



by Tom Jackson

Bucket teeth and ADAPTERS

The right tooth makes a difference.
The bigger the machine the
bigger the difference.

You don't need an engineering degree to select a bucket tooth for your applications, but plenty of engineering goes into the design of these components. And like golf clubs, surfboards or baseball bats, subtle differences matter.

If there is anything contractors do wrong in selecting bucket teeth it might be a tendency to choose what Bob Klobnak, senior product consultant for Caterpillar, calls a compromise tip. "If you pick a tooth that's optimized in one area, it may be compromised in other areas, and that can affect your productivity," he says. "It not only affects how much material gets into the bucket, but it has an impact on the powertrain, tire or track wear, linkages and all kinds of components."

As an example, Klobnak talks about a Cat 330 excavator that was working with a standard penetration tip loading about 450 tons of material per hour. The con-

tractor's maintenance manager didn't like the wear life he was getting on the teeth so he switched to a heavy-duty, abrasion-style tooth. The additional girth of the new teeth reduced the bucket's penetration and caused production on that machine to drop to 180 tons per hour. "They wanted more life and they got it," he says. "But they had to sacrifice production. My opinion is that production always trumps wear life. If you can take advantage of the extra production, that will more than pay for what you save in getting a few more hours out of your bucket teeth."

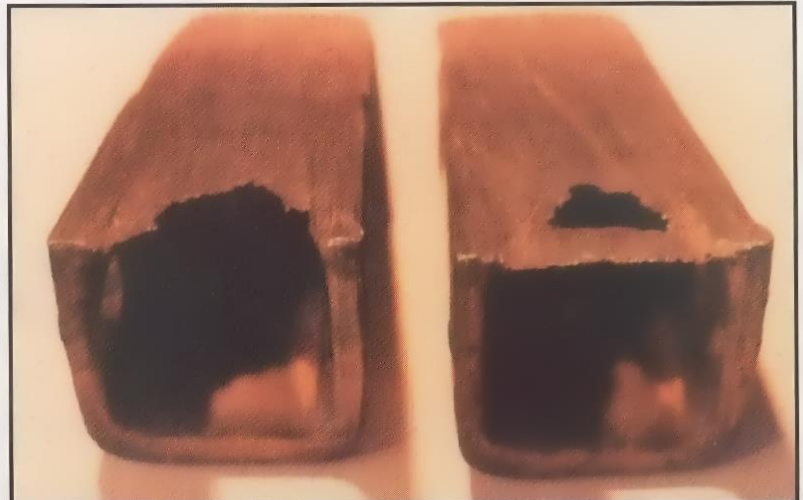
Dana Klostermann, product manager at John Deere Construction, says one of Deere's engineers witnessed a test between two identical excavators loading the same material side by side. The only difference was that one excavator had flair teeth and one had penetrating teeth. The flair-tooth bucket took three seconds longer on

each cycle, which resulted in 40 fewer dump truck loads at the end of an eight-hour day.

TOOTH DESIGN CRITERIA

Bucket teeth are selected based on the machine's size and power and the operating environment. Equipment manufacturers match the teeth to a machine's breakout force and drawbar pull. But it's up to you to tell the dealer or service rep what types of conditions you'll be working in. Contractors aren't always thorough about communicating these details, says Kirk Yoresen, marketing manager at Esco. Even if earthmoving accounts for 85 percent of an excavator's work, if the other 15 percent is demolition, that may influence the type of tooth chosen, and you need to inform the vendor about such details, Yoresen says.

The geometry of teeth range from wide, wedged shaped tips to narrow, pointed penetration teeth. The wedge-style tip is the most popular for digging in a large range of soil conditions, says Chuck Clendenning, engineering manager at H&L Tooth. "The standard tooth gives good penetration and wear ratios and great overall performance," he says. When breaking through or cutting into hard material becomes more

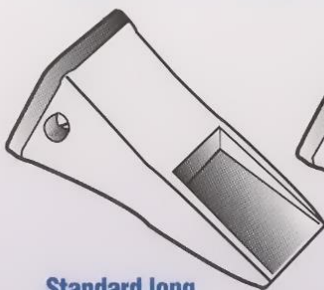


Wear occurred on the heel of these teeth because an excavator adapter with a minimum pitch was used in a loader application.

important than wear life, you need a penetrating tip, sometimes called a star or tiger tooth.

