



Auckland University's Ken Birch conducting the tests.

Oscillating multitools

Independent university test of popular brands

by *Jude Woodside*

Since 2009 there has been an explosion of oscillating multitools on the market. The tool is not actually new. The German tool company Fein first launched the oscillating tool in 1968. It has been a winner for them for some time and found favour in many specialised areas and among certain trades. Perhaps due to the fact that Fein

had the monopoly on the tool, it didn't become an overnight hit. The tool was quite expensive and the accessories were also very pricey. But it was the only tool of its kind and nothing else could do what it did. In 2009, the patent expired and by the end of that year Bosch had a copy in production.





The Bosch PMF180E was a 180 Watt version designed as a DIY tool. It was an instant hit. Suddenly there was a tool that could cut timber without dangerous saw blades. It could cut openings into skirting and floorboards without any fuss, cut out grout from tiles, lift lino and do a host of other tasks that hitherto had meant expense or had taken many tools to accomplish and it was priced around \$100.

The original Bosch PMF180E was intended as a home handyman tool but the demand was such that it took another two years before Bosch would launch their 250 watt version intended for trade use. In that time a host of copy versions had proliferated. Here Dremel,



Milwaukee and Bosch have cordless models and Bosch, Smart Tools and several cheaper home brands have corded versions. Makita is the latest entrant with both cordless and corded. Fein was not idle either and have just launched a 14.4V lithium-ion cordless model. There are as many cordless models as corded.

taking small but rapid bites. The small area of action relatively means the tool can be more precise and needs only the smallest kerf so the cuts are very accurate.

The oscillating action means that the tool cannot cut skin effectively which is one reason they are used in hospitals to cut off plaster casts. But they can plunge-cut into hardened floorboards equally well. A multitool doesn't cut as fast as a circular saw but it will cut very neatly and precisely where you want to cut. An oscillating cutter can cut clean, square holes directly into a surface with no pilot hole. No other tool can do that.

The battle of the oscillating tools has just begun. We thought it would be a good time to have a close look at these tools to see how they stack up against each other.



Oscillating

The secret to the tool is the fact it doesn't rotate; it oscillates back and forth in a very small (2.8°-3.2°) arc. The small teeth on the hardened steel blades can cut quite effectively,

Tools, accessories

For the purposes of this test we assembled some of the most common tools. We were fortunate that Makita were just about to release their first multitool the TM3000C and Bosch are about to release a 300 watt successor to their GOP 250 tool. To these we added the Fein FMM250Q, the SMART SMT 250P and the Renovator Deluxe from





Bosch GOP 300 New lever action clamping system.

Brand Developers Ltd as sold through the Warehouse.

Given their multiplicity of uses they nearly all come with a system of blades and attachments. The basic kit supplied with the machines all feature at least one or two bimetal blades capable of cutting

wood or metal (usually non-ferrous metal, thin sheet steel or nails) a delta sanding pad and some pre-cut sheets. Some kits are more extensive, notably Fein, Smart Tools and Renovator.

Of them all, Fein is undoubtedly the best assortment including two delta sanding

pads and a large circular oscillating sanding pad together with six packets of five pieces each of sanding paper in a variety of grits and a custom moulding sanding kit.

