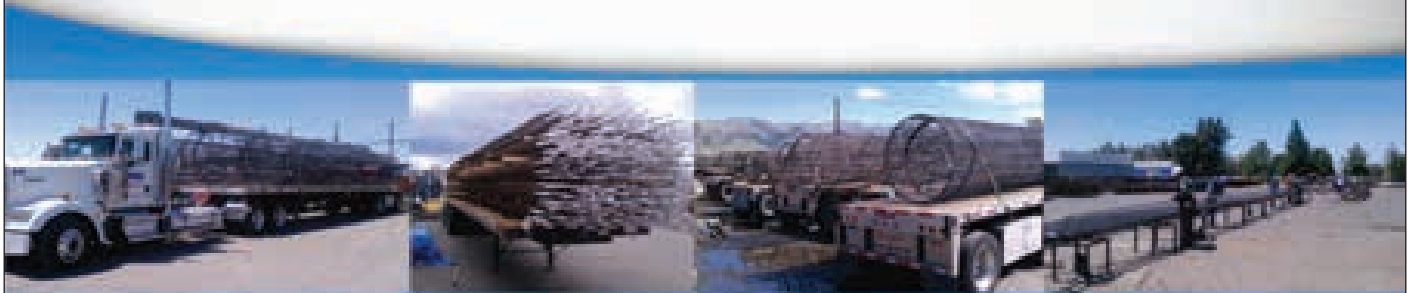
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fluids that can move through the concrete. If the water-cementitious materials are decreased, and the hydrated cementitious materials are increased, then the permeability of the cement is negatively impacted. Adequate curing, mixing, and finishing practices need to be used to improve durability.

- **Reactivity Resistance:** It is important to consider the alkali-silica reactivity (ASR) and how the SCMs will affect this reactivity. Certain types of fly ash can be helpful to reduce the reactivity, but other types can increase ASR.
- **Sulfate Resistance:** External sulfate attack can be reduced by using specific SCMs. As the permeability is reduced and the reactive elements are decreased, then it slows the sulfate reactions.

AGGREGATE: THE BULK OF THE CONCRETE SYSTEM

Rocks and minerals, known as aggregate, created the filler for the concrete system. These products are dimensionally

and chemically stable, which means that it is usually best to maximize aggregate in the mixture as much as possible. The general composition is a mineral-based substance or rock, often sourced from natural locations in seabeds or river beds. Aggregate materials might include:

- Carbonate rock
- Granite
- Sand and gravel
- Manufactured aggregate materials
- Recycled aggregate materials

While aggregate has a strong influence on the workability and durability of the paving, it is important that the right grading techniques are used to reduce the space between the aggregate particles. This space will be filled with cement paste that is chemically reactive, and it also plays a part in the amount of water that is needed for workability.

The most common types of aggregate used for concrete paving are limestone and granite. It is important to choose

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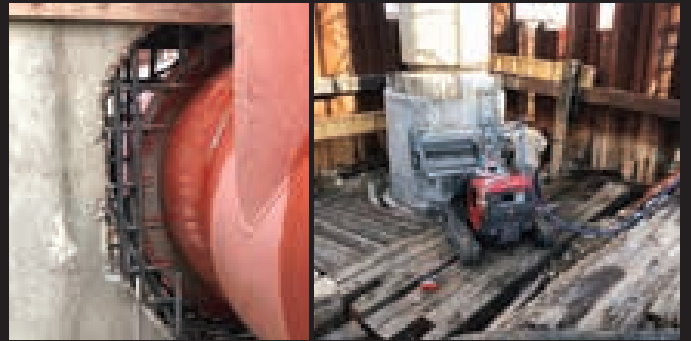
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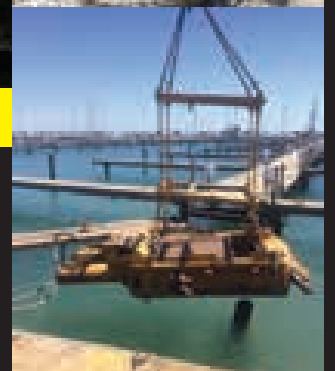
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If you are planning to use questionable water for mixing, then it is always good to test the system in a batch run before completing the paving project. This testing can help to determine the setting time and concrete strength.

aggregate that is durable, helping to minimize the potential damage due to frost, chemical reactions, and salt.

