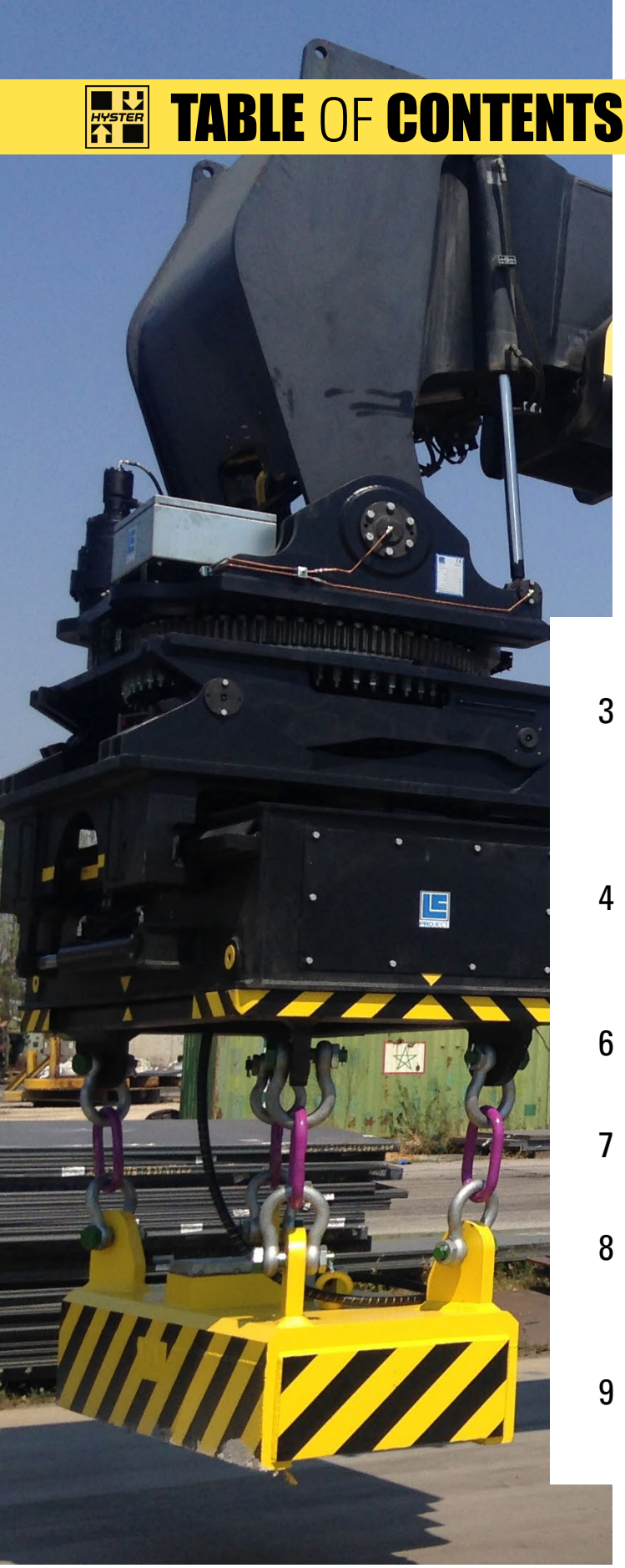
RAISING THE **BAR**

IMPROVING STEEL DISTRIBUTION EFFICIENCY



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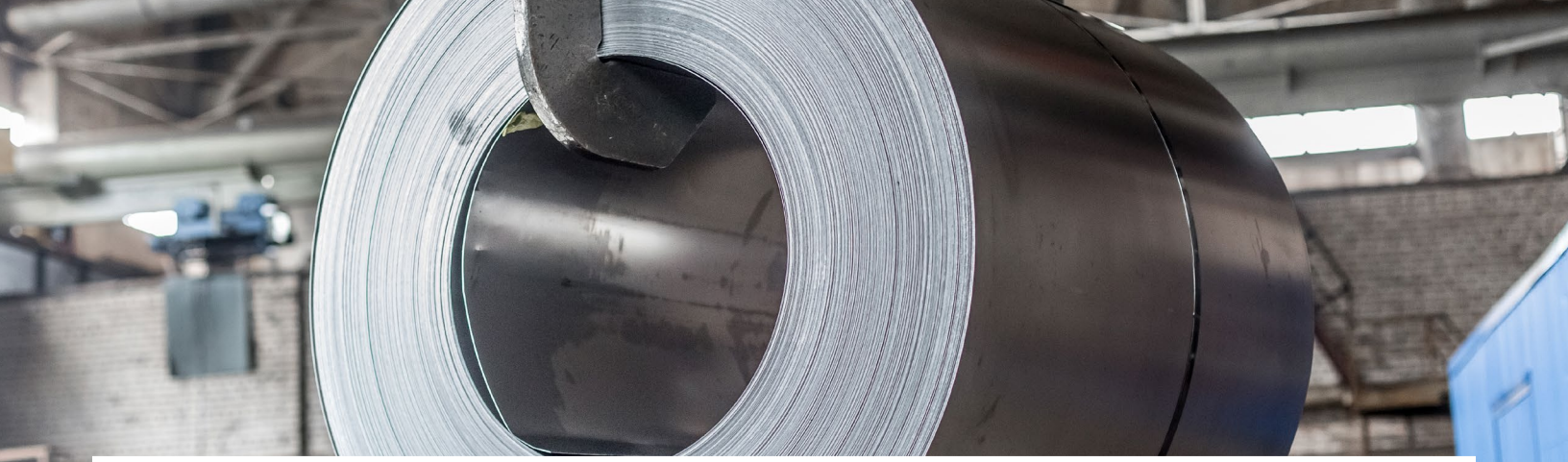


MORE EFFICIENT STEEL DISTRIBUTION UNLOCKED BY VERSATILE REACH STACKERS

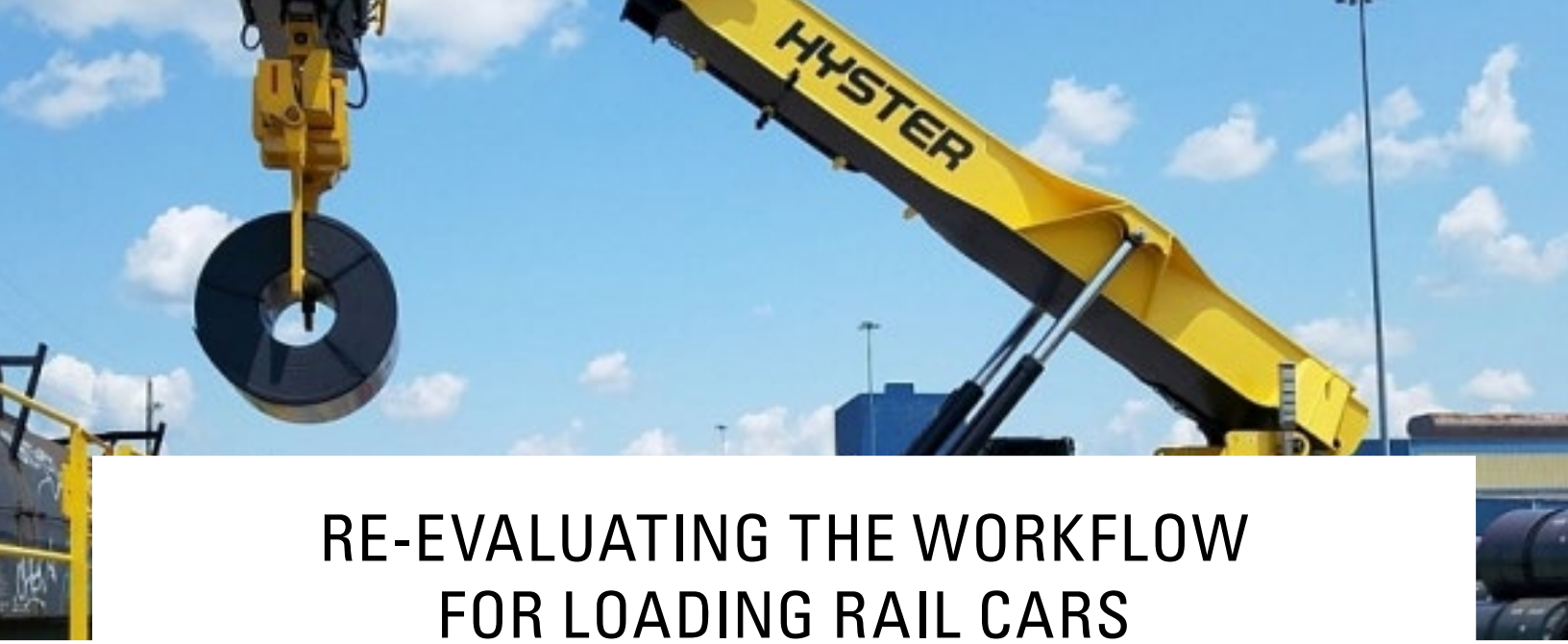
With automation, increased connectivity and evolving labor demographics reshaping industrial landscapes, change is constant, and the steel industry is no exception. Today, mills must serve demand for steel in a variety of shapes and sizes, and face expectations for greater speed and efficiency when moving steel from production to distribution and ultimately, to end users.