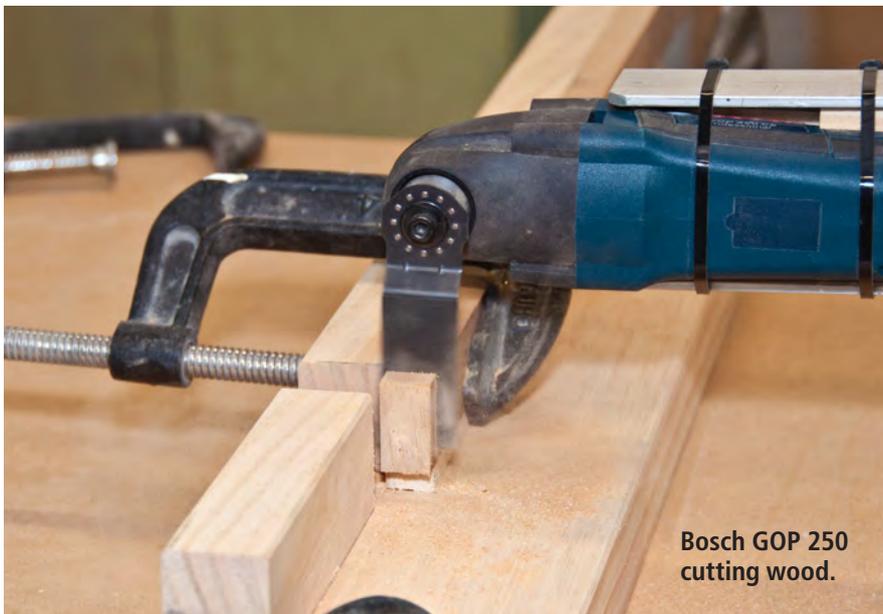
Of course the offerings will vary with the type of kit. In this case the Fein kit is their Top Plus kit, effectively the top of the range and the SMART system is their trade kit, a midrange kit. The SMART trade kit doesn't normally have the sanding pad but they supplied one for this test. Most of the others are supplied as standard kits. The Fein and SMART kits also come in basic kits, which vary little from the other offerings.

All the tools come supplied with plastic cases. Bosch and Makita are surprisingly similar and adequate for their job, with room for the tool and the box of attachments. The SMART and the Fein cases are the most comprehensive with room in both for the machine fittings and several additional spaces for vacuum attachments and additional fittings. The Renovator case contains only the machine and its vacuum attachment. The blades are housed separately.

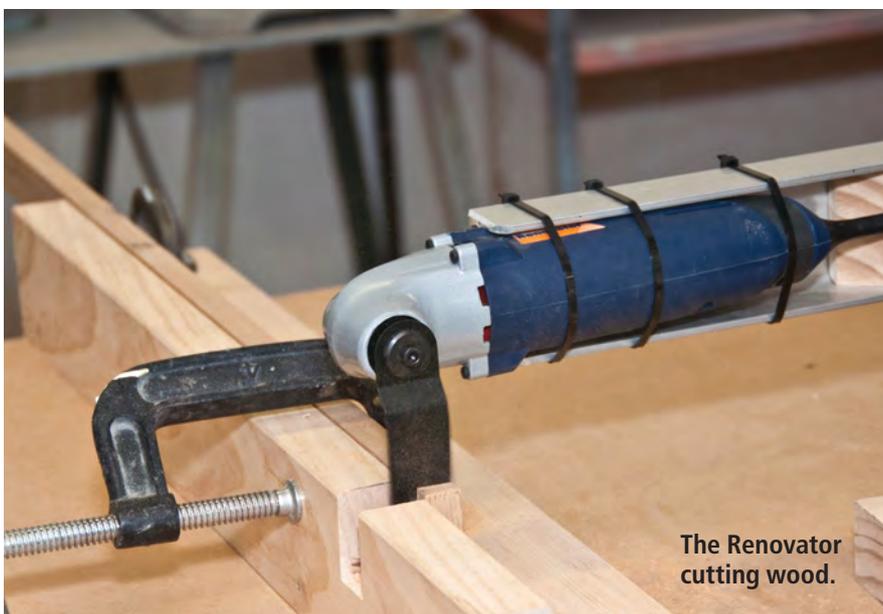
The Fein box has two cases for fittings and extras, especially vacuum attachments, and an additional space for the aforementioned moulding sander. The Fein case is clearly the best designed in ABS plastic with a lot of attention to making the design compact and efficient. The handle folds out of the way to make stacking easier.

All the tools weigh about the same, around 1.4-1.5 kg, and they have more or less similar circumferences, making them reasonably comfortable to hold for the average-sized hand.