As with all types of cement, it is suggested that trial batches of cement be produced with the aggregates to determine the optimal characteristics of the mix.

WATER MIXING FOR CEMENT DURABILITY AND PERFORMANCE

The source and quality of water can have an impact on the workability and performance of the cement mixture. This mixing water might be brought in from different sources:

- Ice
- Batch water
- Free moisture on the aggregates
- Water in the admixtures
- Water added after the initial mixing is complete

The best solution is to use potable water since excessive impurities can impact the quality of the concrete. But, there is an acceptable level of using recycled water that comes from plant washing and returned concrete that might be used.

If you are planning to use questionable water for mixing, then it is always good to test the system in a batch run before completing the paving project. This testing can help to determine the setting time and concrete strength.

CHEMICAL ADMIXTURES

These materials are used in concrete mixtures to change the properties, such as setting time, water requirement, and air content. Good practice and proportioning of the main materials should always be used, with admixtures helping as a complementary addition.

It is common for unintended side effects to occur, which is



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why trial batches should always be completed using the same materials and conditions. A general rule of thumb is that about 5% of the compressive strength will be lost for every 1% of entrained air, which needs to be considered when comparing the results of air-entraining admixtures with options for set-modifying or water-reducing admixtures. Always look for possible incompatibilities when chemical admixtures are used.

**CONCRETE REINFORCEMENT:
DOWEL BARS, TIEBARS, AND MORE**

Adding reinforcement can be helpful to transfer loads across joints and improve the performance of how the paving handles the stresses that can pull the concrete apart. Various materials can be used based on the individual needs of each project:

- **Dowel Bars:** Also known as smooth bars or dowels. Often placed across transverse joints. The goal is to create vertical support so that the loads are transferred across the joints.
- **Tiebars:** These materials are commonly known as deformed bars or rebar. Used for longitudinal joints where the slabs meet, helping to reduce the risk of the slabs separating.
- **Slab Reinforcement:** Can be used to help with carrying the tensile stresses. These reinforcements will hold the pavement together regardless of transverse cracks that might develop.

Various materials can be used for these reinforcement products, such as steel, epoxy-coating bars, stainless-clad bars, fiber-reinforced polymer, synthetic fibers, stainless steel pipes, and more.

CURING COMPOUNDS FOR CEMENT MIXTURES

After the concrete is textured, it is important to use curing compounds that are applied to the surface of the concrete. This process is beneficial to reduce the moisture loss that occurs on the surface. There are various types of curing compounds. But, the most common compounds are materials that are liquid membrane-forming.

Consistent, even application is important so that the surface is covered completely. Often, the curing compounds are pigmented to see the uniformity of the application. For example, if the curing compound will be placed on a hot, sunny day, then a white pigment is used to reflect the heat of the sun. Even though the pigment is visible during application, it usually fades soon after application. ■

Sources:
FHWA HIF-07-004
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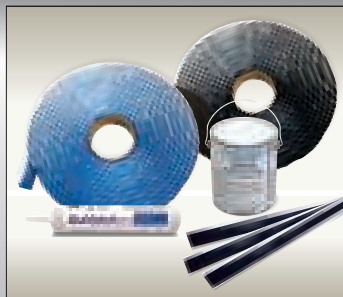
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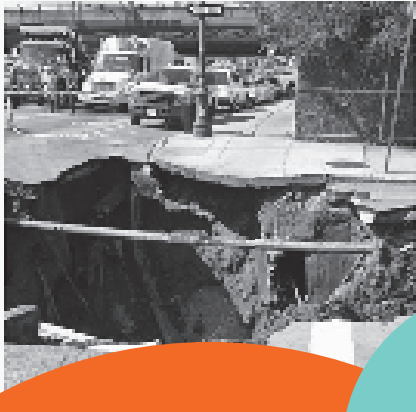
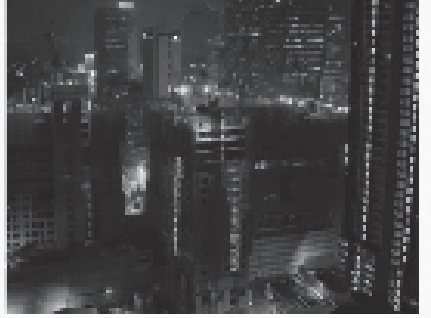