Mills face significant financial commitments, with demand for larger and wider coils driving major investments to widen coil production lines and produce steel in larger depth and diameter coils. The material handling equipment and labor necessary to move steel products also accounts for significant costs. But steel mills cannot afford to cut corners – doing so risks unsafe and ineffective coil and slab handling, which can cause extremely costly lost-time accidents and mill shutdowns.

Steel mills can lose an average $150,000 per hour when the mill is not operational

To stay competitive in such a challenging market, steel producers must re-examine not only the equipment they use, but how they use it. Instead of using multi-step, multi-machine workflows, what if they could shift to a streamlined approach, unlocking greater performance and efficiency to thrive in today's market?

Thanks to material handling equipment innovations that provide unprecedented flexibility, this streamlined approach is a growing reality for steel-handling operations. A single reach stacker can now handle tasks traditionally divided between equipment like gantry systems and coil-ram lift trucks. This enables a consolidated workflow that avoids non-value-added steps like dropping loads at mid-points and changing equipment, while reducing overall equipment inventory and associated training time.



RE-EVALUATING THE WORKFLOW FOR LOADING RAIL CARS

The established process to move steel from production to rail cars is a lengthy one, involving multiple steps and pieces of equipment. Reach stackers have traditionally handled cargo containers and moved heavy loads around the yard. Often, other forklifts and slab carriers are dedicated to a single task, such as handling coils or slabs and bringing them to staging areas. Then, gantry systems use cranes to lift and load them into rail cars.

With steel mills facing competitive pressure to become more efficient, this workflow falls short when it comes to speed and cost. Cranes travel slowly, yet they must traverse long rows of rail cars to pick and place each load, and waiting for rail cars to shuttle in and out of buildings extends the process further. From a financial standpoint, investing in so many different pieces of equipment means greater capital expenditure, while labor efficiency suffers with operators requiring adequate training and shuffling between equipment dedicated only to a single task.

The average fully burdened labor rate for a steel mill forklift operator is approaching $100/hour. What could your operation do with a reduction in labor costs?

