

Measuring Up: Factors for Sizing Equipment from Backhoes to Bulldozers

Equipment sizing varies based on application, transport and volume demands – and it's often the physical size and weight of a machine that affects capacity as much as horsepower.

Contributed by CASE Construction Equipment*

What size machine does it take to get the job done? It's a question with varied answers dependent on the type of equipment, the application, methods of transportation and the environment you work in. And it's an important question: too small of a machine could leave you short of your production needs, and too large of a machine could prove inefficient and costly related to owning and operating costs.

Consultation with your local equipment dealer will help nail down the right machine, but having a basic understanding of the following factors related to size will give you a good start as you begin to look at renting or purchasing a new piece of equipment. In this article, we'll make connections between size/weight and capacity, and take a look at five key product categories: backhoes, dozers, excavators, skid steer loaders/compact track loaders and wheel loaders.

Backhoes

Main size factors: digging depth and reach, lifting capacity

Primary size-related drivers for selecting a tractor/loader backhoe are digging depth (and reach), weight and width – as well as the machine's lifting capacity. Typically grouped by standard digging depth, the two dominant size classes are 14 to 15 feet, and 15 to 16 feet, although extendable booms are available that increase these digging depths by up to four feet. Lifting capacity – made possible by hydraulics, weight and reach – also drives selection as these machines are regularly used to pick and place materials, specifically in roadside construction and utility work.

The backhoe market remains consistent, with 14-foot models well established with the greatest demand (although we do see some fluctuation from time-to-time). As the power, lifting and hydraulic capabilities of models in this size class continue to improve, you may see some contractors who previously operated larger models consider working with a 14-foot model that provides a lower purchase price and lower fuel costs.

Models in the 15-foot class are grabbing market share where the added size, performance and hydraulic capabilities of those models now provide a suitable argument for replacing mid-sized excavators. The backhoe does significantly less damage to the ground, maneuvers more easily, is easier to transport and still gets the lifting capacity of about a 7-8 ton excavator.

Skid Steer Loaders and Compact Track Loaders

Main size factors: operating capacity, size/physical footprint

Skid steers – the ultimate in versatility and jobsite accessibility – have been getting larger throughout the years. When sizing a skid steer, it is best to err on the side of a model capable of lifting more than you would on a daily basis. If you regularly move 1,800-pound pallets, you do not want to get a machine that is simply rated at or under 1,800 pounds. You'll want a machine with a higher rating to ensure that you can handle not only your everyday activities, but unique situations that may require greater capacity.

Bucket size (volume) is less of a driving factor once you've determined that a skid steer can lift the amount of weight you need it to – although, if the skid steer is used primarily in a loading application, the two factors are intertwined.

The most common size class for skid steers across most industries is 1,750 to 2,100 pounds. This range covers the most common digging, grading, lifting and attachment uses. Larger machines – getting up in capacity towards 3,000 pounds – are more common in new home construction and other similar loading/unloading applications where operators regularly move large, heavier pallets of brick, roofing or other building materials. These larger machines offer a number of benefits related to lifting capacity and hydraulics. Relating to hydraulics, skid steers in this size class allow operators to run hydraulic attachments at peak performance.

Skid steers in these larger classes also offer greater lift capacity, particularly beneficial for forklift applications. These gains in capacity are often achieved in a similar footprint to skid steers in lower size classes and are attractive because of that greater capability – although they do often feature a significant increase in weight and cost. That added weight affects everything from tire life to fuel efficiency.

Compact track loaders present a similar breakdown in size and application, however smaller models are popular in many applications for the ability to access tight and confined areas, and traverse finished lawns and surfaces without causing damage.

Wheel Loaders

Main size factors: operating capacity, size/physical footprint

So much of a wheel loader's work is dependent on the type and size of equipment it is matched up with, as well as the environment it is working in. The important questions that need to be asked are: What, on a daily basis, is the amount of material you need to move? How many trucks are operating in your circuit, and how quickly do you need to load them? How big is the hopper you need to fill and what size bucket is going to ensure efficient, continual operation? This will help determine the appropriate bucket size.

Is there another machine that the wheel loader needs to keep up with, such as an excavator or bulldozer, to move material as efficiently as possible? What size/weight of materials will the machine need to lift or place? Much of a wheel loader's ability to lift and move material is determined by its weight. Similarly, depending on where that material needs to be lifted or placed, an extended reach boom configuration may be required. Transport is also an important consideration – what size trailer do you have and what is its weight limit? Similarly: are you limited by the size of the sites you typically work on?

Excavators

Main size factors: bucket capacity, boom length, tail design

Bucket capacity and boom length are important sizing factors based on the type of work you do. It may be as simple as matching the bucket size to the size of the trucks you load to achieve optimal loading cycles. If the excavators work in a more varied application, then there are other considerations: a short arm increases speed, but limits your reach. A longer arm extends that reach, but results in slower cycle times.

Excavators are also versatile in that many of the most common size classes offer similarly capable zero- or near-zero tailswing designs to help meet application challenges. Aside from compact machines, excavators ranging in operating weight from 16,000 to 60,000 pounds will typically have a zero- or near-zero-tailswing machine that matches up well in capacity to their full-sized counterparts. These machines will help in applications along roadsides or around established buildings/structures.

Transportation is also an issue. Excavators that exceed various state-determined regulations for pounds and width typically trigger weight and escort restrictions/considerations that could add cost.

Dozers

Main size factors: blade capacity, physical size/footprint

Sizing a dozer is very much application driven, but – like excavators - these machines also present transportation challenges related to weight restrictions and road clearance, occasionally requiring escorts once you exceed a certain width (regulations vary by state).

Rather than by weight or capacity, dozers are lumped together by horsepower. With greater horsepower comes greater physical size and blade capacity. The greatest machine volume exists in two categories, representing two very different use cases: between 85 and 105 horsepower, and between 160 to 210 horsepower. Machines in

that lower category are more likely to be used in general construction and agricultural applications, and stocked in rental locations due to their size and ability to work more effectively on smaller sites. Dozers in that larger grouping are used across a wide range of industries, from residential and non-residential construction to road construction and aggregates/mining operations. Dozers that exceed 200 horsepower become more common on larger sites and highway projects, and are the standard in aggregate and mining operations. In those operations, where dozers often work as part of a material flow in conjunction with other equipment, having too small or too large of a machine could cause problems. For instance, if a dozer is pushing material to a wheel loader, you don't want to have an undersized dozer that can't keep up with its activity (leaving the loader idling, and trucks or hoppers waiting, slowing down the whole process). Dozers often work upstream of other processes, so matching it to other equipment is critical.

Obviously, with greater horsepower comes greater width, size and weight. With that comes transportation restrictions and, ultimately, added costs. As you get into machines that exceed 150 horsepower, these transportation considerations will come into play, depending on where you work.

Intelligent Sizing Drives Success

We'd all love it if we could justify owning and operating the biggest equipment – just to have it in case certain jobs come up that may require that added capacity. But it's not practical in terms of owning and operating costs, and zoning in on equipment size ranges that best complement your work will make the most sense for your business in the long run.

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