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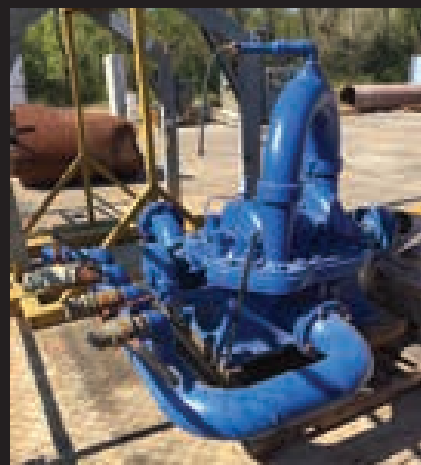
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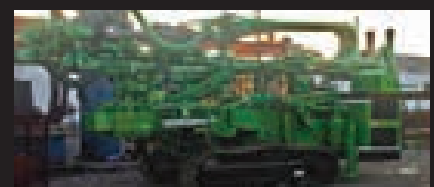


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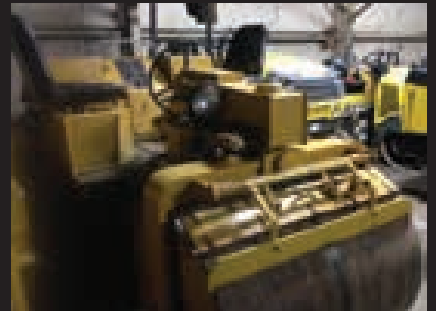
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By Becki Andrus

FLEET MANAGEMENT: A 2019 GUIDE FOR EQUIPMENT AND TRUCK FLEETS





Fleet management is the administrative approach referring to the purchase, organization, and coordination of work vehicles for a company. Implementing a good fleet management system plays an integral role in reducing costs, improving efficiency, ensuring safety, and evaluating government regulation compliance.

The fleet varies depending on the needs of the company and might encompass a range of vehicles and machinery, including commercial motor vehicles, mobile construction machinery, trucks, trailers, vans, ships, rail cars, and aviation machinery.

This article will look at vehicles and machinery specifically used in the construction industry, such as trucks, cranes, excavators, skid steers, dump trucks, compactors, and mixers.

PURPOSE OF FLEET MANAGEMENT

Not only is the right equipment essential for construction and project completion, but it is important to ensure that these vehicles and machines are in working order. Fleet management covers a range of functions to oversee the sourcing, maintenance, tracking, and supervision of these commercial vehicles. Proper care and upkeep of this equipment can be helpful to minimize or even remove risks on the job.

In many areas, government regulations are in place to improve safety measures. It is also smart to implement in-house safety measures and tracking systems to improve the

overall performance of the fleet. These efforts are beneficial for multiple reasons:

- Ensure the vehicles and equipment are operating smoothly.
- Improving performance on the job.
- Minimize operation costs.
- Maintain compliance with government regulations to avoid fines.
- Oversee the activities of operators and vehicles.
- Save money with fuel management and decreased accident risk.
- Decrease maintenance and insurance costs.
- Track vehicle location.

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EQUIPMENT AND TRUCK ACQUISITION

At first, fleet acquisition seems like a simple process. Isn't it easy to select the vehicles that are required, then the purchase can be completed? It's not as simple because of a range of decisions that need to be addressed, such as:

1. Considering your general scope of work, what specific equipment is needed and why?
2. Where will you purchase the equipment? Will it be new or used?
3. When using on-vehicle computer data gathering software to provide management reports, which equipment manufacturer supports company software being used?
4. When is the best time of your fiscal year to complete these transactions?
5. What maintenance plan has been arranged for the fleet?
6. How will the fuel be handled?
7. What systems should be followed for inspection and tracking?
8. Have you considered all of the laws and regulations in your state?
9. How will operators be supervised?

When choosing the vehicles, the goal is to ensure that the company money used on the fleet is well spent. Construction firms can choose to create an in-house team

for fleet management, or outsource fleet management to a firm to oversee both vehicle acquisition, management and maintenance.

Whether using an in-house fleet manager or hiring an outside team to source the vehicles for the construction firm, it is essential to plan enough time for price negotiations, equipment improvements, and delivery. This ordering cycle requires lead time to avoid on site schedule delay.

EQUIPMENT AND TRUCK FINANCING

If there is no cash-in-the-bank to pay for the equipment outright, then a financing company needs to be chosen. Even if the cash is available, it might not make sense to tie up funds in equipment.

