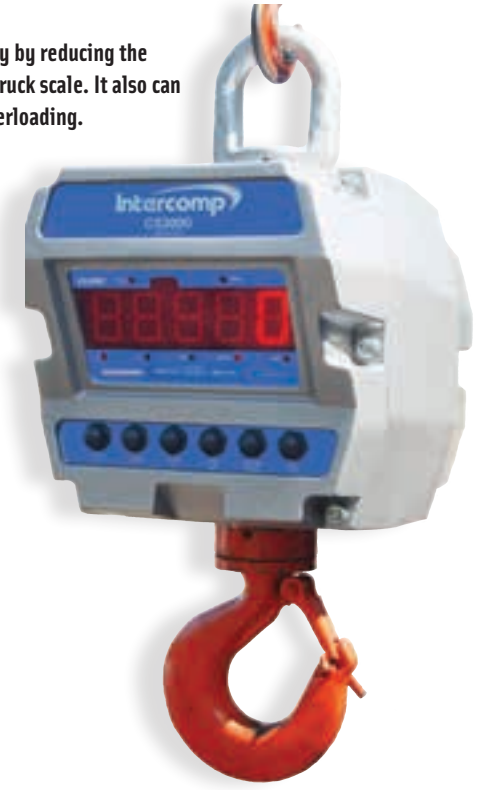
ONBOARD WEIGHING SYSTEMS

WEIGHING DEVICES ON LOADERS, MATERIAL HANDLERS, FORKLIFTS, AND OTHER MOBILE EQUIPMENT ARE GAINING POPULARITY TO INCREASE OPERATING EFFICIENCY AND CUT COSTS IN SCRAP OPERATIONS. **BY KATIE PYZYK**

Nearly every scrap material transaction is based on weight, making a well-functioning scale an essential piece of equipment in every scrap processing facility. Floor, truck, and rail scales are the most common weight measurement devices, but onboard weighing systems for loaders and other lifting equipment are becoming prevalent as well. The systems can improve a scrapyard's operating efficiency and accuracy by eliminating guesswork during material handling, manufacturers say.

The main benefit of incorporating onboard weighing into equipment—primarily forklifts, skid-steers, wheel loaders, and material handlers—is to reduce back-and-forth travel between a work space and the platform or truck scale. From quickly verifying the weight of incoming inventory on pallets to preventing truck underloading or overloading for outgoing material, onboard weighing systems can add value at all steps of the processing chain.

Onboard weighing systems have become "critical when it comes to loading trucks," says Dan Woltmann, general manager at Pacific Recycling (Eugene, Ore.). They allow you to "get almost the perfect weight on the truck each time you need it," he says, rather than guessing or traveling from the yard to the truck scale and then making load adjustments, sometimes repeatedly. Preventing overloading cuts down on safety risks, too, most notably tipping the base machine, and it reduces the potential for fines from truck or rail car weight violations. "That is a very, very important part" of the benefit these scales offer, says a market specialist for a Minnesota-based crane scale manufacturer. "It's something a lot of businesses outside of the strictly transportation industry easily overlook. But when you break it down, it could really affect your bottom line" if you can avoid steep overweight fines.



Onboard weighing equipment can increase efficiency by reducing the back-and-forth travel between a work space and a truck scale. It also can save money by preventing truck underloading or overloading.

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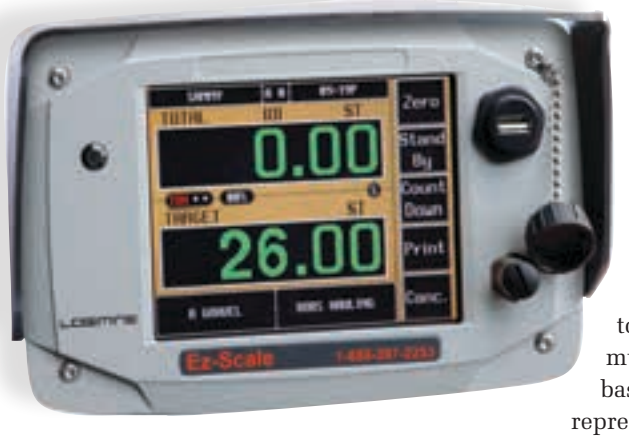
Many third-party manufacturers offer onboard weighing systems, and some manufacturers of mobile equipment do as well. The mobile equipment manufacturers generally sell scales designed for their own machines. In some cases, they are fixed into the unit; in others, the weighing system can be integrated into other manufacturers' mobile equipment. Third-party manufacturers design their weighing systems, which are more prevalent, to operate on a wide variety of loader, forklift, and material handler brands and sizes, as well as material handler attachments such as grapples.

At Pacific Recycling, the onboard weighing system is "not integrated into the loader like the [OEM models] are. This allows you to hook the scale up to any loader that you want to," Woltmann says. This interchangeability can increase your return on investment. Pacific Recycling is a small yard and only needs one loader scale, he says, but scrapyards that regularly use multiple loaders might be better served by purchasing numerous scales and dedicating each one to its own piece of heavy equipment. A recycler he worked for previously did just that, Woltmann says, and the company was pleased with the results and time savings they provided.

