Bobcat

All Hail the Bobcat, the Badass Machine That Changed Job-Site Productivity Forever

The prototypical skid steer may be a small piece of "heavy equipment," but it's truly a powerhouse from construction sites to battlefields.

BY ERIC TEGLER PUBLISHED: MAR 11, 2024

SAVE ARTICLE

With the advent of compact mechanized technologies in the mid-1950s, agriculture was slowly becoming industrialized. But Minnesota turkey producer Eddie Velo still had difficulty finding young men willing to clean manure-laden straw bedding in the ten two-level turkey barns spread across his five farms.

A pair of brothers in nearby Rothsay, Minnesota, had done repair work for Velo in 1956. Machinists and welders, the brothers augmented their repair business, Keller Brothers Machine Company, with innovations including the first single-stage ribbon-auger snowblower, a forerunner of the snowblowers we use in our driveways today.

Velo mused to Louis and Cyril Keller, aware of their ingenuity, "If I just had a little machine that could go around between the barn [support] posts … and would be light enough to go upstairs, that would really be nice."

The diminutive skid-steer loader they invented would ultimately be called the "Bobcat," a brand name so synonymous with their design that, like "Kleenex" and tissues, it became a generic term for a universally recognized good. In simple terms, a skid steer turns when a pair of drive wheels on one side rotates forward while the pair on the opposite side stops or remains in neutral, "skidding" the machine in an intended direction. Six-plus decades after its invention and millions of Bobcats and other skid steers later, it remains a supremely versatile global tool, central to providing a livelihood for millions of people in the $10 trillion global construction industry.

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Instantly recognizable to most Americans, the compact white-and-orange loaders, whether wheeled or tracked, have become so iconic that when the Bobcat company turned 50 in 2009, the Smithsonian's National Museum of American History became the official repository for its archives.

As one museum curator observed, "The tractor replaced the horse and oxen and the Bobcat replaced the pitchfork and wheelbarrow."

As often happens, a dirty job was the catalyst.

Turkey in the Straw

A machine that could allow one farmhand to clean turkey barns more quickly than two or three by mechanizing the back-breaking shoveling chore would be nice indeed, the Kellers reasoned. Sketching on cardboard, they came up with a small, rear-engined, three-wheeled contraption with a pair of hydraulic lift arms raising a tyned-bucket. It had a drive system enabling one main wheel to rotate forward while the other rotated in reverse, allowing it to move 360 degrees within its footprint. It was effectively the first "zero-turn" design.

The Kellers reached an agreement wherein Velo would furnish parts for the brothers' design, and they would build it. Six weeks after striking the deal in late 1956, the brothers had the first Keller Loader ready to go. They delivered it to Velo's farm for testing in February 1957.

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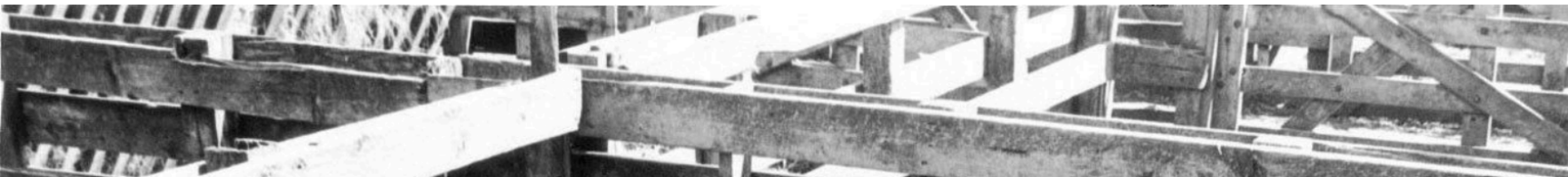
On the upper level of the barn, in the tight confines between its support poles, the maneuverable Keller Loader worked, scooping bigger masses of straw and manure with its tyned bucket faster than a man with a pitchfork. While refinements were needed, the Kellers could see its potential. Over the next year, with help from their brother-in-law, the pair built six more loaders, each with minor improvements, and sold them to local poultry farms.

