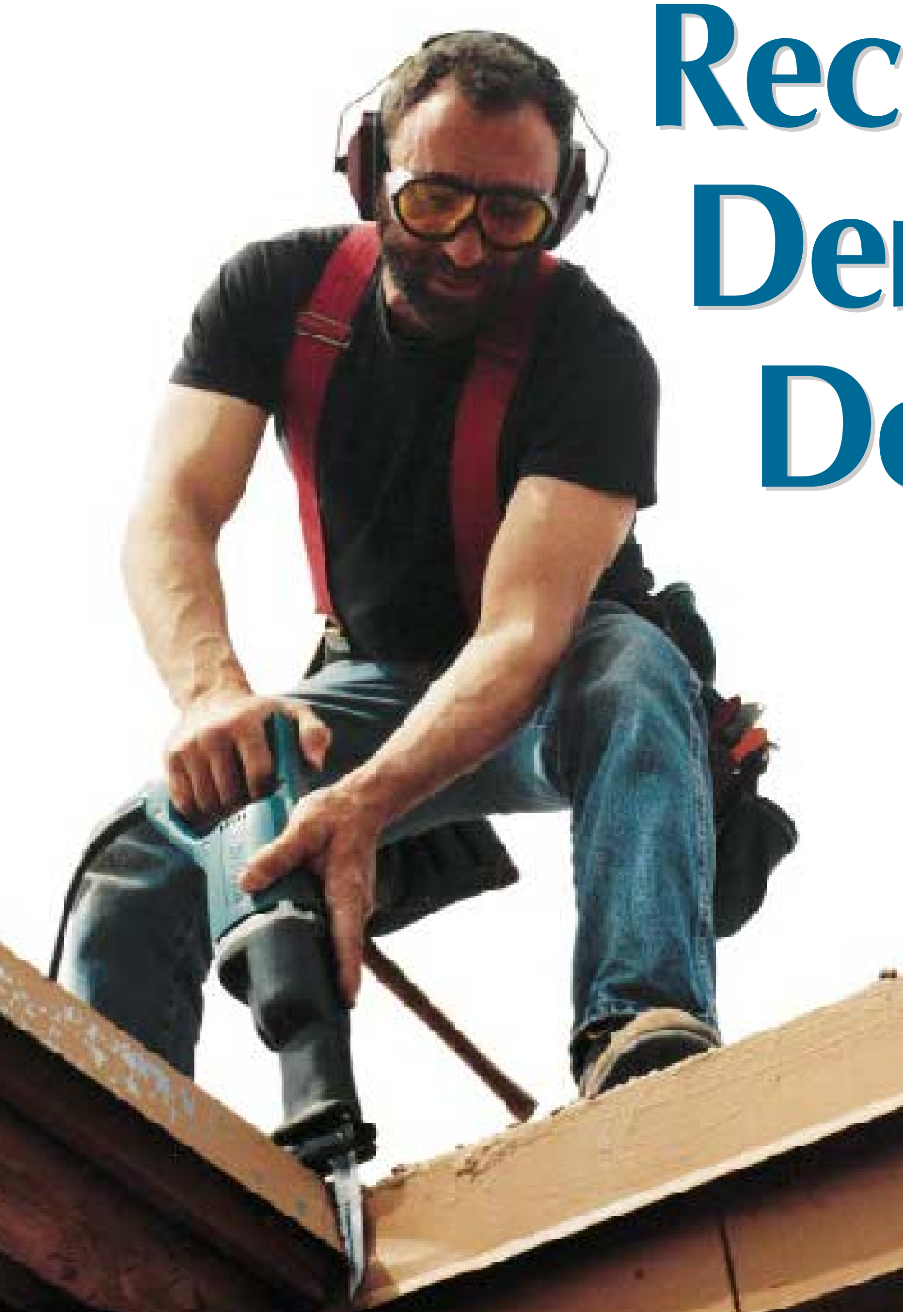
TOOL TEST:

Recip Blade Demolition Derby



New blades make for fast cuts in a variety of materials, but you should match the blade to the work