By using a reach stacker, steel handling operations can engage in a more efficient, simple loading process, using a single piece of equipment to pick up finished pieces of steel and move them to staging and storage areas or load them directly into rail cars. Reach stackers can optimize the process by:

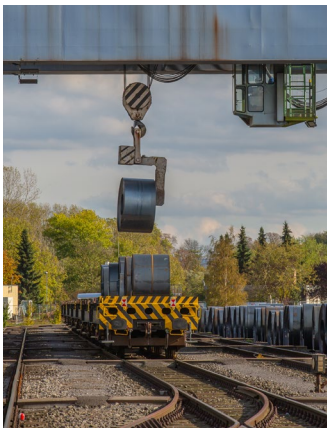
- Reaching far enough to load two rail cars deep without having to drive to a new loading position
- Side-load rail cars and be equipped with gondola car lid lifters
- Driving and lifting up to four times faster than overhead cranes
- Enabling more precise load placement and thus avoiding time-consuming adjustments, due to an elevated cab that offers better visibility to get it right the first time
- Operating without the need for an outside spotter, freeing scarce labor for more valuable tasks
- Eliminating the need for extra rail spurs, opening up more yard space

// A TRADITIONAL COIL HANDLING APPLICATION REQUIRES MULTIPLE, VERY COSTLY, DEDICATED-TASK MACHINES AND TRAINED OPERATORS.

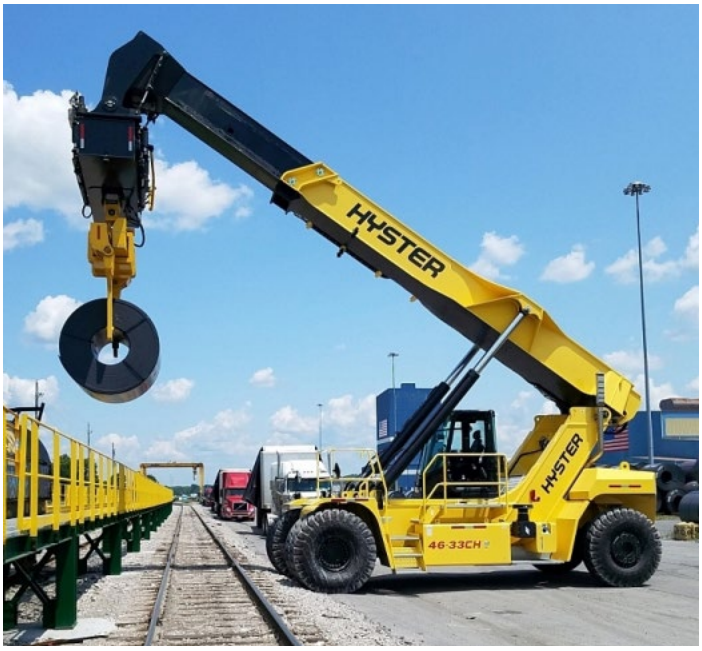
OVERHEAD / GANTRY CRANE:
Located at end of production line; pick up finished coils, place on railcars or transfer carts

TERMINAL TRACTORS:
Pull coils on transfer carts to storage and staging areas

COIL-HANDLING LIFT TRUCK:
Picks coil from storage yard and transfer to loading area



OVERHEAD / GANTRY CRANE:
Pick and load coils for shipment



But a reach stacker appropriately equipped for coil handling can safely and effectively execute all of the coil picking, transportation and loading functions handled by fixed or moving cranes, conventional counterbalance lift trucks and ram tractors in a traditional application.

- Reduced product touches
- Reduced labor and training requirements
- Fewer pieces of equipment to purchase and maintain
- Tool changing technology enables equipment to switch attachments to handle different tasks in simple, plug-and-play workflow [See video]

COIL HANDLING GETS HUGE

To keep production lines running longer and reduce coil change-out time, customers that manufacture products from steel are asking producers to provide larger coils. These new coils are as large as 96,000 pounds and 96 inches wide – up to 16,000 pounds heavier and 16 inches wider than the previous standard.