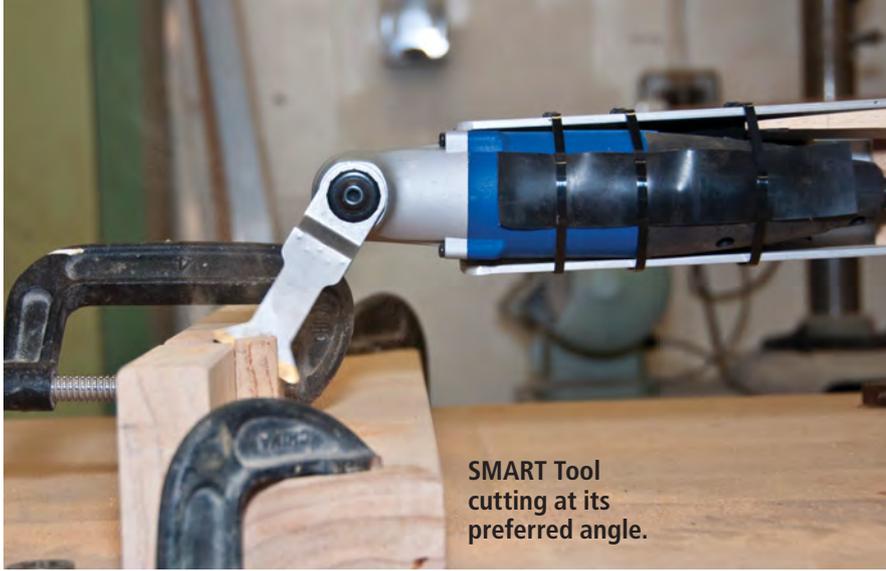
The Fein and Bosch each have a four-metre-long lead. The Fein lead is



Bosch GOP 250 cutting wood.



The Renovator cutting wood.



SMART Tool cutting at its preferred angle.

considerably more pliable and less likely to twist. Makita have the longest lead in the test at 4.9 metres and the SMART and Renovator have leads of 2.1 metres each. The Bosch lead is attached to the machine with a ball joint allowing it to move easily, eliminating twist.

Tests

So what should you be looking for in a good oscillating multitool? It's a handheld tool that, in the case of using it for a detail sander, is likely to be held for a long time. In that case, excessive

vibration can be a disadvantage. Similarly noise is a factor. These aren't the sorts of tools that you would expect to have to use ear protection for. In general in New Zealand, the acceptable background noise for a workplace is 85 dB. Short period noise up to 92 dB is acceptable, too, but above that ear protection should be used.

Noise

We measured the tools at a distance of one metre while they ran without load. Sound is measured in decibels based on

Tool Test

a logarithmic scale where a 3 dB change represents a doubling in sound intensity. The Renovator was clearly the loudest at 88.7 dB. The next loudest was the Fein at 86.2 db. Makita at 74.9 decibels was clearly the quietest in the test. None of the machines was likely to cause ear injury in continuous use. The pitch of the Renovator was noticeably higher than any of the other machines and at 88.7 dB it is at level where earmuffs would be advisable.

Vibration

The vibration levels in all the machines were not excessive, even under load.

Cutting

The real test is in the cutting ability of the machines and that is to some extent determined by the quality of the blades supplied. All the machines have a similar weight and most manuals say to let the tool do the work.

We set up a jig to allow the tools to do just that. The tools were attached firmly to an arm that allowed the machines'



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Fein test.

weight to drive the blade. The tools were set to cut into a piece of 40 x 25 mm rimu, clamped in a jig. The blades were timed from the start of the cut to the finish. We timed at least three attempts each and averaged the results.

Some blades tended to wander in the cut and in those cases the blade was straightened and the test restarted. In one tool, the SMART, we found we couldn't attach the blades at right angles without using the adaptor provided. The hexagonal fitting permits the blade only to be fitted at 60 degree increments.

