Backhoe Evolution = Practical Innovation
Decades of practical use and owner demand have made the backhoe of today what it is: an invaluable jack-of-all-trades. The future promises even more.
By Katie Pullen, brand marketing manager, CASE Construction Equipment

Necessity is the mother of invention. An old proverb, but completely accurate as it relates to backhoes and how they've evolved over time. The original 1957 backhoe loader was born from a need for a solution that was integrated from the factory and warranted by a single OEM, as contractors were retrofitting farm tractors with loaders and backhoe arms.

That necessity/invention pattern has continued. The extendahoe option on backhoe loaders wasn't *just* a great idea – as regulations in northern climates dictated that water pipe had to be placed deeper and deeper to avoid freezing problems, there was a need to dig deeper. It also helped contractors digging around trenches perform that work while having the machine positioned further away – helping maintain the integrity of the trench and the safety of the operator.

2015 will bring with it a new set of innovations, as Tier 4 Final models begin to roll into equipment yards. In this article we'll take a look at some key backhoe evolutions in recent years, hint at some to come, and look at ways that contractors today are expanding the capacity of their machines.

Hydraulics Improve Strength, Lifting Capacity

If you look at larger machines such as excavators, hydraulics are a driving force behind much innovation– especially as manufacturers look for new ways to gain power and efficiency to complement Tier 4 engine technologies. Similarly, backhoes have benefited from these advances.

As an example: with the N Series, CASE redesigned its hydraulic cylinders and robotically welded the boom to support greater lifting capacities. At the touch of a button, the machine will direct greater hydraulic power directly to the boom while simultaneously slowing down engine RPM. This helps ensure smooth lifting and makes it easier for the operator to hear directions from the spotter. It has also proven to improve dipper and bucket breakout forces. But how has that changed buying habits and evolved the industry?

Lifting capacity is one of the most important specs for backhoe buyers. Now – because backhoes have been designed to safely lift more than ever before – a contractor that once owned a 15-foot backhoe may be able to get the same performance out of a 14-foot backhoe. Similarly, a 15-foot backhoe may be able to provide lifting performance comparable to a 7-ton excavator. These added capacities make it reasonable for contractors to buy equipment that is smaller and less expensive – while achieving many of the same results. And smaller equipment is

ultimately easier to transport and has less of an effect on the surrounding environment (space, ground disturbance).

Auxiliary Hydraulics = Greater Functionality

Many backhoe owners of the past were known to look at an attachment on an excavator, skid steer or wheel loader and think: "that would be awesome on my backhoe".

Advances in auxiliary hydraulics have expanded the attachment capabilities of backhoes (stronger boom construction has also made backhoes a better platform for holding and operating attachments). There are three considerations as it relates to auxiliary hydraulics in modern backhoes (configurations may vary by manufacturer): unidirectional hydraulics to the backhoe, bidirectional hydraulics to the backhoe, and auxiliary hydraulics for attachments mounted to the loader end of the machine. Bidirectional hydraulics to the backhoe provide the most flexibility to run all attachments because hydraulic power flows two ways. This is ideal for use with thumbs, augers and swivel buckets. Unidirectional auxiliary hydraulics are fine if a contractor only plans on running attachments with one-way hydraulic flow, such as breakers and compactors. Some manufacturers offer a method of modulating that hydraulic flow in a unidirectional setup for optimal attachment operation. A combination hydraulics set-up is ideal as owners can then switch back and forth between unidirectional and bidirectional as needed.

Auxiliary hydraulics to the loader end of the machine expand the machine's capabilities to run attachments such as brooms, grapples and 4-in-1 buckets.

By adding hydraulics to one or both ends of the machine, contractors can save significant money in equipment rental or purchasing down the road – and give themselves more flexibility with their backhoes than they've ever had. And upcoming advances in coupler technology with Tier 4 Final models will further expand the flexibility owners have with their attachments.

Electronics Make Equipment Smarter

Equally important to hydraulics in backhoe evolution is electronics. Many of the features that make backhoes stronger and more efficient have been made possible by electronics: new sensors, new solenoids, features actuated at the push of a button, control pattern changers, etc. It's electronics that largely makes it possible to work in different operating modes, ensuring that the machine only puts out as much effort as is required to complete the job. If hydraulics provide the power, it's electronics that makes that power intelligent. Features such as auto idle and auto shutdown are also made possible by electronics – and, of course, telematics would not be possible without all of these technological advances. And, while telematics adoption is still in its early stages, some equipment manufacturers are offering it as a standard service at the time of purchase to encourage use and to show customers

the true benefits: smarter maintenance and diagnostics, greater efficiency and performance, better utilization and improved security.

Less Spillage and a Smoother Ride

Backhoes have benefitted greatly from technologies derived from larger pieces of equipment. As a wheeled machine, a backhoe is susceptible to every bump it travels over. Transitioning Ride Control technology to backhoes from wheel loaders was a no-brainer. Manufacturers and equipment buyers wanted operators who were comfortable with wheel loaders to be able to get on a backhoe and feel just as productive on that machine (this also lead to features such as Return to Dig to be implemented on backhoes). Ride Control helps make roading smoother, and reduces spillage when travelling with a full bucket – but one hitch is that operators would occasionally forget to disengage Ride Control. This hampers digging applications because there is no down pressure being applied to the bucket. As such, one of the more recent evolutions is Auto Ride Control, where the machine automatically engages into Ride Control at a specific speed. Even more recent is the introduction of speed-selectable Ride Control, where the operator can select the speed at which Ride Control engages and disengages.

The Effect of the Owner/Operator on Controls

Every equipment introduction you read today typically talks about "new, advanced controls" – and backhoe controls are no different. But backhoes are a bit unique in that a number of manufacturers still offer the "old school" stick controls AND the newer pilot controls. A big part of this is the high percentage of backhoe owners who are classified as "owner/operators" and have had a long-time preference for those controls – and they've often trained their next-generation operator on those same controls. Conversely, operators who work in more of a "fleet" environment have become accustomed to pilot controls, and get frustrated if they have to work with the old-style controls. Because there is such a strong preference for one set-up or the other, manufacturers continue to offer both.

Practical Innovation

Additional features, such as Pro Control (eliminates rebound of the backhoe arm to improve cycle times and lessen stress on the machine) and Comfort Steer (reduces fatigue on the operator by making steering easier), have been introduced in recent years to further improve backhoe performance. All of these solutions have a practical use on the jobsite that helps expand the operator's capabilities and makes them more efficient for the owner. The next wave of innovation – Tier 4 Final backhoes – is just on the horizon. With these introductions will come new capabilities that further evolve backhoe use and efficiency. Stay tuned.

# # #