By *JLC* Staff

Reciprocating saws are indispensable for demolition work. They save time, and for some cuts they're the most practical power tool on the job site. Years ago, however, the usefulness of a recip saw was limited by the short service life and cutting capability of the blades. Most early blades were made of high-carbon steel, approximately .035-inch thick, hardened to about Rockwell 65. These inexpensive blades could perform general cutting tasks, but there was a tradeoff between flexibility and durability. Steel that could be sufficiently hardened to provide a good cutting edge lacked the tensile strength and flexibility that would allow it to hold up under severe use, like cutting nail-embedded wood. To improve performance, engineers were faced with the task of making a wear-resistant, shatterproof blade with a hard edge that would cut through a variety of materials.

Bimetal. Blade performance improved dramatically in the early 1970s with the introduction of bimetal blades. This new breed of blade has a high-alloy tool steel cutting edge welded to a strong, flexible spring-steel blade. The resulting bimetal strip is straightened, tempered, milled, and ground to produce the shape we recognize as a saw blade. The tool-steel teeth on a bimetal blade are designed to resist impact and abrasion, and are shaped specifically for their intended task. The tooth gullets extend past the alloy material into the spring steel, ensuring that the blade remains flexible throughout its width.

Demolition Blades

Although standard bimetal blades make quick, dependable cuts through a variety of materials, including nail-embedded wood, they're still only about .035-inch thick. While this makes the blades flexible, it also causes some problems. If these relatively thin blades extend too far out of the material being cut, the blade will tend to whip, leading to premature tooth wear and failure. Likewise, if the shoe of the saw isn't held firmly against the work, the blade may bend or break. And plunge cuts with these narrow, flexible blades can be an expensive and sometimes dangerous exercise in futility.

Heavier blades. The answer was a heavier bimetal blade designed for demolition. Demolition blades measure about .050 to .062 inch — more than 50% thicker than regular bimetal blades in some cases. This is about as thick as they can be and still fit into the collet of most saws (with some saws you may even need to scrape the paint off of the tang of the blade to get it to mount). Some demo blades are also wider by as much as 30%, resulting in greater overall strength.

Stronger teeth. Another advantage of the thicker demo blade is wider, stronger teeth. There are a variety of tooth designs, with teeth-per-inch (TPI) counts generally in the range of 3 TPI for fast cutting in clean wood, 6 TPI for fast rough-cutting in nail-embedded lumber, and 10 to 24 TPI for finer cuts, thinner materials, and metals.

Which tooth pattern you use depends on the material you are cutting. In addition, most companies now offer blades with "variable" tooth patterns, originally developed to reduce noise and vibration in bandsaw blades (see Figure 1). These blades are supposed to cut a wider variety of materials than a regular blade, reducing the number of blades you need to carry.

Demolition Blade Test Results

Manufacturer	Model	Price[1] per Blade	Size (in.)[2]	TPI	Number of Cuts[3]	Time of First Cut	Plunge Cut[4]
Nail Embedded Wood							
Bosch	S234XF	$4.88	6	progressive	6	0:19	G
DeWalt	4862	$4.61	6	6	14	0:28	#2
DeWalt	4845	$2.79	6	10-14	4	0:23	P
Lenox	606R	$2.88	6	6	34	0:16	G
Lenox	6066R	$5.69	6	6	2	0:35	#1
Lenox	650R	$3.65	6	10-14	1	0:27	F
Magna	90422	$4.50	6	10-14	5	0:23	F
Milwaukee	Ax5021	$2.20	6	5/8	23	0:22	#3
Nicholson	81115	$2.54	6	6	3	0:14	P
Nicholson	81117	$2.54	6	10	1	0:22	G
Starrett	B66	$2.55	6	6	21	0:21	P
Starrett	B6610	$2.55	6	6-10	11	0:16	P
Starrett	B61014	$2.55	6	10-14	11	0:17	P
Nasty Sandwich							
Bosch	S3456XF	$5.35	8	progressive	2	0:16	P
DeWalt	4863	$5.64	9	6	2	0:47	G
DeWalt	4865	$4.61	8	10-14	1	1:10	P
Lenox	966R	$7.51	9	6	3	0:22	#2
Lenox	960R	$7.51	9	10	1	1:18	G
Magna	90452	$4.01	8	progressive	7	0:36	G
Milwaukee	Ax5026	$2.80	9	5/8	1	1:08	F
Morse	RB96206	$5.00	9	6	3	0:24	#1
Morse	RB96210	$5.00	9	10	1	1:17	#3