Instead, the trucks and equipment can be financed to leave cash-on-hand for ongoing costs and materials.

There may be situations where fleet leasing makes sense.

However, it can often cost more money in the long run because there will be no equipment asset that can be sold when the project is finished.

Determine the length of time the equipment will be used as well as the potential resale value to compare the cost of leasing versus buying.

If financing, find a financial service that specializes in fleet acquisition. Options include current bank or credit union,

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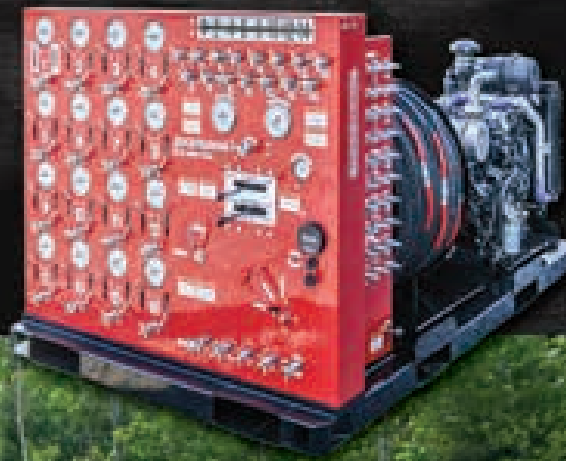
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When choosing the vehicles, the goal is to ensure that the company money used on the fleet is well spent. Construction firms can choose to create an in-house team for fleet management, or outsource fleet management to a firm to oversee both vehicle acquisition, management and maintenance.

or financing companies that cater to construction firms and fleet purchases.

EQUIPMENT AND TRUCK MAINTENANCE

A fleet preventive maintenance program should be implemented from the moment the vehicle acquisition takes place. This program needs to consist of scheduled inspections, servicing and repair work, with the goal of maximizing the availability of the vehicles and preventing potential problems.

If preventive maintenance is not a priority, the expected life span of the equipment vehicle can be greatly reduced. Additionally, overall costs can go up due to repair work, acquisition

of replacement vehicles and time lost when equipment is out-of-service.

These costs and issues can be minimized by implementing a proactive approach with the maintenance schedule.

Safety is another issue that should be highlighted as essential. Improper care and upkeep of your fleet will result in vehicles that are unsafe for use. Not only do these safety issues put employees and contractors at risk, but poor maintenance could lead to negligence and litigation costs if something goes wrong.

Your preventive maintenance program should include:

1. A checklist of maintenance tasks, based on the specific requirements of each vehicle.

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2. A timeline as to when these tasks should be performed.
3. A convenient system for operators to record inspection details and possible complaints about the equipment.
4. Scheduled periodic staff meetings to discuss status of fleet.
5. In-house or outsourced trained mechanics to complete repairs and maintenance.

The most effective preventive maintenance schedule should be based on mileage, time, engine hours, or the number of fuel gallons used. Specific tasks should include testing, inspection, cleaning, lubrication, repair, and the replacement of worn out parts. The timing varies based on the type of vehicle, so the best solution is to schedule this system based on the manufacturer's recommendations.

Routine preventive maintenance should include:

- Engine oil and filter changes
- Fuel system
- Cooling system
- Belts and hoses
- Brake system
- General tune-ups
- Exhaust system
- Steering system
- Transmission fluid
- Transmission and engine mounts
- Fluid leaks

- Frame and undercarriage
- CV joints or drive shafts
- Suspension system
- Electrical system
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- Seatbelts and seats
- Wheels, tires, and rims
- Horn and sirens
- Windshield wipers
- Auxiliary systems

EQUIPMENT AND TRUCK TELEMATICS

Software programs can be used to develop, implement, and maintain a preventive maintenance program for your fleet.

This technology, known as telematics, eases the scheduling burden with the implementation of an automated computer system. Manually managing the fleet is not only time-consuming, but it can be a tedious task.

There are multiple companies in this space to focus on improving efficiency by generating specific reports based on the data gathered from the fleet.