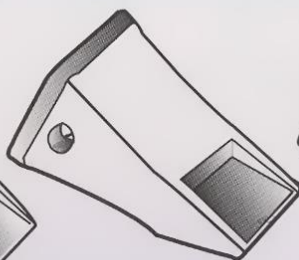
A long penetrating tooth with an abrasion pad for additional wear works best for loading, Clendenning says. Although the extra weight translates into extra costs, in the long run the abrasion pad of the tooth will

TOOTH DESIGNS AND APPLICATIONS



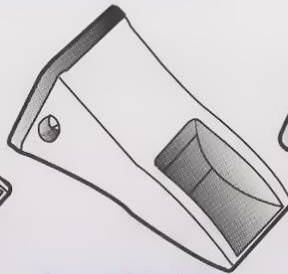
Standard long

The most common tooth sold for excavator buckets. Provides the best balance between wear life and penetration in a wide variety of soils. Some have a ridge in the center for added strength.



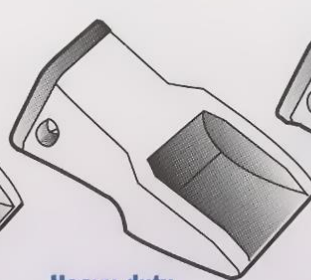
Standard short

Same basic characteristics as the standard long, but shorter length. Used when prying or penetrating forces might crack or damage a longer tooth or damage the adapter. Less wear material means it will have a shorter life and less penetration means lower productivity.



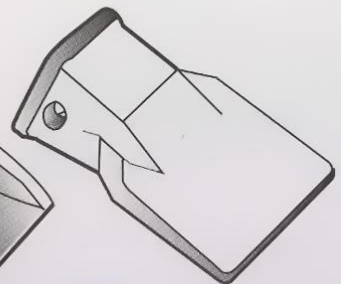
Heavy-duty long

Same performance characteristics as the standard long, but with more wear metal. It may include abrasion-resistant materials to stand up to abrasive soils and material. Usually designed to be self-sharpening so that penetration doesn't suffer as the tip wears.



Heavy-duty abrasion

In conditions where tooth life is short this design attacks material with extra metal to extend life. The tradeoff is that penetration is reduced.



Wide

Used primarily with softer materials where penetration is easiest. Good for creating smooth bottom trenches and quarry floors or for cutting clean bites out of coal stockpiles.

(Note: nomenclature varies depending on manufacture)

protect the cutting edge and reduce the wear on the bucket edge.

"Penetration is the name of the game," Clendenning says. If you can't penetrate material you can't load it. And if you spend too much machine energy trying to penetrate material with a blunt tooth you lose money. The designs for teeth have become fairly standardized over the years. Each manufacturer offers subtle variations on the same basic shapes. There are a handful of unique systems available and you'll also find some differences in the way manufacturers apply wear strips on abrasion resistant teeth. (See the drawings below and the box on page 44.)

One additional consideration in deciding on a tooth system is determining how long it takes to change the teeth. That length of time can vary from 15 minutes to an hour or more, says Yoresen. That may not make much difference to the guy who digs a basement a day. But for somebody who's working a \$200,000 or \$300,000 machine two shifts a day, every minute of downtime is an expensive proposition.

ADAPTERS EQUALLY AS IMPORTANT

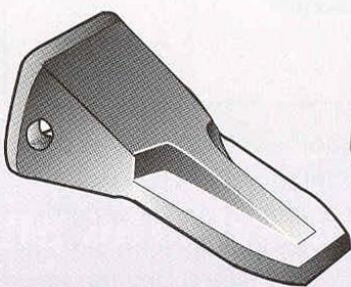
"One thing that is key when a customer is selecting a tooth system is to select the right shank or adapter," Yoresen says. The tooth shape can be easily replaced or

changed. The adapter costs five or six times what a tooth costs, and since most adapters are welded on, it may take three or four hours to replace each one. A good rule of thumb, Deere's Klostermann says, is to plan for 10 tooth replacements for every adapter replacement.

Adapters come in bolt-on or weld-on versions. Most are welded on since a welded assembly holds up better in tough digging than a bolted assembly. But bolt-on systems are still used in smaller equipment or where the digging is easy. The cost difference is negligible.

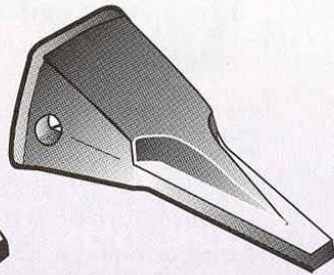
You'll also find adapters in two-strap versions, with flanges running on the top and bottom of the bucket edge, or flush mount with the flange running on the top or inside edge of the bucket. Two-strap designs are the most durable and are used in almost all digging systems. Flush mounts are used mainly on loader buckets where you want to get a clean, knife-like cut.

