MACHINE CHOICES

HYDRAULIC EXCAVATOR SELECTION GUIDE

CHOOSING THE RIGHT MACHINES FOR THE JOB

Every job estimate starts with putting together the list of equipment needed. It isn't enough to ask yourself, **Which machine can do the job?** It's more important to figure out which machine(s) can perform the required tasks as quickly and cost-effectively as possible.

With so many choices among the types and models of construction machines available today, **How can you make sure the machine you select is precisely the right one for your job?**

And given the substantial investment you make in a machine up front plus operation and maintenance over its life, the question also becomes, **Which machine will do the most to make you more competitive and more profitable?**

INFORMATION IS YOUR MOST POWERFUL SELECTION TOOL

Of course the key to making the best choice is pulling together good information that helps you compare options, costs and projected returns. Here's a checklist of information must-haves:

- [ ] Define the requirements for the equipment
  - Reach and dig depth
  - Material characteristics
  - Lift capacity
  - Versatility and attachments
- [ ] Know the application characteristics
- [ ] Calculate the unit cost of production for each choice
- [ ] Compare machine sizes and their specifications
- [ ] List available couplers and attachments
- [ ] Check the availability of parts and service
- [ ] Define cash flow needs
- [ ] Search for financing options
- [ ] Validate equipment safety

CAT

HYDRAULIC EXCAVATORS

EXCAVATOR:

CAT® HYDRAULIC EXCAVATORS

Cat® excavators are built to accommodate a big range of job requirements. Whether your focus is driving down cost per hour, raising the bar on performance and fuel efficiency or hitting big, bold production and cost targets, there are multiple models to choose from to match your job and your budget. This guide is focused on track excavators but many of the principles apply to wheel excavators as well.

NEXT GEN:

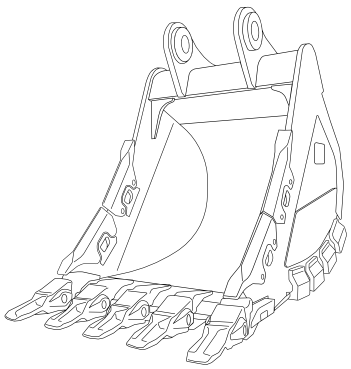
NEXT GENERATION EXCAVATORS

INDUSTRY LEADERS IN STANDARD TECHNOLOGY AND FUEL EFFICIENCY
Next Generation Cat Excavator models have more integrated technology than any other excavator in the industry, combined with **outstanding fuel efficiency and powerful lift capacities**. You can size a machine to match the work and your budget.

GC:

CAT GC EXCAVATORS KEEP OPERATING COSTS LOW

Cat GC models are designed to keep costs low with lower acquisition costs, good fuel economy and extended maintenance intervals.



CAT WHEEL EXCAVATORS CAN HELP YOU TAKE ON TIGHT QUARTERS

Excavators on wheels can work in urban and residential spaces that are more confined. They deliver the same great versatility as track excavators with easy mobility and a wide range of attachment choices.

CAT ATTACHMENTS – ALMOST 400 BUCKET AND TOOL OPTIONS

A full line of couplers and attachments is available for Cat excavators, which makes them even more versatile and profitable.

MORE VALUE

With Cat excavators, you have the Cat **dealer network** to provide fast parts and service. And, with proper maintenance, Cat excavators consistently hold excellent resale value.

DID YOU KNOW?

Cat Next Generation Excavators Reduce Costs:

Up to **25%** REDUCTION IN FUEL CONSUMPTION

Up to **20%** REDUCTION IN MAINTENANCE COSTS

HYDRAULIC EXCAVATORS

WHAT'S YOUR SIZE?