In need of significant capital to enter mass production, the Kellers turned to Les Melroe, one of the owners of a North Dakota firm that manufactured spring-tooth harrows for grooming soil and attachments for combines used in harvesting.

Melroe was impressed enough after seeing the Keller Loader that he invited the brothers to display it in the Melroe company booth at the 1958 Minnesota State Fair. It was such a hit that before the end of the Fair, the Melroe company sought to place its stickers on the machine.



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The first production model of the Melroe "self-propelled loader" at the West Fargo, North Dakota, stockyards, late 1958.

In the aftermath, the Kellers became subcontractors and employees of Melroe Manufacturing Company. They further developed their loader, patented their skid-steer mechanism, and ran a loader production line for the company. The first production Melroe loader, the M60, debuted in 1959. It sold for $1,390 (about $14,714 today) with four available attachments including a utility scoop, manure fork, rotary snow plow, and sweeper.

Powered by a 12.9-horsepower, two-cylinder ONAN engine, the small, wheeled loader was initially regarded by farmers as a little toy, not a serious, hefty piece of farm equipment. Louis may have modified and improved the loader, but Cyril went out on the road, demonstrating it to skeptical farmers and training other salesmen to do the same. The three-wheeled M60 and the mass-produced M200 remained a tough sell, and the Melroe Company asked Louis to do something to bolster their utility and appeal. He added a second pair of drive wheels, making the Melroe M400 a more stable and tractive four-wheeler and the root of all subsequent skid steer designs.

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With improvements from a bigger engine to a safer enclosed drive system and the addition of more powerful double-acting cylinders on the lift arms, sales accelerated with 200 M400s purchased in 1961–1962. Melroe also pursued the fertilizer and dairy markets, which led the company to select a white paint scheme for subsequent loaders. The white color both hid fertilizer dust and signified the cleanliness required for the dairy market. At about the same time, an advertising agent Melroe hired came up with a brand name for the little white loaders. Their nimble, rugged, and adaptable nature reminded him of an animal: the North American Bobcat.

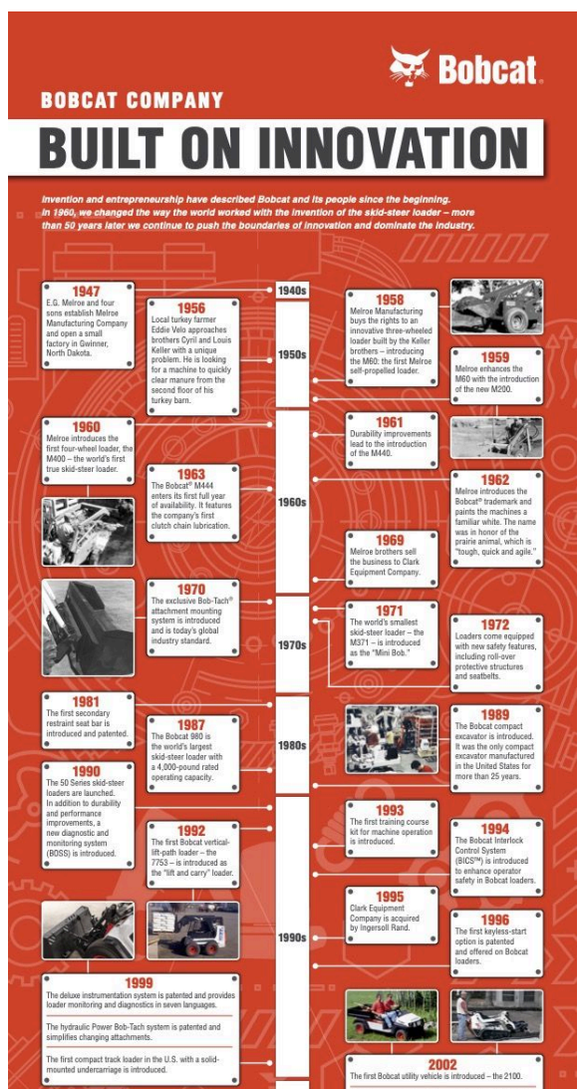
The Melroe M440, which was essentially the same as the M400, became known as the "Bobcat" skid steer loader. The marketing slogan, "Tough, quick, and agile," was born, and production began in 1962. New models with more power and more attachments were released through the 1960s, and by 1969, the company built its 10,000th loader. The Bobcat had clawed its way to popularity and established an entirely new market segment.