The adapter also determines the angle of the tooth relative to the bucket, and the tooth angle has a big impact on the performance of the machine, especially loader buckets. And the wrong adapter angle will cause teeth to wear out quickly and unevenly. "The most important thing you select is the adapter," Yoresen says. "The tooth shape can be changed according to the conditions. An incorrect adapter, even with the right tooth, will not perform properly and the customer will likely blame the tooth system."



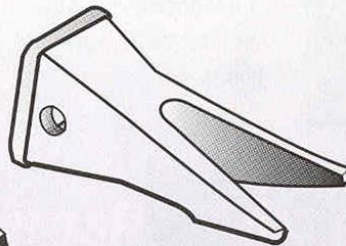
Penetration

Used in rock, caliche, coral and other difficult soil conditions. Thinner cross section results in more rapid wear. Sometimes called tiger teeth, star teeth or picks.



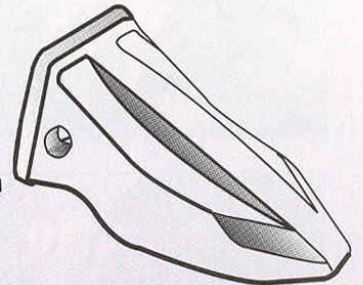
Sharp

Designed for extremely hard conditions, where rock and/or other tightly bound materials need to be worked. Usually has the least amount of wear metal.



Twin sharp

Used in same conditions as a sharp tooth, often positioned on the outside edges of the bucket to create clearance so that abrasive material doesn't wear away sides of bucket. They are frequently used across the bucket in fracturable material conditions.



Heavy-duty penetration

Combines penetrating shape with lots of mass and may have hardened wear strips to extend life in high-abrasion conditions. Popular on large loaders in quarry and mining applications.

EQUIPMENT INFORMATION

ATP *Thor* OZAT

One Stop Shopping
For all your Industrial & Construction
Tool and Parts needs

Check out our full line of Heavy Duty Industrial & Construction Tools - Impact Wrenches, Chipping Hammers, Air Motors, Drills, Concrete Saws, Breakers, Rock Drills, Rivet Busters, Water Pumps, Grinders, Replacement Parts, and Impact Sockets.



Fast

- Parts available from stock.
- Most parts orders shipped the same day.

Reliable

- 100% interchangeability
- Guaranteed for life against breakage, subject to normal wear

ATP, Thor & OZAT are Divisions of Hy-Tech Machine
1-800-245-1148

Write 521 on Reader Service Card

Kaufman Trailers Inc. Ph: 336-859-5785 Fax: 336-859-5963

Skid Steer Trailers
* Wood & Diamond Floor
* 7,000 - 14,000 GVWR

Heavy Duty Pintle
* GVWR: 25,900 lb
* Length: 20ft + 5ft dovetail

25 Ton Dropdeck
* \$ 12,250
* 55,000 GVWR
* Deck Size: 40'x102"

Medium Duty Pintle
* \$ 5,295
* 9 Ton Tandem Dual
* Cold Form Tongue

10 Ton Gooseneck
* \$ 6,020
* GVWR: 25,900 lb
* Frame: 10" I-beam
* Length: 24' standard

10 Ton Paver
* \$ 7,850
* 14" I-beam Pierced Frame
* Spring Assisted Bi-Fold Ramps

Financing Available

Low Delivery Rates!!!

Get A Quote! at www.kaufmantrailers.com

* Purchase now to avoid higher prices due to steel surcharges.

Write 522 on Reader Service Card

Your Traditional Backhoe Teeth... Just Got Better!
COMING THIS FALL... DeltaWing G.E.T!



Patented Features!

- 1 Fits existing Adapters!
- 2 Provides Bucket Lip Protection!
- 3 Pin guide eases Installation!
- 4 DeltaWing Design Provide Greater PENETRATION!
- 5 Reversible Corner Teeth

*Increases Bucket PENETRATION! * Increases Bucket CAPACITY! * Increases the LIFE of the Bucket!
*REDUCES expensive Bucket lip Maintenance * Increases Backhoe PROFITABILITY

10055 East 56th Street Tulsa, Oklahoma 74117 www.HLTOOTH.com Call Toll FREE 1-800-458-6684

H&L Tooth Company 1-800-HL TOOTH

Write 523 on Reader Service Card