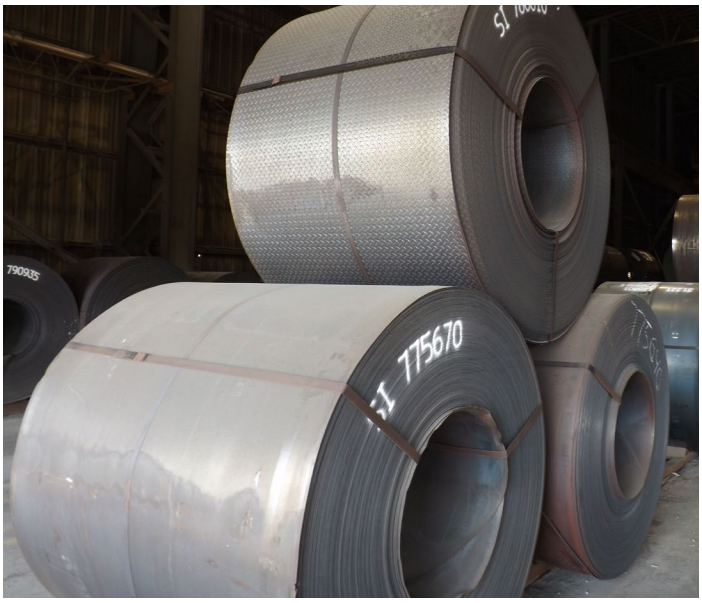
But for steel producers, creating – much less distributing – these larger coils is no small task. Mills are making significant investments to widen production lines, but they must also modify material handling and transportation infrastructure. This means higher capacity lift trucks and a transition to rail and barge travel instead of over-the-road semi-trucks.

// MAKE LIGHT WORK OF HEAVIER LOADS

To handle heavier, wider coils, a reach stacker offers the right combination of size, heavy duty features and most importantly, greater payload. In addition to heavier booms, larger tires and axles, and right-sized coil handling attachments, reach stackers can lift up to 120,000 pounds and offer an extended load center of up to 252 inches, not only accommodating wider coils, but providing the extended reach necessary to place them on a double deep rail car, or a widely staged semi-trailer flatbed.

Operations can also utilize attachments designed specifically for coil handling, like coil hooks and grabs.

- **Coil hooks**, similar to those used by overhead cranes, allow operators great flexibility when positioning coils on flat rail cars with coil cores placed perpendicular to the railroad tracks. They can even include an integrated rail lid lifter for quick, integrated access to loading targets.
- **Coil grabs** are an effective choice to load walled gondola cars. The grab arms need a minimal distance to release the coil, fitting inside the walls of the rail car for maximum precision.



GETTING A HANDLE ON STEEL SLABS

With end users demanding steel coils and slabs alike, mills must be prepared to produce, handle and load both types. Flat slabs possess key differences from coils and lift trucks require different attachments to effectively handle them.

// SLAB HANDLING ATTACHMENTS

- **Slab magnets** are used for stacking ambient temperature slabs in a storage yard and dropping them into place. Unlike clamps, magnets are well-suited for loading rail cars with side walls, and they avoid the extra step of placing spacers between loads, expediting processes and enabling real productivity gains.
- **Slab tongs**, on the other hand, are typically used to grab and transport hot slabs around the yard and to load flat rail cars without walls. They enable more precise handling than forks.

QUICK AND EASY ATTACHMENT CHANGES

If a mill uses some lift trucks to handle coils and other equipment to handle slabs, they are most likely paying for a bloated fleet. The coil handling trucks will sit idle and take up yard space when slabs are handled and vice versa, simply due to an inability to easily switch between the proper tooling.

A new tool changing technology eliminates the cumbersome, arduous process of manually changing attachments and the need for excess lift trucks. For non-powered attachments such as coil hooks or mechanical slab tongs, operators can change them without even leaving their seat! For items that require power, such as electricity for slab magnets or hydraulic power for clamping or rotating attachments, operators will need to briefly leave the cab, but the process is simple. A plug-and-play workflow means operators just need to use quick-connecting fittings to connect the power supply for the attachment. Ultimately, this ability to more easily and quickly switch between different attachments can enable a leaner, more productive fleet.