Blades

One curious outcome of the blade testing was finding that the bimetal blades in most cases cut the wood faster than the specific wood blade. In most cases the wood blades had slightly coarser teeth.

The winner here was the Bosch GOP 250 which took, on average, only 2.9 seconds with a bi-metal blade. Curiously, it took nearly twice as long (4.75 seconds) with a blade intended for wood but that was also the best in its class, bettered only by the Bosch GOP 300. Curiously, here the Bosch GOP 300 managed to cut faster with the wood blades than the bimetal, using the same blades as the Bosch GOP 250.

We did not have a wood blade for the Makita kit so we have only the bimetal blade result for that test. Similarly we had some problems with the mounting of the SMART blades. The wood blade worked well with the adaptor in place which allowed the blade to be positioned at 90°. But we could not make the bimetal blade cut when it was similarly attached, so we resorted to using the

blade without the adaptor and set it up to cut at its preferred 60° angle.

The clear winner in the wood cut event was the Bosch, which excelled with both a wood blade and the bimetal. The Fein was consistent but again proved the point

that its wood blades were a good second slower than the bimetal blade in speed.

Nail cuts

Another common use for these tools is in cutting nails to release a window or door



Nail test.

Fein nail test.



frame. Builders often use reciprocating tools for this job but multi-cutters can do it without damaging the timber of the door or window surround. That's what the bimetal blade is designed for, to be able to cut through timber with nails. In the nail test we measured the time the tool took to cut through ten 90 mm x 2.5 mm nails typically used in framing.

Winner



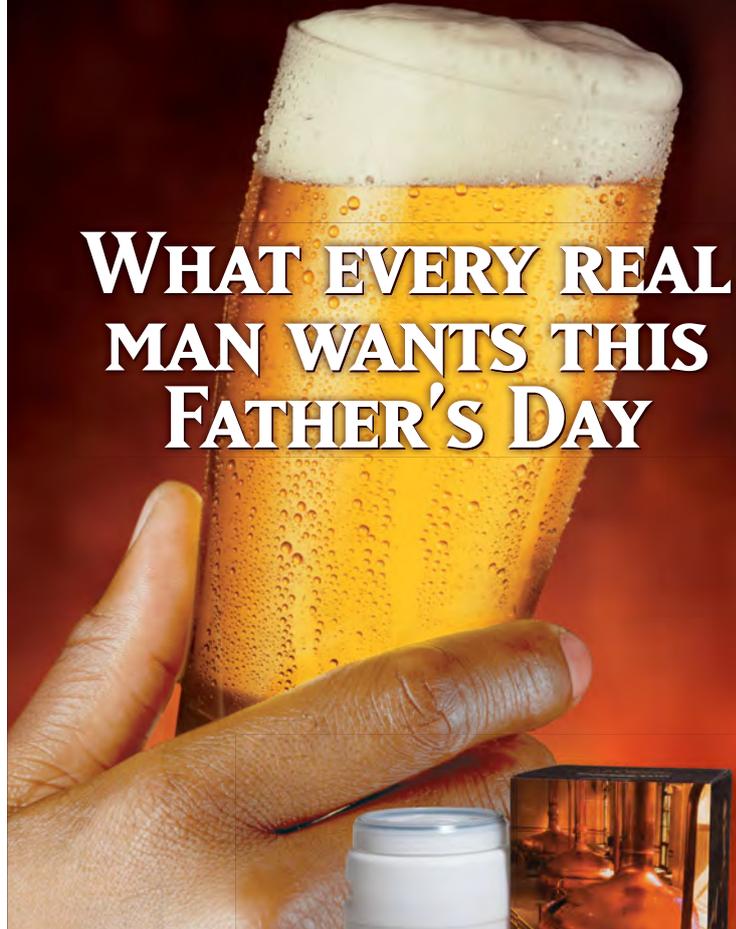
Clearly the standout machine was the Bosch GOP 250. It excelled at every test by a wide margin. The Makita is close behind in second place with the Bosch GOP 300 third overall. The SMART didn't perform to expectations in the cutting tests. We tried this test several times, resetting the blade but with very similar results. It appeared to work reasonably well when hand-held to cut timber but it was also twice as slow at cutting nails as the Makita. Nevertheless, it outperformed the Renovator. Fein is still a contender in performance and quality and with the comprehensive kit they supply; although this tool is expensive it is still good value for the money. The SMART system doesn't have the same performance of either the Bosch or the Fein system but it is still a reasonable tool for the price. We expected at the start of the test that we should see little difference in the tools and that the blades would be the deciding factor and, by and large, this is the case.