GPS tracking uses a small, plug-and-play device, also known as a telematics device, which is connected to the on-board diagnostics (OBD II) port of the vehicle. If the vehicle or truck

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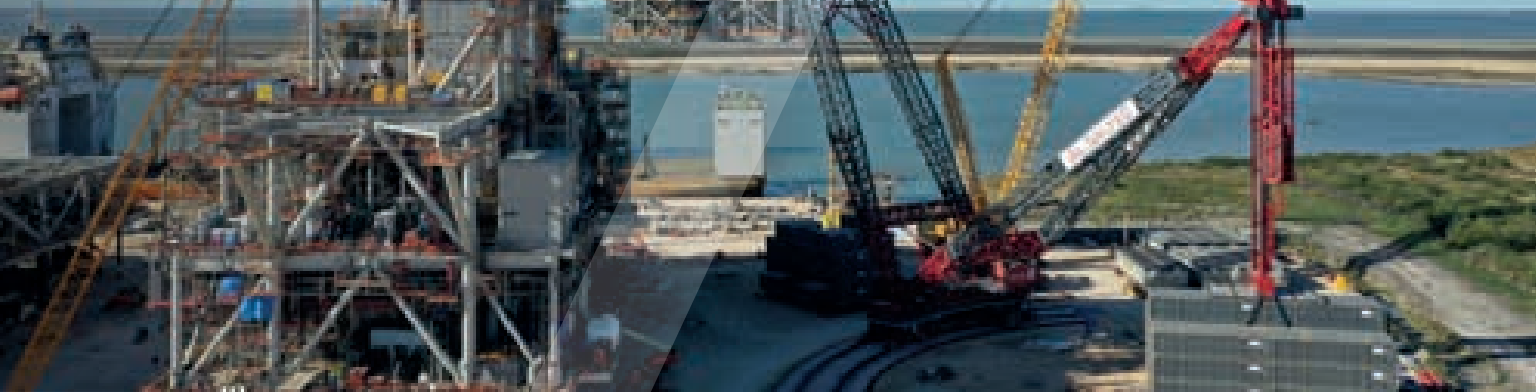


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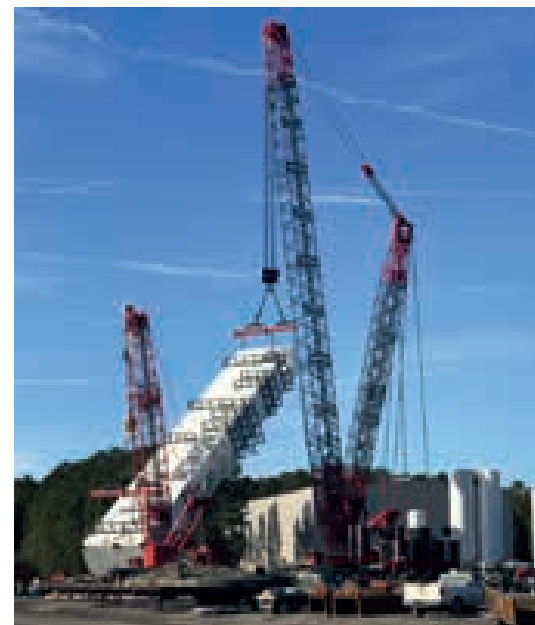
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Software programs can be used to develop, implement, and maintain a preventive maintenance program for your fleet. This technology, known as telematics, eases the scheduling burden with the implementation of an automated computer system. Manually managing the fleet is not only time-consuming, but it can be a tedious task.

does not have an OBD II port, usually an adapter can be used.

The data and trend information can be accessed from web-based fleet management software on a PC, smartphone, or tablet. The software can provide real-time exception notification via email and smartphone to alert management of risky behavior such as speeding, after-hour use or excessive idle-time.

A high-quality vehicle tracking device can collect a vast amount of data. For example, second-by-second data on position, speed, trip distance and time, idling, operator behavior

(harsh braking and cornering, seat belt use), fuel consumption, vehicle faults, battery voltage, and other engine data.

The software reports are critical in helping fleet managers make cost saving decisions to improve operating efficiency and grow their bottom line. Make sure that the selected system meets your individual fleet requirements and is customized based on the needs of your company.

Information that can be tracked might include:

- Preventive maintenance schedules
- Creation and tracking of work orders
- Fuel usage
- Mileage
- Operator time and labor
- Tire logs
- Claims and accidents
- Inventory management
- Invoicing for purchase and maintenance receipts
- Stock reports

OPERATOR MANAGEMENT

Effective management of your operators can save a company thousands of dollars each year.