Enter the Skid Steer

The key to the success of the Bobcat or any so-called "skid steer" is the drive mechanism that allows it to turn on a dime.

The Kellers devised a system of chain-driven sprockets connected to stub axles on either side of the loader, which could alternately be driven by two limited slip clutches. With a forward clutch fully engaged, the pair of drive wheels on one side would rotate forward whilst the pair on the opposite side could be in neutral or reverse, their clutches partially engaged, effectively "skidding" the machine in an intended direction. Or the reverse clutch on the opposite side could fully engage, rotating its wheel pair backward, turning the loader within its radius.

Louis and Cyril Keller's clutch-and-chain system (patented in 1964) formed the conceptual basis for subsequent skid steer loaders and newer compact loaders.



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By the late 1960s, several companies besides Melroe, including John Deere and Case, were building and selling their skid steers. As the 1970s progressed, the classic clutch-and-chain drive system was replaced by a design using two separate hydrostatic transmissions (one for the left side and one for the right side) to achieve differential steering and zero-turn capability. Hydrostatic transmissions use an engine-driven hydraulic pump to push fluid to a variable-speed hydraulic drive motor, which directly drives wheels forward or backward or actuates gears in a gearbox which then drives the wheels.

Skid steers proliferated in the 70s, their focus becoming construction rather than just agriculture. The trend was reflected when New York-based Clark Equipment Company bought Melroe Manufacturing in 1969.

When Clark Equipment took over Melroe Manufacturing in 1969, it maintained Bobcat production in North Dakota. In 1995, Clark sold Bobcat to industrial machinery producer Ingersoll Rand. In 2007, South Korean equipment maker, Doosan, bought Bobcat from Ingersoll. With each new owner, investment in Bobcat was renewed, allowing it to continually innovate.

For example, Clark's late 1960s purchase of Bobcat led to further development including the introduction of the "Bob-Tach" quick-change system for attachments.

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The almost endless array of attachments developed for the Bobcat and other skid steers have been crucial to their success. You can likely picture them on the front of any skid steer in your mind's eye—forklift attachments, grapplers, jackhammers, concrete wheel-saws, brush and tree cutters, and so on. Today, Bobcat alone offers over 400 attachments for its loaders.

"The skid steer is half of the equation," Troy Kraft, chief technology officer for Doosan-Bobcat, tells *Popular Mechanics*. "The other half is the versatility of the attachments that we offer and truly integrate into our machine."

The Bob-Tach essentially uses a pair of mechanically-actuated, wedge-shaped pins on an adapter plate mounted between the lift arms to lock into and release from receiver slots in each attachment. A pair of levers atop each side of the adapter plate are used to lower (lock) and raise (release) the wedge-shaped pins into "slots" in the attachment frame.

After lowering the attachment to the ground, an operator shuts off the machine and steps out of the seat to raise the Bob-Tach levers, releasing the attachment. Then, they return to the seat and restart the machine, backing away from it, and taxiing to the next attachment. They position the adapter plate into the new attachment and repeat the steps to engage the levers.

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The entire operation takes about as long as reading the previous paragraph. Bobcat later fully automated the Bob-Tach, making it possible to change attachments by simply flipping a switch in the operator's station.