1 Blades are typically sold in packs of 2, 3 or 5.

2 12-inch blades were not tested.

3 Last cut was judged to be the one that took 50% longer than the first cut. As a result some blades made additional cuts beyond the number shown.

4 Top three 6-inch and 9-inch blades are noted. Other ratings are: G=Good F=Fair P=Poor.

Test ranking:
1st
2nd
3rd

Test Criteria

With added thickness and more aggressive tooth designs, demo blades should last longer with less breakage, make predictable (and safer) plunge cuts, and perform dependably in hard use. But it's impossible to know how well a given blade will work just by looking at it. And even if a blade performs well at one job, it may be nearly useless at another.

Given the range of blade designs available, we decided to focus on those specifically intended for demolition. While we tried to standardize the tests for objective results, they were not intended to be scientific. To accurately compare these blades under controlled conditions (the way manufacturer R&D departments do) would require sophisticated equipment, engineers, metallurgists, and a tremendous amount of time.

Instead, we took a more practical approach. To help carpenters avoid having to settle for whatever blade happens to be in the saw box that day and muscle it through the cut, we decided to find out which blades work best for specific tasks. We subjected the blades to typical cutting tasks, then formed an opinion about each blade's performance under relatively standardized conditions.

We tested blades in three typical demolition tasks: cutting nail-embedded wood; cutting several layers of different materials, as when demolishing an asphalt roof over trusses or when cutting through a finish floor; and making plunge cuts through sheet materials. We also concocted a flex test to see how well demo blades cut without breaking or kinking when flexed. We used 6-inch blades for nail-embedded wood, 8- and 9-inch blades to cut composites, and both 6- and 9-inch blades for the plunge test; the flex test was done with 12-inchers.

We devised a test bench that used a hanging weight to put a steady 28 pounds of pressure on every blade (Figure 2). We mounted each blade in a Milwaukee Super-Sawzall that was U-bolted to a plywood scrap. A hinge restricted the saw to the same range of motion every time, and the cuts were made with the Sawzall locked at full speed.

Reading the results. The most important decision was how to judge when a blade had reached its limit. Speed is important, so every cut was timed, yet a blade that has slowed down but is still cutting well remains useful. To keep the comparison fair, we decided to declare a blade to have "failed" when it couldn't cut through the test material in 150% of the time it took for that blade to make the first cut. On the job site, it makes no sense to keep using a blade after that point, unless it's the last one you have.

As it turned out, each blade failed differently. Some would cut consistently right up to the point where they suddenly couldn't continue; others wore out gradually. And some blades just wouldn't quit, although they eventually started to burn their way through the material.

The test results are tabulated in the chart on previous page. What follows is a more detailed description for the three best performing blades in each test.

Nail-Embedded Wood

The first nail-cutting test we devised consisted of crosscutting a 2x6 with three 16-penny sinkers driven into the end grain. We soon discovered, how-

Figure 1. A "variable" tooth design (top two blades) alternates the size and number of teeth per inch across the length of the blade. With a "progressive" tooth pattern (bottom two blades), teeth grow in size from the shank to the tip. Designed to enable cuts in a wider variety of materials, the more aggressive tooth angle on these blades makes for faster cuts.