A good operator training program, as well as ongoing telematic systems, will help with the reduction of costs without a negative impact on the level of service.



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Operator onboarding might include license checks as well as risk assessments.

Then, initial training should be focused on mapping the best routes, economical driving, use of the telematics systems, safety on the job, and anything else applicable to your projects.

Three important categories are applicable to fleet management:

- **Speed Management:** Speed is a dangerous factor that can increase the risk of fatal road accidents and expensive loss of equipment. Additionally, speed management has a direct impact on fuel and emission savings.

Both operators and vehicles should be monitored for speed.

Even if operators are trained in safety and speed practices, there is always a risk of noncompliance. Vehicle tracking telematics allows fleet managers to generate reports that uncover dangerous driving habits by showing the operators who have been speeding and how often the speeding occurs.

- **Fuel Management:** According to the U. S. Department of Energy, gas mileage decreases significantly at speeds over 50 miles per hour. Every 5 miles per hour increases the costs by \$0.16 to \$0.32 per gallon, depending on the type of vehicle.

In addition to the management of speed, other policies need to be in place to reduce engine idling, manage routing for fuel optimization, and keep up with routine maintenance that affects vehicle fuel usage.

Consider a system using fuel cards for each operator to see how much is spent on fuel and historical data for the vehicle.

- **Safety Management:** Fleet vehicle accidents are often the most expensive injury claims employers need to bear.

A formal fleet safety program will reduce the risk of these accidents, especially when the program is designed specifically to your company needs.

Safety management should include the selection and identification of operators, onboarding and ongoing training

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for operators, management of updated fleet safety rules, written policies, and a formalized plan for vehicle repair, inspection, and maintenance.

LAWS AND REGULATIONS FOR FLEET MANAGEMENT

Both federal and local agencies have laws and regulations that will affect the management and efficiency requirements for your fleet. A broad range of laws could be applicable depending on your location and the types of vehicles you are using.

The most important thing to do is consult with a fleet management expert to identify the regulations and laws that apply to your situation.

Legislation often affects petroleum consumption and rewards alternative fuel use.

Other common regulations require the submission of annual reports that show the makeup of the vehicle fleets and details about vehicle usage.

WHAT MAKES A GOOD FLEET MANAGER?

It doesn't matter if an in-house fleet manager is hired or if these services are outsourced. Either way, evaluate the fleet manager for the qualities and skill sets necessary to ensure an optimal outcome.

The following are some of the things that should be considered when hiring a fleet manager:

- **Knowledge:** A fleet manager needs to understand all aspects of vehicle care, tracking, safety, and more. A great leader knows how to implement the right tools to improve results, such as computer software (telematics) and accountability practices for operators and technicians.
- **Vision and Goals:** This person or team will oversee the acquisition and management of all company vehicles and equipment. So, it is important that they have a clear picture of current processes and target outcomes in the future. Decisions should be data-driven to support positive changes in the fleet.
- **Commitment:** Consistency is key for fleet management. Being consistent with repair and maintenance tasks, improves the performance of the vehicles and equipment. Additionally, ongoing documentation and metrics need to be measured to stay ahead of the details that matter for safety and efficiency.

PITFALLS TO AVOID WITH FLEET MANAGEMENT

While good fleet management practices can optimize the long-term results, pitfalls could take a hit on your business success.

Common pitfalls include a rising accident rate due to

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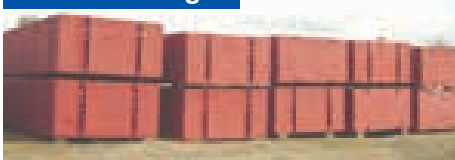
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It might seem like an endless challenge to keep up with fleet management, but many risks, costs, and hazards can be avoided with the right tools and good planning. The best way to maximize return on investment and ensure the performance of the fleet is to enlist the services of an experienced fleet manager.

operator errors and improper maintenance practices that result in expensive repairs and equipment being out-of-service.

One thing to consider is the quality of your driving team. High turnover can make it difficult to retain a team of experienced, trained operators.

As a result, you might find it difficult to trust new operators who aren't yet familiar with the company goals, safety practices, and more. It's important to hold onto good operators, which means you need to show your staff that you value the contributions of the team.

Consider implementing an operator incentive program based on performance and other data-driven metrics.