An onboard scale takes its weight reading through the base machine's hydraulic system and provides a variety of weight data on in-cab digital displays. For example, on a wheel loader, the scale's screen might show the tons of material currently in the bucket, the tons already loaded into a truck or rail car, and the tons still needed to complete a task. The scales come in various capacities, and they are designed to withstand harsh environments while maintaining weighing accuracy. Some manufacturers also offer high-capacity and heavy-duty versions.

Onboard weighing systems have taken on new importance with the increase in multimodal transportation, industry participants say. When

scrapyards load materials into containers that get shipped overseas, "those containers' [weights] have to be as accurate as possible. They have to be within 1% accuracy," says a wheel loader product manager for a Pennsylvania-based manufacturer of construction equipment. Using onboard scales on equipment used to fill shipping containers can ensure that the containers are loaded to the correct capacity so that the truck driver doesn't have to return to get additional material, or remove material due to overloading, prior to reaching a port to verify the weight, he says.



Newer in-cab display devices use touch screens instead of push-buttons to control the features. They offer higher resolutions and adjustable brightness, which is helpful when switching between indoor and outdoor operations. The port for transferring data into a USB flash drive is on the front of this device; some companies also offer Wi-Fi or Bluetooth data transfers.

TECHNOLOGICAL ADVANCEMENTS

While the weighing technology has remained relatively constant, data reporting and data management options have advanced in the past few years. For the in-cab display, "in the past, we had a push-button system" alongside the screen, says a senior project manager for a California-based loader scale manufacturer. "Now we have a touch screen, just like your smartphone." Newer touch-screen displays also tend to offer higher resolutions with adjustable brightness, which is particularly useful to accommodate changes in sunlight throughout the day or traveling between indoor and outdoor operations.

Data management options include creating and storing running tallies. For example, you can create and save lists of weights for different customers or different materials. Older models could store only about a dozen data sets, but more recent versions can store hundreds, these manufacturers say. The tallies make it easier to switch among handling various commodities throughout the day. At scrapyards, "you'll load shredded steel one instant, and in the next instant you're loading fluff going to landfill. You can choose to tally it up for the total shipped for each commodity each day, and print a ticket out as well," Woltmann says. As he points out, in-cab ticket printers, which can provide immediate load documentation, are growing in popularity as an add-on to these scales, manufacturers say. "We offer both a wireless and a cabled printer," the Minnesota-based crane scale manufacturer's rep says.

Data output and integration options have changed as well. Many onboard weighing systems allow you to transfer data from the scale to a management system database using a USB flash drive. "Everything is there. Whatever the operator has done for the day, for the week, [and] for the month," says the California company's rep. Newer models send that information directly into the management system in real time via wireless technology—Wi-Fi or Bluetooth—and can store data in the cloud. The latter feature also allows you to access scale information remotely. "Bosses can see what the operator is doing, the location of the loader, how many buckets were lifted, [and] how many times they raised the bucket up and down," he says. The Minnesota rep says his company continuously works to increase the accuracy not just of the "actual weighing, [but] also the wireless capabilities of communicating with a remote indicator to a crane scale high in the air and not within a visible range."

Wireless connectivity and cloud storage come in particularly handy for businesses that want to combine data from multiple locations. The base machine manufacturer representative says his company's loader scales are "designed to connect to our electronic architecture," an Android-based platform that allows users to do additional analysis, such as simultaneously tracking pounds lifted and machine fuel consumption to analyze how efficiently the equipment is operating.

Onboard weighing systems' tracking capabilities—especially in real time—also can lead to safety improvements at a scrapyard, these sellers say. Managers' ability to access greater amounts of data about each machine's and operator's daily activities could uncover areas for operational improvements and teachable moments. For instance, a manager might spot a dangerously overloaded machine through weight information transmitted via Wi-Fi and instantly contact a machine operator to correct the problem.

Earlier versions of onboard weighing systems could provide data for company use internally, but they weren't certified to provide legal weights for payload transactions. Numerous manufacturers now say they market legal-for-trade onboard weighing systems, federally certified through the National Type Evaluation Program, for some mobile equipment. The industry standard is for onboard weighing to be accurate to plus or minus 1%, although that can edge up slightly for in-motion weighing, in some instances up to plus or minus 3%.

Technological advances that improve accuracy have led more scale

LOAD MASTERS

manufacturers and suppliers to offer in-motion weighing systems in addition to stationary options. In-motion systems use software algorithms to process load weight by filtering out the spikes and dips in weight caused by the heavy equipment's motion. The California manufacturer's representative explains that his company's system performs static weighing by locking the hydraulic lift cylinder for 1.5 seconds during weighing, so "it does not matter if the machine is moving or not, [if the] hydraulic oil is hot or cold, the machine is on uneven ground, or the bucket is bouncing up or down." This design also reduces the equipment operator's influence on an accurate weight reading, he notes. For systems not designed for in-motion weighing, to take an accurate weight reading the equipment should be stationary, on level ground, operating within a specific rpm range, and the hydraulic oil must be warm, he says.