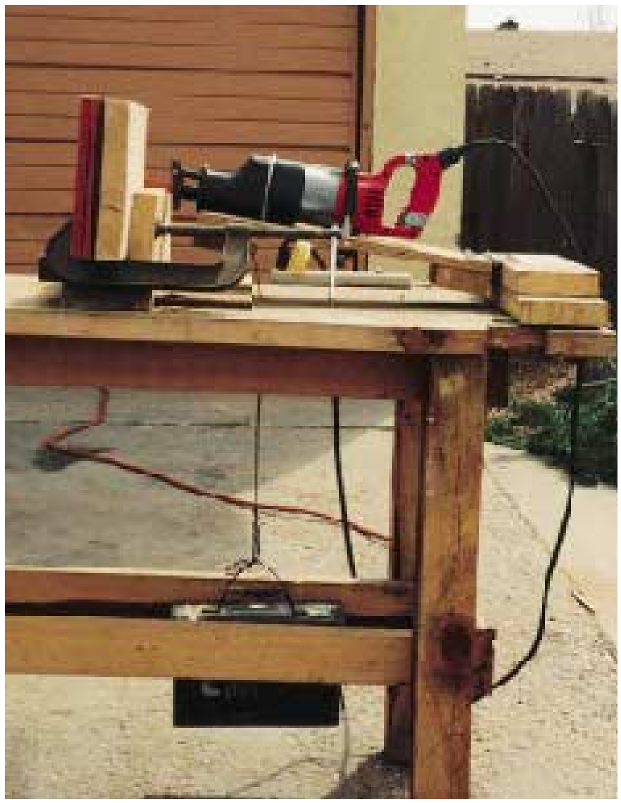


Figure 2. Blades were tested at high speed in a Milwaukee Super-Sawzall bolted to a hinged table that ensured a consistent range of motion. A hanging weight applied a consistent 28 pounds of pressure during each cut.

Lubricating Metal Cuts

Even the best blade designs need help when cutting metal. A blade will last longer if you keep it cool, and the best way to do this is to maintain a slow blade speed and use a lubricant. Commercially available cutting fluids work well, but they can be messy and they don't always find their way onto the job site. Lenox offers a biodegradable, water-soluble, nontoxic tool lubricant that's supposed to decrease cutting time by up to 50% while increasing the life of the blade. For the less environmentally concerned, motor oil also works, as does air-tool oil. (If you use either of these, be careful not to splash oil on finished surfaces or surfaces that will be finished, and don't breathe the fumes.) In a pinch, dish soap and water works better than nothing.

ever, that what we had thought was a tough cutting job wasn't going to wear out the best of these blades very quickly. Several blades cut this material relentlessly, with no sign of wearing out or even slowing down. At that rate, the tests would take forever.

What we ended up using was 4x6 Douglas fir cull lumber with six 30-penny spikes driven into the end grain (Figure 3). Some of the blades might have done better with less steel in their way, but those that did well did really well – they're that good. Here's how the top three blades performed in the nail-embedded test (Figure 4).

Figure 3. Scraps accumulated rapidly (above) as each blade made multiple cuts through a variety of test materials. Nail-cutting tests were made on Douglas fir 4x6s embedded with six 30-penny nails (right).

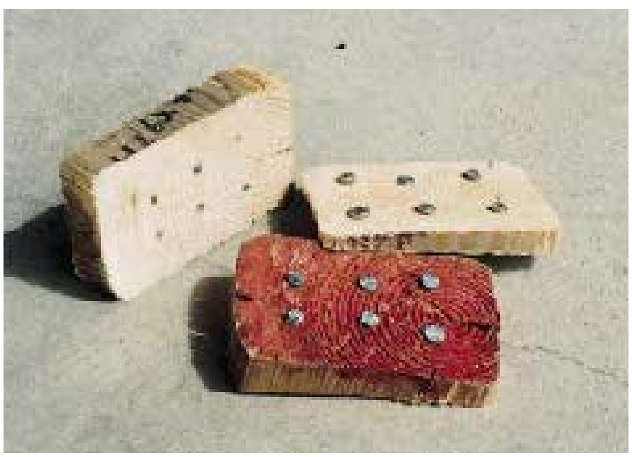


Figure 4. The top-performing nail-cutting blades were the Lenox 606R, which reached the test limits after 35 cuts but never actually wore out; the Milwaukee Ax 5021, which cut accurately without bending; and the Starrett B66, which never slowed down through 22 cuts but was very flexible and ultimately snapped.