Contemporary skid steers and compact track loaders share the same basic elements: a rear engine, hydraulic lift arms, an attachment interface, wheeled or tracked undercarriages, central operator stations, multiple attachments, and hydraulic/electric power interfaces to operate attachments.

To maintain maneuverability, skid steer loaders, and compact track loaders are designed with a 70–30 rear-front weight balance. When unloaded, this allows them to easily "skid" steer, and pivot. When loaded, as with a bucket full of dirt, the weight shifts forward, lightening the rear counterbalance, while maintaining overall balance and zero-turn capability.

While the Keller loaders are steered by a pair of mechanical levers, like early military tanks, modern loaders use either a single or a pair of low-effort joysticks (rate controllers) for travel speed and steering direction. The Keller loader used foot pedals to control lifting and tilting of the bucket or attachment while modern loaders generally use the previously mentioned joysticks.

Bobcats Roam the Planet

When we think of worksites, particularly construction sites, we imagine yellow pieces of heavy equipment working them. For decades, Bobcats were the only pieces of heavy equipment not painted yellow, and to this day their white and orange scheme remains a flash of color in a sea of yellow.

That iconic paint job is central to the Bobcat company. "It's vitally important," Doosan-Bobcat's VP of innovation, Joel Honeyman, tells *Popular Mechanics*. "It is the identity of the company. We invented this industry more than 65 years ago with that skid steer loader."

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Today, Bobcat commands approximately 40 percent of the market, producing 19 models of skid steer loaders and 14 models of compact track loaders ranging in size from just three feet wide to seven feet.

“There’s a variant and a size for every specialty,” Kraft says. “The classic products that everybody sees running around are often about 50 hp and can lift around 1,300–1,500 pounds.”

Today, the company is headquartered in West Fargo, North Dakota, and the main plant is still in Gwinner, North Dakota, where the Kellers joined with Melroe to begin production back in 1959. By 2014, over a million Bobcats had been produced, including compact track loaders. Many more skid steers were made by the likes of Caterpillar and Kubota to name a few. The industry turns out about 150,000 skid steers/loaders every year.

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Skid steers, and Bobcats, in particular, have been sold in every country except Russia, company executives say. While they can’t confirm that Bobcats are working in the Arctic and Antarctica, it’s highly possible. “Our products are so portable they get moved around the globe,” Honeyman says. “I’ll get a call letting me know that a machine someone bought in Indiana is now in Ivory Coast or somewhere else in Africa and they’re looking for [maintenance] support.”

Bobcats and other skid steers have served with the U.S. Army, Navy, and Marine Corps, dropped into exercises and war zones from C-130 cargo airplanes, and lowered from CH-47 Chinook helicopters. They do anything you can think of. “People will transform this loader into a miniaturized version of any large piece of construction equipment,” Honeyman adds.

It’s an amazingly heavy lift for the little loader the Kellers invented. Though they’ve both passed, Louis and Cyril are still with us every time we see a Bobcat. This year they were selected as inductees for the National Inventors Hall of Fame (NIHF) in Alexandria, Virginia. Louis’ son, Joe Keller, owns the Keller Loader that made such a splash at the 1958 Minnesota State Fair. He recently hauled it to NIHF from North Dakota, stopping at Bobcat dealers to show off their heritage.

He was received enthusiastically at every stop. “They said to me, ‘This little loader is why we have this business.’ To hear that from so many people… it’s hard to explain what that means.”

Troy Kraft put his finger on the essence of the little white and orange loaders. “You don’t always use your screwdriver to turn screws. You use it as a pry bar, a hammer. That’s how these machines get used.”

That’s one Badass tool.