STRENGTH AND STABILITY FOR BILLET HANDLING

The round, cylindrical shape of billet steel pieces makes them susceptible to rolling on forks. When billets roll back toward the cab, they strike the forklift carriage, stressing components with great force. And if forks are tilted forward, billets can roll ahead and abruptly fall off, risking damage to the environment and other objects. Billets rolling in either direction creates scenarios where excessive forces are continually placed on the lift truck, causing machine and product damage. Successfully handling billet steel means reducing product damage and handling costs with equipment that is tough enough for the job and designed to prioritize load stability.

// LOAD STABILITY AND EQUIPMENT DURABILITY

Whether billets roll forward or backward, product and equipment damage is a real possibility. Key enhancements to traditional lift truck forks and carriage components can promote load stability and equipment durability.

- **Heavy-duty radius forks** feature a curved fork shank designed to help disperse shock created when billets roll rearward and strike the lift truck carriage. The fork heel radius enables the billets to roll slightly upward, greatly reducing the shock force on the lift truck carriage and related components.

- **Heavy-duty poly blocking** is designed to stand up to the shock created by rolling billets. Roller bearings are the traditional means to enable the sideshifter and fork positioner to move along the carriage. When billets roll backward, roller bearings are commonly damaged – leading to costly replacement. Hyster has replaced traditional carriage roller bearings with poly blocking installed behind the forks and remains intact even when the carriage is shocked by heavy rolling billets.

In addition to radius forks and poly blocking, heavy-duty fork carriers, specially designed carriages with protection plates and increased under clearance are features billet mills should look for to keep equipment moving reliably – and keep handling costs under control.

EQUIPMENT DAMAGE FROM BILLETS CAN ADD UP FAST

Preparing for billets rolling backward is essential because they can lead to costly equipment damage, specifically for roller bearings. Traditional forklift systems use bearings located behind the forks to enable the sideshift and fork positioner to move along the carriage. But not only are those bearings fragile and expensive – they're easy targets for billets rolling backward. Replacing broken bearings not only costs money, but the resulting equipment downtime disrupts normal work and costs productivity.

For one billet mill operation, broken roller bearings had become an exceptionally common occurrence – up to five incidents each day. With replacement bearings costing as much as $1,000 each, the costs added up quickly and the mill risked material handling costs spiraling out of control. But heavy-duty radius forks and poly blocking proved to be effective solutions. Once implemented, the mill no longer experienced any equipment damage or workflow disruptions.

KEEPING LONG-LOAD HANDLING STRAIGHT

Handling long steel loads, like beams and rebar, places unique stress on equipment. Effective long-load handling requires consideration of several variables, including road conditions, yard layout and equipment design. Long loads extend well beyond the sides of the lift truck acting as a huge lever that generates high amounts of torque that twists the mast and related components. This excess torque is especially powerful when the mast is elevated and operators travel through turns and over bumps and potholes, risking cracks and other damage to the mast, carriage and tilt cylinders.

// STRENGTH

Key enhancements can equip lift trucks to stand up to the demanding duty cycle of steel operations and the stresses specific to handling long loads.

- **Mast overlap:** The more overlap between the inner and outer mast channels, the more surface area to disperse the shock and torsion created when handling elevated loads over rough terrain. Additional overlap can help counteract the mast twist and boost durability.
- **Cross bracing:** To further strengthen the mast for heavy-duty applications, cross bracing between the mast pillars along with oversized mast channel brackets can help further improve mast solidity and stability carrying wide loads.
- **Super-duty mast mountings:** Enhanced mast mounting brackets, mast mounting pins and bearings can also serve to counteract the stresses of long load handling.
- **Carriage valve protection:** The hydraulic control valve is the meeting point for all hydraulic lines that configure and control forks, masts and other elements of carriages. To protect this critical point from costly damage in harsh conditions, manufacturers can place heavy-duty steel plates over the carriage valve.

// VISIBILITY

Moving long loads requires navigating steel yards with limited space and maneuvering around obstacles, often while the load is elevated. Not only does equipment need to be tough enough to withstand the stresses of such movements, but operators must have a clear view of their surroundings to properly position laden equipment. Camera systems are a useful tool to supplement operator views through and around the mast, to the side and behind the operator compartment.