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MODEL	BOSCH GOP250CE	MAKITA TM3000C	BOSCH GOP300SCE
	 OVERALL BEST PERFORMANCE	 RUNNER-UP	
Power	250 W	320W	300W
Oscillation amplitude	2.8°	3.2°	2.8°
No Load Speed	8,000 - 20,000	6,000 - 20,000	8,000 - 20,000
Weight	1.5kg	1.4kg	1.7kg
Fittings	28mm Bimetal	28mm bimetal	28mm Bimetal
	85mm Bimetal	85mm HSS	85mm Bimetal
	28mm wood*		28mm wood*
	Delta sanding pad	Delta sanding pad	
	4x sanding sheets		
Blade adapter	yes	yes	yes
Tool mount	Hex screw	Hex screw	Clamp
Warranty	1Yr	1yr	1yr
Price RRP	\$299	\$320	\$599
Noise	75.8dB	74.9dB	84.5dB
Cut wood blade (avg)secs	4.76 secs	n/c	3.5 secs
Bi metal (avg)secs	2.9 secs	3.43 secs	4.55 secs
Nail cut (avg)	12.05 sec	15.77 sec	15.98 sec
Temp	31°	33°	29°
Combined Cut Tests (secs)	7.66	n/a	8.05
	*Blade not included in basic kit		*Blade not included in basic kit

	FEIN FMM250Q  	SMART SMT250P 	THE RENOVATOR 
	250 W	250 W	250W
	3.2°	3.2°	2.8°
	11,000 - 20,000/min	11,000 - 20,000/min	15000 - 21000/min
	1.42	1.4kg	1.5
		Trade Kit	
	44mm Bimetal blade (offset)	44mm Bimetal blade	32mm E cut wood/metal
	80mm HSS seg saw	75mm HSS saw	32mm E cut wood
	65mm standard set teethwood	32mm Long reach wood	32mm E cut wood
	30mm HSS straight	32mm fine finish wood	10mm Ecut metal
	52mm rigid scraper	63mm fine finish wood	10mm ecut wood
	63mm Carbide segment saw		20mm e cut wood
	Delta carbide rasp		semi circ 80mm wood/metal
	115mm sanding pad		92mm semi circ tile diamond grout
	Delta sanding pad unperforated		66mm grout remover
	Delta sanding pad perforated		50mm rigid scraper
	6 pkt of 5 sanding sheets		delta rasp
	dust extraction kit		8 pkts of 3 sanding sheets
	detail sanding kit		Delta sanding pad perforated
	no	yes	no
	QuickIN Clamp	Hex screw	Hex screw
	3yrs	1yr	2yrs (trade exclusion)
	Kit \$699	Kit \$449	Kit \$239
	86.2dB	78.7dB	88.7dB
	5.28 secs	15.18 secs	7.53 secs
	5.96 secs	11.6 secs	22.8 secs
	31 sec	34 sec	dnf 9 @ 41sec
	33°	38°	44°
	11.24	26.78	30.33



Sanding test.

We don't recommend trying to cut hardened nails such as those used in gas-fired framing guns.

This is a severe test of any blade but at the price of these blades we reason that they should be able to cut at least ten nails. One would reasonably expect a \$30 blade to cut even more.