Despite some manufacturers' claims of their scales being intuitive and user-friendly, not every customer is wowed by the recent technological advances. A technical service provider for another Pennsylvania-based manufacturer says his company prefers to "keep it simple" and stick with offering a basic model focused on durability and dependability. "When you get too sophisticated, it takes an IT guy to run the scale," he says, and that's not what all customers are interested in. Plus, simplicity keeps costs lower than those of more complex onboard scale systems.

However, his company as well as others say they continue to advance their technologies in one key area: They redesign their products to keep up with changes in the base machines, such as the trend toward smaller, more powerful equipment. "We change the components that go into our systems to allow [customers] to attach our system smoothly to a newer-style loader," he says. For example, wheel loader manufacturers used to have split flanges where the hydraulic lines ran into the boom cylinders, but recently, OEMs "started eliminating [those] and going with a flat face O-ring, which means we had to find a different way to tap into the hydraulics," he says. In addition, his company's loader scales now have dual pressure transducers to monitor both sides of the boom cylinder, which give more consistent readings over time and "eliminates [the need for] running a hydraulic line up into the cab into the back of the meter,"

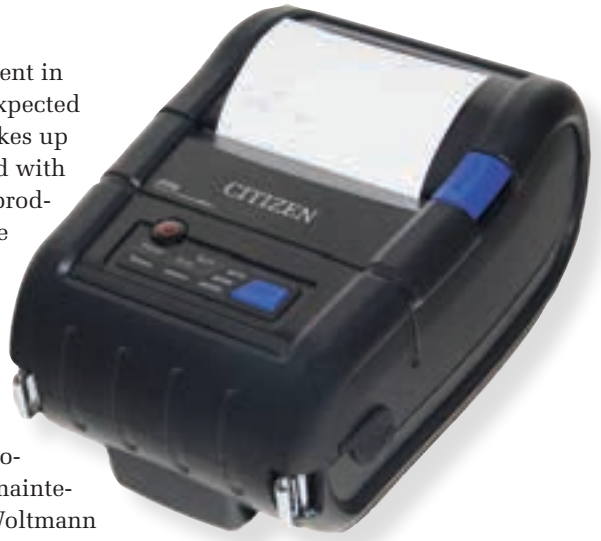
which was necessary with single-transducer systems, he says.

WEIGHING BUSINESS GAINS

The prices of onboard weighing systems vary greatly depending on the application, model, weight capacity, base unit compatibility, and features, with standard products selling for $1,500 to $15,000. Installation, operator training, and add-ons—such as ticket printers and wireless capabilities—all add to the price. Many of these manufacturers say their scales will last at least 10 years when used properly, and they report that customers have had some models for twice as long. They stress that quality—in terms of accurate weight measurement and longevity—can differ among products and manufacturers, so do your homework before choosing a product.

"When you make an investment in a high-quality product, the expected life of that product really makes up for" the higher cost compared with "some of the less expensive products available that may not be built to the highest quality," says the Minnesota crane scale manufacturer's rep.

Onboard weighing systems are "hugely beneficial to the efficiencies within a yard. … They're relatively economical … [and] really low maintenance," Pacific Recycling's Woltmann says. Calibration is the primary maintenance requirement. "You have to keep an eye on it, just like [you would for a] normal platform scale," he says. Manufacturers recommend a system calibration once a year for all types of onboard weighing systems. Material handler



In-cab ticket printers are becoming popular additions to onboard scales. Some companies offer both wireless and wired in-cab printing options. Newer scale models with greater data storage capabilities can keep tallies of hundreds of commodities or customer accounts.

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scales don't require extra calibration unless they sustain a major stress—such as tipping—but loader scales benefit from additional calibration during seasonal changes, manufacturers say. Cold weather can affect weight because there is a "tendency for material to stick in the bucket, so next time you start weighing … it might have an extra 100 or 200 pounds stuck in the bucket," says the base machine manufacturer's rep. Several industry participants also recommend that customers send the scale back to the manufacturer for a general examination at least once a year. Another maintenance step for more technologically advanced onboard weighing systems is ensuring they're current with software updates; manufacturers often push updates to the devices automatically through the cloud.

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One more factor in onboard scales' success is simply maintaining the base machine, these sellers say. "The scale is only as good as the loader it's on," the Pennsylvania company's rep says. Check hydraulic hoses regularly for wear and rubbing, especially in environments with a lot of inclement weather, and replace them as needed. Examine seals for fluid leaks, test the hydraulic system pressure, and properly grease components to prevent binding and resistance.

Because each scrapyard's needs are a little different, "contact the manufacturer … and ask them about the ease of installation and the accessories that come with the scale to integrate into your hydraulic system because there are a lot of different attachments or adaptors," Woltmann says. Manufacturers and suppliers also have extensive knowledge about the scale capacity recommended for different scrapyard applications.

With scrapyards more focused than ever on cutting costs, increasing efficiencies, and maximizing return on investment, "the time has come in the industry where everyone has to have an [onboard weighing system]," the California company's rep says.

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