MINI EXCAVATORS:

(APPROXIMATE WEIGHT: 7 METRIC TONS (15,400 LBS) TO 10 METRIC TONS (22,000 LBS)

- Designed to deliver more dig depth, reach and power in tight work areas
- Some models are available with zero or near-zero tail swing

SMALL & MEDIUM EXCAVATORS:

(APPROXIMATE WEIGHT:
SMALL: 13 000 METRIC TONS (28,660 LBS)
TO 19 200 METRIC TONS (42,300 LBS)

MEDIUM: 21 900 METRIC TONS (48,300 LBS)
TO 38 020 METRIC TONS (83,820 LBS)

- Most common excavators in commercial construction
- A sizable step up in power and capacity, while remaining maneuverable and versatile
- Hydraulics available to handle multiple tools
- Heavier working weight increases psi and requires larger trailers for transport

LARGE EXCAVATORS:

(APPROXIMATE WEIGHT: MORE THAN 45 METRIC TONS (99,200 LBS)

- Most powerful choice for heavy construction, demolition and truck loading
- Oversized trucks and trailers are required for transport
- Occupy significant floor space when not in use
- Require high utilization to get steady return on machine investment

EXCAVATORS – MULTI-TASKERS OF THE JOBSITE

Hydraulic excavators are versatile, productive and easy to operate. Their track-type undercarriage allows them to tread more easily in soft or wet underfoot conditions and on slopes. Their size, maneuverability and 360-degree swing capability make them ideal for working in confined spaces. They move less to get the job done, which means less ground disturbance and less damage to site features that might need to be protected.

TYPICAL APPLICATIONS

Excavators can be used for a lot of applications. Technology has expanded their grading and loading capabilities and efficiency. You should consider an excavator for these types of applications:

- Trenching
- Site development
- Residential excavation
- Clearing access roads/lots
- Digging footings and basements
- Utility connections/work
- Sewer and water work
- Truck loading
- Digging ditches and sloping along roadways
- Pavement removal
- Loading hoppers
- Setting barrier walls
- Hammering and demolition
- Ripping
- Slope construction and restoration

SPECIALTY CONFIGURATIONS

- Mass excavation booms and sticks
- Long reach booms and sticks
- Wheel excavators
- Compact radius excavators

DID YOU KNOW?

Shorter cycle times reduce cost. With a 20-ton machine, for example, you want a range of 18- to 24-second cycle times as a good productivity target.* When you demo machines, be sure to check out the cycle times.

* Cycle times vary based on a variety of factors, including material density/stiffness, depth of dig/bench height, technology used and condition of machine. Cycle time here is offered only as a guide.

TOP EXCAVATOR SELECTION CRITERIA

LIFT CAPACITY

Check the lift capacity against your heaviest anticipated load — for example, a sewer manhole box, cast iron pipe, heaped bucket or tree stump. You want a machine that will handle the weight without taxing hydraulics or wasting fuel. You also want a machine with sufficient operating weight to remain stable when lifting. It's easy to assume that "bigger is better," but you should carefully compare machine sizes and price points to ensure your choice is "right sized" for the applications it will work in.

RULE OF THUMB: GETTING THE RIGHT NET LIFT CAPACITY

The weight difference of any attachment heavier than the standard configuration of the excavator you're considering must be subtracted from the rated lift capacity to determine the correct net lift capacity.

RULE OF THUMB: FIND THE RIGHT BUCKET, THEN MATCH THE EXCAVATOR

The most common excavator configuration is with a bucket. Your bucket is the limiting factor on productivity, so it just makes sense to:

1. Identify the loose density of the heaviest material you expect to handle
   - Be sure to include bucket GET weight in your bucket weight calculation
2. Identify the bucket size and capacity needed to move that material
3. Then select the machine that will best handle the bucket and the load

RULE OF THUMB: THE RIGHT WIDTH MATTERS UNDERGROUND

Bucket width in underground utility applications is critical to ensure proper fit inside cave-in protection devices. Choosing the right width is important for safe operation and minimizes overages on excavation as well as bedding and backfill materials.

REACH AND DIGGING DEPTH

As part of your preparation, you should take a careful look at the reach and digging depth required by the jobs this machine will perform. This will ensure you choose the right boom and stick configuration for the work you want to do. If you need longer reach, look for models with a long roller frame option with extra rollers. This will add to stability.