This test was run with the technician holding the machine. It wasn't possible to create a jig as we had done for the wood blades. It's necessary to move the blade from side to side to cut successfully.

One blade didn't actually manage to cut ten nails—in fact, the Renovator blade was all but finished at six nails and struggled on to take 41 seconds to cut nine nails. Again the Bosch GOP 250 set the pace, powering through ten nails in just 12.05 seconds. Both the Makita and the Bosch GOP 300 took around 15 seconds and the Fein and SMART machines came in at 31 and 34 seconds respectively.

Sanding

For the final test we took a look at the sanding abilities of the machine. There is no objective test that we can apply here but we ran each machine for 15 minutes, sanding a piece of plywood that had been sprayed with three coats of lacquer. Each machine was set up with its sanding pad and 80 grit paper.

The Fein, SMART and Renovator have smaller pads (45 mm) than the Bosch and Makita (52 mm). Both SMART and Fein had the edge on the Renovator for sanding. The Renovator pad did not grip

the paper as securely as others and it appeared to be softer and more spongy. It was less effective at material removal, too. The Renovator pad clearly showed some distortion after use. This was



Measuring the temperature of tools after sanding test.



especially concerning since it was used for only 15 minutes. There was no discernible difference in the sanding abilities of the Bosch or Makita compared to those of the SMART or Fein. All of them removed material at a slower rate compared to a purpose-built detail sander. The larger 55 mm random



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orbit circular pad on the Fein sanded best of all.

Heat

We also took the opportunity to test the temperature of the tools at the end of the sanding test. We measured the temperature at the gearbox in the head of the tools, reasoning that this is where the work is done. Once again the Renovator scored worst here with a temperature of 44 °C. The SMART tool also warmed up at 38°. The Bosch GOP 250 reached a very modest 31° while the Fein and Makita recorded little more at 33° each. Unsurprisingly, the more powerful Bosch GOP 300 was the coolest at 29°. To be fair the Renovator is not marketed as a trade tool.

Accessories

Fein have definitely got the most comprehensive system of accessories available with several specialised tools. In particular, their detail sanding kit is very impressive but SMART Tools have a very comprehensive range, too. The Renovator also supplies a comprehensive selection of blades, but sadly they don't seem to deliver on

quality. While we didn't test all these blades, those we did test, which should have been the best performers, did a poor job overall.

The Fein kit includes vacuum extraction, profile sanding kit and the range of tools. Fein include 84 accessories with their tool including 14 blades and sanding pads, and at an average retail price of \$30 each that's over \$420 worth of accessories. The Renovator claims to have 37 accessories. Both count each piece of sanding paper.

Only two kits provided vacuum dust extraction—Fein and Renovator. We didn't test either but the inclusion is a worthwhile option if you plan to do much detail sanding.

Interconnection

Bosch has recently developed the Oscillating System Interface (OIS) as a universal standard for multitool blades, allowing interconnection across brands. The standard

features 12 points of connection to enable a firm grip on any connection system.

This has already been adopted by a number of manufacturers and most recently by Makita on the machine we tested here. Bosch expects this to be as widely adopted as was their SDS system for connecting bits in impact drivers and hammer drills.

Adaptor

Most machines have an adaptor, which will permit other brands of blades to be used. Fein is an exception as they have a proprietary system which will not accept other blades except those that have been manufactured deliberately to fit them (although it is possible to get an adaptor to fit other blades). The SMART tool system blades will fit a Fein. ◉



Disclaimer

The independent testing was carried out by Auckland University UniServices. We should make clear that this is not a test conducted under rigorous scientific conditions. We have attempted to show the tool in use in conditions that were ostensibly the same for each machine with little human input. We would stress that, in normal use, the operator has the ability to move the blade and apply pressure. We don't claim that our test is a definitive measure of the ability of the tool to cut—it is only a comparison under identical conditions.

Overall Best Performance:
Bosch GOP250

Runner-up: Makita TM3000C

Best Kit: Fein Top Plus