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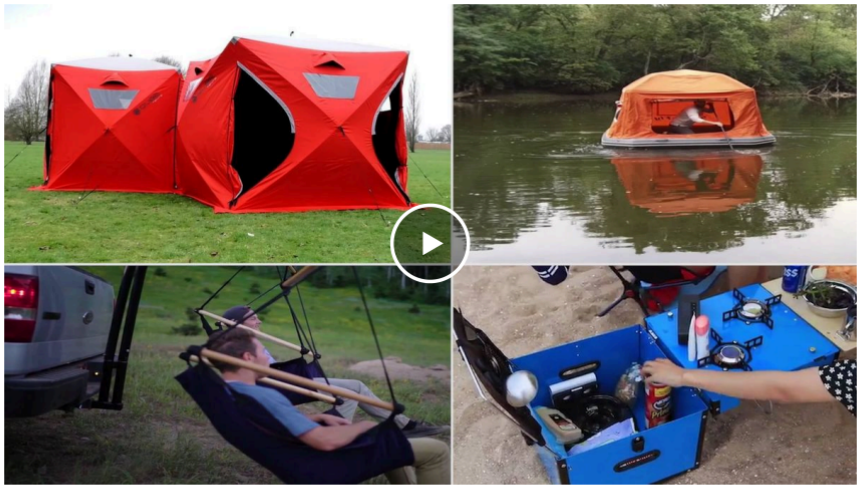

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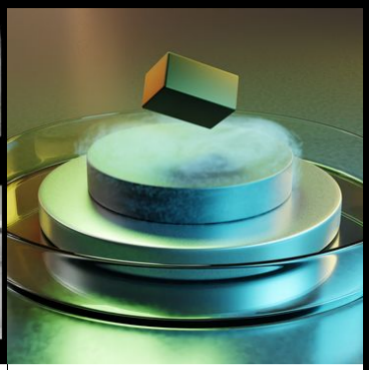

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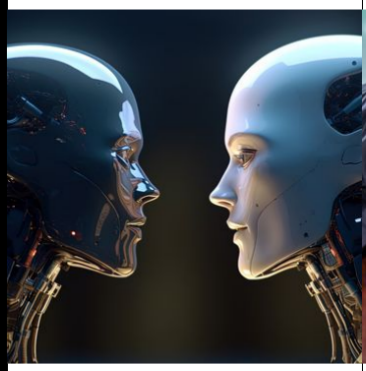

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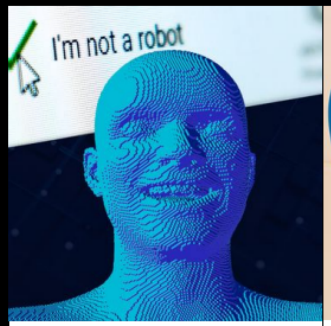

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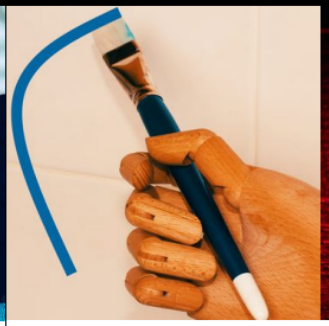

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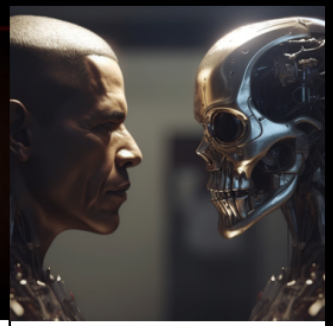

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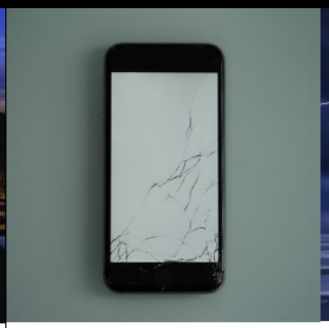

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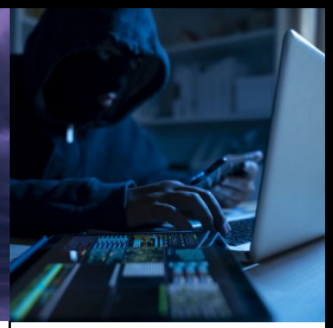

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