Lenox 606R. Even in good company, the Lenox 606R is impressive. Although it seems a little thin (.035 inch) for a demolition blade, no other blade even came close. Making its first cut in 16 seconds and its fifteenth cut in 18 seconds, it performed well right up to the thirty-fifth cut, when it finally took 50% longer than the first cut. Even then, the teeth still felt sharp to the touch and it still cut through the test material easily, if more slowly. At one point, this blade pulled the nail-embedded wood right out of the bench clamps at full speed. The blade turned several shades of blue and was severely flexed, but it didn't stay bent.

I don't know how long this blade would have kept cutting — I never did wear it out.

Milwaukee Ax5021. At 23 cuts before failure, this is one stout blade. The Milwaukee Ax5021 gains additional strength from a maximum-thickness 1-inch-wide blade. While it wasn't as fast as the thinner blades, it was more accurate, cutting straight and true without a hint of bending or flexing.

Starrett B66. The shank on the Starrett B66 broke at the twenty-second cut. Up to that point, the blade never even slowed down: All 21 cuts were timed at about 21 seconds. This blade was so flexible, however, that even when restrained by the test stand, it took an unpredictable path through the wood. As a result, the blade often deflected excessively under load, which I suspect was the cause of the break. It appears that this blade would perform very well if you could avoid deflection.

The Nasty Sandwich

Most carpenters know how tough roof demolition is on blades. We decided to make it even worse by making up a 2x10 test piece with truss plates hammered into one side, five 16-penny nails driven into the end grain, two layers of fiberglass-reinforced asphalt shingles, and two layers of 1/2-inch OSB. We dubbed this the "Nasty Sandwich," and it gave a few of the blades a bad case of indigestion (Figure 5). Several other blades did about what you'd expect, making one cut fairly well, and as many as three more cuts prior to failure. But the top performer in this test just tore it up (Figure 6).

Magna 90452. This progressive-tooth all-purpose blade chewed through the Nasty Sandwich like it was a tofu burger. Until we tried this blade, we wondered if the test should be easier, since some blades couldn't make a second cut. The Magna made seven consistent cuts before slowing down. To make sure it wasn't a fluke, we tried the test two more times — with the same results.

Lenox 966R and Morse RB96296. These two blades tied for second place. Each made three straight, true cuts, with nearly identical times overall.

Bosch S3456XF. Although identical to the Magna except for the paint, the Bosch blade did not hold up nearly as well. It made the fastest first cut — 16 seconds — but it "failed" with a second cut of 35 seconds; two subsequent cuts took 44 and 60 seconds, respectively. However, we decided to let it run these two extra cuts since it was still doing better on its third cut than many blades were doing on their first.

Take the Plunge

Making a plunge cut with a reciprocating saw is just plain irritating. Standard bimetal blades often whip around and beat up everything in the vicinity, ultimately bending or breaking before cutting into the work. Carpenters who give up in frustration and whack a starter hole with the rip claw of their framing hammer still get a wavy, irregular cut with what's left of the smoking blade.

It turns out some demo blades don't do much better: They still jumped around, made a lot of noise, and did nothing useful (remind you of anyone on your site?). Others did marginally better than standard blades. But a few provided sure, smooth, exact cuts through 1/2-inch OSB screwed to joists on 16-inch centers.

We tried every blade at least six times at various speeds to give each blade the best chance of success. As expected, shorter blades performed better than longer blades of the same brand and style, an important point to remember when attempting plunge cuts. Occasionally, however, a good 8- or 9-inch blade could make the plunge cut better than some of the more flexible 6-inchers (Figure 7).

The top three 6-inch blades were the Lenox 6066R Demolition, the DeWalt 4862 Demolition, and the Milwaukee 5021 Ax. Of the 9-inchers, the Morse RB96206, Lenox 966R, and Morse RB96210 finished one, two, and three.