RULE OF THUMB: BOOM AND STICK

Remember that shorter sticks provide more breakout force, while longer sticks yield lower breakout force. Choosing the appropriate counterweight will ensure that the machine is well balanced.

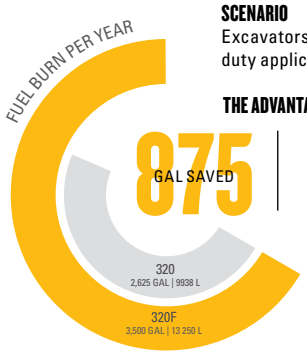
FUEL EFFICIENCY

Fuel makes up one of the biggest percentages of operating costs, so it makes sense to research the fuel consumption rates of models you're interested in. Cat excavator models have three fuel saving modes — Power, Smart and Eco — that increase fuel efficiency without sacrificing power.

Machines designed with variable-speed control technologies reduce engine rpm when workload demand is low, such as during the swing portion of a dig cycle. This lowers the total power required and reduces fuel consumption by up to 25%.*

*Compared to F Series excavators. May vary by model.

FUEL EFFICIENCY SAVINGS ADD UP



SCENARIO
Excavators working in a medium-duty application, 1,000 hours/year

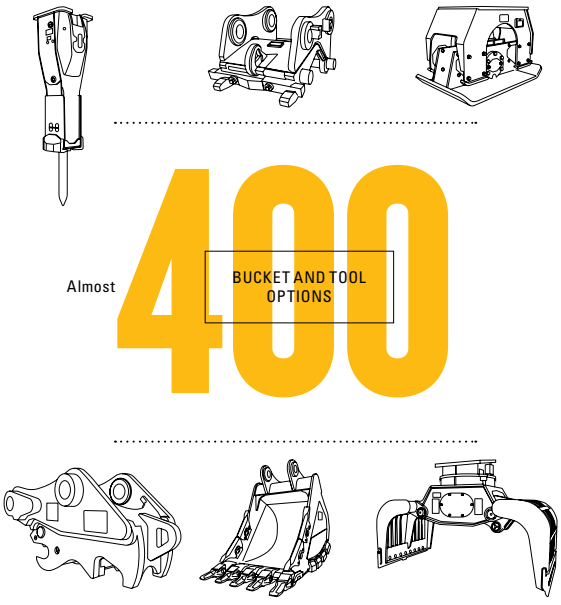
THE ADVANTAGE

875 GAL SAVED | 3312 L SAVED

CALCULATION:

320F:
3.5 GAL/HR X **1,000** HR/YR = **3,500** GAL/YR
13.25 L/HR X **1,000** HR/YR = **13,250** L/YR

320:
(**3.5** GAL/HR X **75%**) X **1,000** HR/YR = **2,625** GAL/YR
(**13.25** L/HR X **75%**) X **1,000** HR/YR = **9,938** L/YR



Almost **400** BUCKET AND TOOL OPTIONS

VERSATILITY

One of the primary reasons many contractors add excavators to the fleet is their versatility. If you need an excavator that requires auxiliary hydraulics for multi-directional movement, you'll want to take a closer look at the hydraulic systems and if they are designed to handle those hydraulic demands.

HOW MUCH TECHNOLOGY ARE YOU READY FOR?

Finding seasoned equipment operators has become an ongoing challenge, and this shortage can significantly slow down productivity on any job. Equipment manufacturers are continuously searching for ways to make machines easier to run for operators across all skill and experience levels. Technology has become the go-to solution to help address these challenges.

To choose an excavator with the right level of technology requires an understanding of the technology and how it can benefit your business.