Cost is one of the biggest factors that can injure your company. Necessary maintenance and safety precautions are an investment that can reduce fleet collision rates, avoid liability exposure, and keep insurance rates low.

Also, consider that most fleet vehicle return-on-investment (ROI) will eventually drop significantly due to reckless driving and poor maintenance. These poor practices take a toll on the resale value of the vehicles and cut into profit margins. Cost of ignorance (COI) is avoidable.

LONG TERM STRATEGY FOR FLEET MANAGEMENT

It might seem like an endless challenge to keep up with fleet management, but many risks, costs, and hazards can be avoided with the right tools and good planning. The best way to maximize return on investment and ensure the performance of the fleet is to enlist the services of an experienced fleet manager.

An industry expert will help implement the right long-term strategy based on the equipment and vehicles needed for the services that are offered. ■

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The order includes 40 Peterbilt trucks, 12 Nelson RGN (removable gooseneck) trailers, and 160 new Manac drop deck trailers. Of the Manac trailers, 100 are 48-foot spread axle units, which can accommodate 20,000 pounds per axle anywhere in the United States. The remainder consists of 50 tandem axles, 4 quad axles, and 6 aluminum flatbeds.

The majority of the Manac trailers (150 of the 160 total) are galvanized, continuing ALL Crane's investment in galvanizing rather than paint, which can extend trailer life at least twofold. Galvanized steel decks reduce



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maintenance and resist chips, scratches, and wear, particularly the corrosion caused by road salt and brine. Also, although ALL Crane is a Manac dealer, these 160 new trailers will be exclusively dedicated to the company's own fleet.

ALL Crane will take delivery of the entire order through the end of 2019, with units being strategically distributed across all three dozen

branches of the ALL Family.

"This package demonstrates our continued commitment to investing in whatever it takes to get equipment to customers, wherever and whenever they need it," said Jimmy Hill, senior logistics manager. "We are able to easily move cranes across the country or across town to keep customers' projects on schedule."

ALL Crane's specialized transport divisions have ICC authority in the 48 contiguous U.S. states and throughout Canada. As a founding member of SC&RA, the Specialized Carriers & Rigging Association, ALL has the capability, equipment, knowledge, and expertise to move equipment safely, efficiently, and on time.



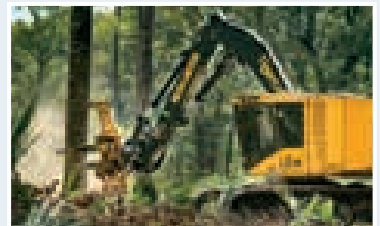
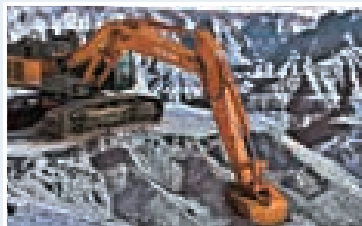
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JOHN DEERE INTRODUCES NEXT GENERATION OF CONSTRUCTION SIMULATORS

MOLINE, Ill. — John Deere is rolling out its new construction simulators — further bridging the gap between the classroom and jobsite. The modular update outfits the new John Deere simulators to one of six machine types: backhoe, crawler dozer, excavator, wheel loader, joystick-controlled motor grader and fingertip control motor grader.

“The next generation of John Deere simulators builds on a state-of-the-art technology that teaches machine

controls, hand-eye coordination, safe operation, and operator technique,” said Jon Goodney, manager learning & Forestry. “Simulators offer cost-effective and efficient operator training in a risk-free environment, while avoiding wear and tear on the equipment. It’s a win-win for organizations looking to get the next generation of operators ready for the jobsite.”

Based on actual John Deere equipment, the updated simulators feature swappable controls that allow for quick interchange of joysticks and foot pedals to multiple machine types.

The state-of-the-art software boasts highly-detailed, realistic virtual environments designed to cover basic and advanced operator duties through multiple jobsite tasks. A performance function provides metrics to measure student progress to help build proficiency and confidence.

The updated backhoe, excavator, and motor grader simulators will be available this spring, while the crawler dozer and wheel loader will be available for purchase this summer.

The new simulators can be coupled with the free online training available through John Deere University, offering a well-rounded operator training package.

The new simulators will be debuted at bauma 2019, April 8–14 in Munich. To learn more, contact your local John Deere dealer. ■

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