Get Bent

A common task for a reciprocating saw involves cutting nail-embedded wood in circumstances where the blade

Figure 5. To simulate heavy roof demolition, blades had to cut through the "Nasty Sandwich" — two asphalt shingles sandwiched between two layers of 1/2-inch OSB, a truss plate, and a 2x10 with five 16-penny nails driven into the end grain.

Figure 6. The progressive-tooth all-purpose Magna 90452 blade ate the Nasty Sandwich for lunch, making seven cuts without slowing down. The Lenox 966R and Morse RB96296 each made three cuts. Although the Bosch S3456XF made just one quick cut before slowing significantly, it performed better on its third cut than many blades did on their first.

Figure 7. In general, it's easier to make a plunge cut with a short blade than a long one. Despite their added thickness, most of the demolition blades still jumped around too much to be useful, but these six blades made smooth, accurate cuts.

Figure 8. The flex test was designed to simulate making a cut parallel to the grain through nails with the blade slightly bent, a common situation during site demolition. All of the demo blades performed poorly, although the Nicholson 81139 and the Milwaukee Ax 5027 made the most progress, albeit slowly and for a short distance.

can't contact the work without some deflection. Often this involves change orders ("I wanted this wall to be over there") or unforeseen conditions ("No ma'am, I didn't think the termites would eat that far, either"). What you need for this kind of job is a blade that can be bent fairly far, cut cleanly without overheating or breaking, and still be useful for more than one cut.

For the test, we generously nailed a 2x6 plate to an OSB deck with 16-penny nails and tried to cut it loose (Figure 8). If you were faced with this on the job, you'd probably reach for your cat's paw. But the idea here was to simulate tight conditions where you're cutting with the grain of the framing lumber, possibly against dissimilar materials, and hitting nails that you can't reach to pull.

The 9-inch blades we tried first were either too stiff, taking deep cuts out of the plate and OSB, or too flexible, so they jumped around and were hard to control. So we decided to test only 12-inchers.

While there is no fair way to quantify these test results, I would say that all of the blades performed poorly, even those designed for metal cutting. The best performers were the Nicholson 81139 and the Milwaukee Ax 5027, but even those two blades only made slow progress for a short distance before they wouldn't cut any more. This is one place where manufacturers could do more research and development.

Mix and Match

Demo blades are not cheap. If you ask an expensive blade to do something it's not suited for, you're wasting time and money. You might also be risking personal injury. On the basis of what we saw in this evaluation, no one blade could perform well at all of the demolition tasks you might ask of it in the course of a typical day. Most carpenters already keep a variety of blades in the saw box. If your work includes a lot of demolition, consider carrying several types of demolition blades. The difference between them makes it well worth the trouble. If you want to stock just one type of demolition blade, match the blade to the kind of work you expect to do most often.

Sources of Supply

Bosch
S-B Power Tools
4300 West Peterson Ave
Chicago, IL 60646
877/267-2499
www.boschtools.com

DeWalt
DeWalt Industrial Tool
P.O. Box 158
Hampstead, MD 21074
800/433-9258
www.dewalt.com

Lenox
American Saw & Manufacturing
P.O. Box 504
East Longmeadow, MA 01028
800/628-3030
www.lenoxsaw.com

Magna
Magna Industrial Tool Co.
National City Tower, Suite 2300
101 S. 5th St.
Louisville, KY 40202
800/624-9044

Milwaukee
Milwaukee Electric Tool Corporation
13135 West Lisbon Road
Brookfield, WI 53005-2550
414/781-3600
www.mil-electric-tool.com

Morse
M. K. Morse Company
P.O. Box 8677
Canton, OH 44711
800/733-3377
www.mkmorse.com

Nicholson
Cooper Tools
P.O. Box 30100
Raleigh, NC 27622
919/783-2013
www.coopertools.com

Starrett
L. S. Starrett Company
121 Crescent Street
Athol, MA 01331
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www.lsstarrett.com