INTEGRATED TECHNOLOGIES INCLUDED IN CAT NEXT GENERATION EXCAVATORS

TECHNOLOGY	WHAT IT DOES	KEY BENEFITS	INVESTMENT
Cat Grade with 2D	Ensures cuts and fills are made to exact specifications in a wide range of applications	· Increases efficiency up to 35% · Eliminates under- and over-cutting · Eliminates most ground stakes	· Standard on non-GC models · ROI begins first job
Cat Grade with Advanced 2D	Adds in-field design capabilities to Grade with 2D	· Maintains precision across larger sites and more complex applications · Onscreen display shows progress	· Upgrade on non-GC models · ROI begins first job
Cat Grade with 3D	Adds real-time satellite positioning guidance to Grade with 2D	· Provides bucket positioning and guidance to accomplish accurate grade in the fewest passes · Reduces rework, cycle time, fuel and material overruns	· Upgrade on non-GC models · ROI begins first job
Cat Grade with Assist	Adds semi-autonomous movement to boom and bucket	Boosts operator efficiency up to 45% when used with Cat Grade with 2D	· Standard on non-GC models · ROI begins first job
Bucket Assist	Maintains bucket angle and keeps cut accurate	Highly accurate sloping, leveling, fine grading and trenching	· Standard on non-GC models · ROI begins first job
Boom Assist	Automatically raises the boom	Keeps excavator balanced and on the ground under load	· Standard on non-GC models · ROI begins first job
Swing Assist	Automatically stops excavator at defined points when loading or trenching	Reduces fuel consumption and improves cycle times	· Standard on non-GC models · ROI begins first job
E-Fence Protection **(Floor, Wall, Cab Avoidance, Swing and Ceiling)**	Creates invisible electronic boundaries over, under and around the excavator	Protects people and property in all directions, increasing safety and minimizing risk	· Standard on non-GC models · ROI begins first job
Cat Command	A sophisticated remote control system that allows operators to work from outside the machine	Keeps excavator and operator out of hazardous conditions, allowing work to continue with minimized safety risk	· Optional technology · Fast ROI as work gets completed that may not be able to be done otherwise
Cat Payload	An onboard scale system that provides on-the-go weighing of material in the bucket	Improves loading accuracy, efficiency and overall productivity	· Standard on non-GC models · ROI begins first job

CONSIDER THE VALUE OF A CONNECTED JOBSITE

Cellular and internet connectivity are perhaps some of the most important functions to have at the jobsite, as they give people a way to exchange information about the project and machine status. The connected trend is on the rise, but you're probably wondering what's the value of making that investment?

ADVANTAGE #1: IMPROVED EQUIPMENT UTILIZATION

When you can collect accurate data from your fleet, you can run utilization reports by asset type.

Let's take a look at a fleet with 15 excavators. The data shows that:
- 8 of them are running at 80% utilization
- 4 of them are running at 50% utilization
- 3 of them are running at 20% utilization

When equipment use information is wirelessly communicated to you via the internet, you can see the numbers in black and white, in real time.

In this case, it's easy to see that if excavator utilization was better managed, the operation may be able to reallocate an excavator or two. That could free up the capital invested in excavators that aren't fully utilized, resulting in better cash flow and reduced cost of capital.

ADVANTAGE #2: REDUCED FUEL AND MAINTENANCE COSTS

When you can gather the telematics data from a connected machine, you have the opportunity to differentiate between working time and idle time. Working with your operators to reduce idle time will dramatically cut your fuel bill in the short term and also give you a realistic usage barometer for that machine. Then you can begin to manage maintenance on that machine based on the true hours worked, not just the hours on the meter, reducing maintenance costs.

ADVANTAGE #3: GPS DELIVERS FAST RETURN ON INVESTMENT

Based on this quick list, it would seem that connectivity delivers sufficient cost savings to pay for itself. Let's extend the conversation beyond leveraging information to adding GPS earthmoving technologies to the mix. Is GPS worth it?

A Civil Engineering study found that GPS-enabled earthmoving can:

INCREASE PRODUCTIVITY BY **21.74%**

GENERATE COST SAVINGS OF **12.02%**

Add to that you'd save more than $60,000 – more than half of the cost of the system. Add to that more competitive bidding (resulting from accurate data) and faster job completion (resulting from efficiency gains), and breakeven should easily come within the first year of ownership.

For more complete information on Cat products, dealer services and industry solutions, visit us on the web at www.cat.com

Materials and specifications are subject to change without notice. Featured machines in photos may include additional equipment. See your Cat dealer for available options.